

II.

GROWING INNOVATION

AMERICA'S ENERGY





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February 2009

For the U.S. ethanol industry, 2008 ushered in a year of historic production to meet record demand as the industry continued to grow to meet America's energy needs.

The industry can be proud of the milestones reached in 2008, including record production of 9 billion gallons, implementation of a new Renewable Fuels Standard (RFS), record exports of distillers grains to feed the world's livestock, building new infrastructure, moving to higher blends, and last, but perhaps most importantly, technological innovations to improve both starch and cellulose-based ethanol production.

It will take time to yield returns on these investments. This past year presented unique challenges and economic difficulty, as producers faced record input costs, lower ethanol values and the evaporation of credit in the market. But the industry will emerge stronger than ever.

2009 promises to be another exciting year. The RFS calls for blending 11.1 billion gallons of ethanol and other biofuels in the U.S. motor fuels market. To ensure that America's renewable fuels industry continues to grow and evolve, the market for ethanol and other biofuels must expand. It is critical that the arbitrary limit on ethanol blending – today capped at 10% of each gallon of gasoline – be removed to allow gasoline blenders and refiners to take full advantage of the benefits of ethanol blending. Increasing ethanol content reduces foreign oil consumption and our rising trade deficit, and ensures a market will exist for the next generation of ethanol produced from cellulose.

We will continue to challenge ourselves to reduce our carbon footprint. More efficiently using our natural resources is at the core of this nation's efforts to secure a more sustainable energy future. America's ethanol producers are at the forefront of that effort, developing the technologies that are constantly improving its green footprint.

The U.S. ethanol industry remains strong and steadfast in its resolve to provide domestically produced renewable fuels because America's energy future starts at home.

Sincerely,

Bob Dinneen, President & CEO

GROWING TO MEET AMERICA'S ENERGY NEEDS

There can be little doubt that 2008 will be a year America's ethanol industry will not soon forget. In the face of manufactured baseless attacks, record corn prices, undervalued ethanol, and an economic crisis many say will rival the Great Depression, America's ethanol producers continued to provide America with a homegrown answer to its dependence on foreign oil.

U.S. ETHANOL BIOREFINERY LOCATIONS



Biorefineries under construction (20) Source: Renewable Fuels Association, January 2009 In just the past year, America's annual operating capacity increased by 2.7 billion gallons, a 34% increase over 2007. This growth in production capacity was fueled by completion, start-up, and operation of 31 new ethanol biorefineries and will ensure America's ethanol producers are capable of filling the federal requirements for ethanol use outlined in the Renewable Fuels Standard (RFS).

In addition, ethanol production has continued to expand geographically, with ethanol biorefineries now operating in 26 states, bringing economic opportunity to tens of thousands of Americans, many of whom live in rural areas. Dozens more biorefineries are in the planning stages, including a number of next generation facilities that will not only expand the reach of traditional ethanol production and use, but will broaden the array of feedstocks from which ethanol is produced.

As a result of this kind of growth and innovation, America's ethanol industry produced a record 9 billion gallons of ethanol in 2008 and is poised to produce well in excess of 10 billion gallons in 2009, representing nearly 9% of America's gasoline supply.

RECENT ETHANOL INDUSTRY EXPANSIONS

	Jan 2000	Jan 2001	Jan 2002	Jan 2003	Jan 2004	Jan 2005	Jan 2006	Jan 2007	Jan 2008	Jan 2009
Biorefineries Online	54	56	61	68	72	81	95	110	139	170*
Capacity (mgy)	1,748.7	1,921.9	2,347.3	2,706.8	3,100.8	3,643.7	4,336.4	5,493.4	7,888.4	10,569.4

* This figure represents operating ethanol biorefineries as of January 2009. It does not include those facilities that have been temporarily idled. For a complete list visit www.ethanolRFA.org.

AN INDUSTRY EVOLVING

The perfect storm of events in 2008, while temporarily disruptive, is going to lead to a new and more robust American ethanol industry in 2009 and beyond. The challenges faced and currently being addressed by this industry will make it stronger and more successful far into the future.

Improved efficiencies at existing biorefineries, new process technologies, commercialization of cellulosic conversion technologies, and yes, even some industry consolidation, will provide a platform from which this industry can launch and expand into a new, sustainable, and renewablyfueled era in American history.



*0006

9000

8500

8000

7500

7000

6500

6000

5500

5000

4500

6500

4900

3900

U.S. ETHANOL PRODUCTION CAPACITY BY STATE

In Millions of Gallons

	Nameplate	Operating	Under Con- struction/ Expansion	Total
lowa	3,076.0	2,856.0	690	3,766.0
Nebraska	1,444.0	1,164.0	319	1,763.0
Illinois	1,190.0	1,190.0	293	1,483.0
Minnesota	1,081.6	837.6	50	1,131.6
South Dakota	1,016.0	799.0	33	1,049.0
Indiana	899.0	697.0	88	987.0
Ohio	470.0	246.0	65	535.0
Kansas	491.5	436.5	20	511.5
Wisconsin	498.0	498.0		498.0
Texas	250.0	140.0	115	365.0
North Dakota	353.0	233.0		353.0
Tennessee	267.0	267.0	38	305.0
Michigan	265.0	215.0	5	270.0
Missouri	261.0	261.0		261.0
California	136.5	96.5	105	241.5
New York	164.0	50.0		164.0
Oregon	148.0	148.0		148.0
Colorado	125.0	125.0		125.0
Georgia	100.4	100.4	20	120.4
Pennsylvania			110	110.0
North Carolina			60	60.0
Arizona	55.0	55.0		55.0
Washington			55	55.0
Idaho	54.0	54.0		54.0
Mississippi	54.0	54.0		54.0
Kentucky	38.4	38.4		38.4
New Mexico	30.0			30.0
Wyoming	6.5	6.5		6.5
Louisiana	1.5	1.5		1.5
Total	12,475.4	10,569.4	2,066	14,541.4

Source: Renewable Fuels Association, January 2009

BUILDING FOR THE FUTURE

America's ethanol producers have answered the challenge put forth in the Renewable Fuels Standard (RFS) and are producing enough domestic ethanol to fill the requirements. In so doing, this industry has recognized new opportunities to expand the use of ethanol and ensure the success of the RFS in the years to come.



E85 REFUELING LOCATIONS BY STATE

Source: Alternative Fuels & Advanced Vehicles Data Center (AFDC), National Ethanol Vehicle Coalition (NEVC), Renewable Fuels Association

BREAKING THROUGH THE BLEND WALL

American ethanol production is quickly careening toward the blend wall – that moment when ethanol production and use is equal to 10% of the nation's gasoline supply. Without a change in federal standards, that level of ethanol use will undermine the goals of the RFS and become an unwarranted cap on the growth of this industry and the development of next generation technologies.

In 1979, the federal government determined that the appropriate blend of ethanol in gasoline for use in every vehicle on the road was 10%, commonly referred to as E10. Following this guideline,

> automakers extended warranty coverage for the use of E10 in all their vehicles. That made sense at the time because ethanol was little more than a grain of sand on the beach of American gasoline consumption. Today, such an arbitrary limit no longer makes sense.

In order to tear down the blend wall and ensure the success of the RFS, comprehensive research and sound scientific data must be at the core of this industry's efforts to achieve higher level ethanol blending. By working with automakers, the federal government, and other stakeholders, that research can be done and the federal cap on ethanol use can be changed. Whether it is 13, 15 or 20%, increasing the volume of ethanol blended into each gallon of gasoline is critical to the future of America's ethanol industry.

NEW RENEWABLE FUELS STANDARD SCHEDULE (Billion Gallons Per Year)

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Renewable Biofuel	9.0	10.5	12.0	12.6	13.2	13.8	14.4	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Advanced Biofuel		0.6	0.95	1.35	2.0	2.75	3.75	5.5	7.25	9.0	11.0	13.0	15.0	18.0	21.0
Cellulosic Biofuel			0.1	0.25	0.5	1.0	1.75	3.0	4.25	5.5	7.0	8.5	10.5	13.5	16.0
Biomass-based Diesel		0.5	0.65	0.8	1.0										
Undifferentiated Advanced Biofuel		0.1	0.2	0.3	0.5	1.75	2.0	2.5	3.0	3.5	4.0	4.5	4.5	4.5	5.0
Total RFS	9.0	11.1	12.95	13.95	15.2	16.55	18.15	20.5	22.25	24.0	26.0	28.0	30.0	33.0	36.0

BLENDING BEYOND THE BASICS - FFVS

One way to address the artificial wall limiting ethanol use is to expand production of flex-fuel vehicles (FFVs) and the mid-and-higher level ethanol blending infrastructure to fuel them.

Currently, some 7 million vehicles on American roads are designed and warranted to run on ethanol blends higher than 10%. Yet, these FFVs represent just 3% of the total 220 million vehicles on the road today. Encouraging, and perhaps even requiring, that more of the new passenger vehicles be manufactured as FFVs would also help expand the market for ethanol.

BLENDING BEYOND THE BASICS - INFRASTRUCTURE

To accommodate an increase in demand for more ethanol use, investments in America's fueling infrastructure are essential. This industry, working with oil refiners, gasoline marketers, rail and terminal operators, and even pipeline companies, is making great strides to develop new markets for 10% ethanol blending. This effort is laying the groundwork for the investment in blender pumps and E85 (85% ethanol/15% gasoline) infrastructure that will be needed to replace more of America's gasoline use with homegrown ethanol. Blender pumps are gaining popularity across many Midwestern states with more ready access to higher volumes of ethanol. These pumps allow drivers to fill their vehicle with any blend of ethanol from 0 to 85%, depending upon the kind of vehicle they drive and prevailing economics of ethanol and gasoline. This models what Brazil has done at many of its refueling locations.

E85, a more familiar form of higher level ethanol blends, continues to grow in popularity. Today, approximately 1,900 gasoline stations across the country offer E85. As the production of FFVs continues to increase and the infrastructure investments are made in higher level ethanol blends, fuels like E20, E30, and E85 will gain a bigger share of the gasoline marketplace.



QUICK FACT

Currently, more than 7 million flex-fuel vehicles on American roads are capable of using ethanol blends up to 85%. Automakers such as General Motors, Ford, Chrysler, Toyota, Izuzu, Mercedes, Mazda, and Nissan all offer various models equipped with flexfuel technology.

Source: AFDC, NEVC

REENERGIZING THE ECONOMY & HELPING CONSUMERS

The growing U.S. ethanol industry continues to have a profoundly positive impact on the U.S. economy, particularly in the current economic climate. America's ethanol producers have long been at the cutting edge of the green economy, helping support more than 494,000 well paying jobs in 2008 alone. Importantly, ethanol production provides a critical stimulus for struggling rural economies, providing farmers the most important value added market for grains in more than a generation.



ECONOMIC CONTRIBUTIONS IN 2008

The combination of spending for annual operations, ethanol transportation and capital spending for new plants under construction added more than \$65 billion to the nation's Gross Domestic Product (GDP) in 2008. Additionally, the production of ethanol provided an additional \$20 billion for American households in 2008.

Source: "Contribution of the Ethanol Industry to the Economy of the United States," LECG, LLC, February 2009.

STIMULATING THE ECONOMY WHILE GENERATING REVENUE

The combination of increased GDP and higher household income in 2008 attributable to the U.S. ethanol industry generated an estimated \$12 billion in federal tax revenue and \$9 billion in state and local government tax revenue. Given the shrinking tax base in today's economy, the ethanol industry's contribution is a bright spot for federal, state and local coffers.

QUICK F A C T

2008 ETHANOL ECONOMIC CONTRIBUTIONS:

Jobs = 494,177

Contribution to GDP = \$65.6 billion

Household Incomes = \$20 billion

Tax Revenue Generated (federal, state and local) = \$20.7 billion



Assuming that all of the 9 billion gallons of ethanol produced in 2008 were marketed, the estimated cost of the two major federal incentives for the year (VEETC and the Small Ethanol Producer Tax Credit), totaled \$4.7 billion. By comparison, the ethanol industry generated \$11.9 billion in new tax revenue for the Federal Treasury, yielding a direct return on investment to the federal government of 2.5 to 1. *Source: "Contribution of the Ethanol Industry to the Economy of the United States," LECG, LLC, February 2009.*

CREATING GREEN JOBS, ECONOMIC OPPORTUNITY FOR THE FUTURE

America's ethanol industry is a significant economic driver today and has even greater potential in the future. Conservatively assuming that the Renewable Fuels Standard serves as a ceiling and not a floor to American ethanol production and use, this industry would create on the order of 1 million new jobs across the entire economy by 2022. In turn, these jobs and economic opportunities would generate \$420 billion of increased household income, add \$1.6 trillion to the GDP, and provide more than \$500 billion of new tax revenue for federal, state and local governments by 2022.

INVESTMENT IN INNOVATION:

The American ethanol industry is investing billions of dollars in new technologies that will further enhance the economic benefits of domestic renewable fuel production. In 2008, this investment alone helped support more than 29,000 jobs that put more than \$1.5 billion in the pockets of Americans.

Source: "Contribution of the Ethanol Industry to the Economy of the United States," LECG, LLC, February 2009.

BREAKING AMERICA'S FOREIGN OIL DEPENDENCE

There is little question that the increased supply of biofuels, including ethanol, worldwide is not only lowering oil demand, but also helping to mitigate the devastating impacts of volatile oil markets, which reached a record \$140/barrel in 2008. On average, the world consumes some 86 million barrels of oil per day. According to the International Energy Agency (IEA), that number is slated to rise to 116 million barrels by 2030. In a 2008 report, IEA notes that in order to meet the world's thirst for oil, nonconventional sources of fuel must be found. By IEA estimates, world biofuels production is the only nonfossil fuel that is helping to reduce oil demand. Were it not for the increasing production of world biofuels producers, oil consumption would expand by 1 million barrels per day.

A London-based analyst for Merrill Lynch has noted that biofuels are keeping world oil prices 15% lower than they would otherwise be and shaving \$0.50 off the price of a gallon of gas. "On a global scale, biofuels are now the single largest contributor to world oil supply growth. We estimate that retail gasoline prices would be \$21/bbl higher, on average, without the incremental biofuel supply."

Francisco Blanch, Senior Commodity Analyst, Merrill Lynch, in a June 6, 2008 investors report.

QUICK FACT

The production and use of 9 billion gallons of ethanol in 2008 displaced the need for 321.4 million barrels of oil. It also saved American consumers/ taxpayers \$32 billion, an average of more than \$87 million a day.

Source: Energy Information Administration, LEGC, LLC.

BIOFUELS NEEDED FOR LONG-TERM SECURITY

New oil supplies are getting harder and more expensive to find. Existing supplies are dwindling in many of the world's producing nations. Nonconventional reserves, like Canadian tar sands, pose even more environmental and economic risks. To ensure longterm economic health and energy security, biofuels must be part of the nation's energy policy.

According to the IEA's June 2008 outlook, "Biofuels, including ethanol and biodiesel, will be an increasingly important source of unconventional liquids supplies, largely because of the growth in U.S. biofuels production. In the IEO2008 reference case, U.S. biofuels production in 2030 is projected to be 1.2 million barrels per day, accounting for nearly one-half of the increase in world biofuels production over the projection period."

HISTORIC OIL IMPORT DISPLACEMENT BY ETHANOL



"America's dependence on oil is one of the most serious threats that our nation has faced. It bankrolls dictators, pays for nuclear proliferation, and funds both sides of our struggle against terrorism. It puts the American people at the mercy of shifting gas prices, stifles innovation and sets back our ability to compete."

President Barack Obama, January 26, 2009.

To put in perspective the contribution of America's ethanol industry toward reducing our dependence on foreign oil, consider that the 321 million barrels of oil displaced by 9 billion gallons of ethanol production and use in 2008 is the equivalent of eliminating oil imports from Venezuela for 10 months. Or, to put it another way, it would mean that America would not have to import any oil for 33 days, or the equivalent of more than one month's imports of crude oil. In 2009, the anticipated production and use of more than 10.5 billion gallons of ethanol will further weaken America's dependence on foreign oil.



U.S. FUEL ETHANOL INDUSTRY BIOREFINERIES AND CAPACITY

Company	Location	Feedstock	Nameplate	Operating	Under Construc-
			Capacity (mgy)	Production (mgy)	tion/Expansion
Abengoa Bioenergy Corp. (Total)			198.0	168.0	Capacity (mgy) 176.0
	Madison II ^	com			
	Mt. Vernon, INA	com			
	Colwich, KS	com/milo			
	Ravenna NF	corn			
	York NE	corn			
	Portales NM	corn			
Absolute Energy LLC*	St Ansgar IA	corn	100.0	100.0	
ACE Ethanol IIC	Stanley WI	corn	41.0	41.0	
Adkins Energy, LLC*	Lena. IL	corn	40.0	40.0	
Advanced Bioenergy, LLC	Fairmont, NE	corn	100.0	100.0	
Advanced Bioenergy, LLC	Aberdeen, SD	corn	50.0	50.0	
Advanced Bioenergy, LLC	Huron, SD	corn	32.0	32.0	33.0
Ag Energy Resources. Inc.	Benton, IL	corn			5.0
AGP*	Hastings, NE	corn	52.0	52.0	
Agri-Energy, LLC*	Luverne, MN	corn	21.0	21.0	
Al-Corn Clean Fuel*	Claremont, MN	corn	42.0	42.0	
Alchem Ltd. LLP	Grafton, ND	corn	10.0		
AltraBiofuels Coshocton Ethanol, LLC	Coshocton, OH	corn	60.0		
AltraBiofuels Indiana, LLC	Cloverdale, IN	corn	2.0		
AltraBiofuels Phoenix Bio Industries, LLC	Goshen, CA	corn	31.5	31.5	
Amaizing Energy, LLC*	Atlantic, IA	corn			110.0
Amaizing Energy, LLC*	Denison, IA	corn	48.0	48.0	
Archer Daniels Midland (Total)			1,070.0	1,070.0	550.0
	Cedar Rapids, IA	corn			
	Clinton, IA	corn			
	Decatur, IL	corn			
	Peoria, IL	corn			
	Marshall, MN	corn			
	Wallhalla, ND	corn/barley			
	Columbus, NE	corn			
Arkalon Energy, LLC	Liberal, KS	corn	110.0	110.0	
Aventine Renewable Energy, LLC (Total)			207.0	207.0	
	Pekin, IL	corn			
	Aurora, NE	corn			
Badger State Ethanol, LLC*	Monroe, WI	corn	48.0	48.0	
Big River Resources Galva, LLC	Galva, IL	corn			100.0
Big River Resources West Burlington, LLC*	West Burlington, IA	corn	92.0	92.0	
BioFuel Energy - Buffalo Lake Energy, LLC	Fairmont, MN	corn	115.0	115.0	
BioFuel Energy - Pioneer Trail Energy, LLC	Wood River, NE	corn	115.0	115.0	
Bional Clearfield	Clearfield, PA	corn			110.0
Blue Flint Ethanol	Underwood, ND	corn	50.0	50.0	
Bonanza Energy, LLC	Garden City, KS	corn/milo	55.0	55.0	
Bridgeport Ethanol	Bridgeport, NE	corn	54.0	54.0	
Bunge-Ergon Vicksburg	Vicksburg, MS	corn	54.0	54.0	
Bushmills Ethanol, Inc.*	Atwater, MN	corn	50.0	50.0	
Calgren Renewable Fuels, LLC	Pixley, CA	corn			55.0
Cardinal Ethanol	Union City, IN	corn	100.0	100.0	
Cargill, Inc.	Eddyville, IA	corn	35.0	35.0	
Cargill, Inc.	Blair, NE	corn	85.0	85.0	
Cascade Grain	Clatskanie, OR	corn	108.0	108.0	

Castle Rock Renewable Fuels, LLC	Necedah, WI	corn	50.0	50.0	
Center Ethanol Company	Sauget, IL	corn	54.0	54.0	
Central Indiana Ethanol, LLC	Marion, IN	corn	40.0	40.0	
Central MN Ethanol Coop*	Little Falls, MN	corn	21.5	21.5	
Chief Ethanol	Hastings, NE	corn	62.0	62.0	
Chippewa Valley Ethanol Co.*	Benson, MN	corn	45.0	45.0	
Cilion Ethanol	Keyes, CA	corn			50.0
Clean Burn Fuels, LLC	Raeford, NC	corn			60.0
Commonwealth Agri-Energy, LLC*	Hopkinsville, KY	corn	33.0	33.0	
Corn Plus, LLP*	Winnebago, MN	corn	44.0	44.0	
Corn, LP*	Goldfield, IA	corn	55.0	55.0	
Cornhusker Energy Lexington, LLC	Lexington, NE	corn	40.0	40.0	
Dakota Ethanol, LLC*	Wentworth, SD	corn	50.0	50.0	
DENCO, LLC	Morris, MN	corn	24.0		
Didion Ethanol	Cambria, WI	corn	40.0	40.0	
E Caruso (Goodland Energy Center)	Goodland, KS	corn			20.0
E Energy Adams, LLC	Adams, NE	corn	50.0	50.0	
E3 Biofuels	Mead, NE	corn	25.0		
East Kansas Agri-Energy, LLC*	Garnett, KS	corn	35.0	35.0	
ESE Alcohol Inc.	Leoti, KS	seed corn	1.5	1.5	
Ethanol Grain Processors, LLC	Obion, TN	corn	100.0	100.0	
Front Range Energy, LLC	Windsor, CO	corn	40.0	40.0	
Gateway Ethanol	Pratt, KS	corn	55.0		
Glacial Lakes Energy, LLC - Mina	Mina, SD	corn	107.0		
Glacial Lakes Energy, LLC*	Watertown, SD	corn	100.0	100.0	
Global Ethanol/Midwest Grain Processors	Lakota, IA	corn	97.0	97.0	
Global Ethanol/Midwest Grain Processors	Riga, MI	corn	57.0	57.0	
Golden Cheese Company of California*	Corona, CA	cheese whey	5.0	5.0	
Golden Grain Energy, LLC*	Mason City, IA	corn	115.0	115.0	
Golden Triangle Energy, LLC*	Craig, MO	corn	20.0	20.0	
Grain Processing Corp.	Muscatine, IA	corn	20.0	20.0	
Granite Falls Energy, LLC*	Granite Falls, MN	corn	52.0	52.0	
Greater Ohio Ethanol. LLC	Lima. OH	corn	54.0		
Green Plains Renewable Energy	Shenandoah, IA	corn	55.0	55.0	
Green Plains Renewable Energy	Superior, IA	corn	55.0	55.0	
Hawkeve Renewables. LLC	Fairbank, IA	corn	120.0	120.0	
Hawkeye Renewables, LLC	Iowa Falls, IA	corn	105.0	105.0	
Hawkeve Renewables LLC	Menlo IA	corn	110.0	110.0	
Hawkeye Renewables LLC	Shell Rock IA	corn	110.0	110.0	
Heartland Corn Products*	Winthron MN	corn	100.0	100.0	
Heron Lake BioEnergy LLC	Heron Lake MN	corn	50.0	50.0	
Highwater Ethanol II C	Lamberton, MN	corn	50.0		50.0
Homeland Energy		corn			100.0
	Plainview NE	com	75.0	75.0	100.0
Idaha Ethanal Processing		potato wasto	13.0	73.0	
	Pachalla II	com	4.0	4.0	
	Ruffton IN	com	101.0	100.0	
	Biulitoli, IN	com	101.0	101.0	
	Minden NE	com	40.0	40.0	
	Minden, NE	corn	40.0	40.0	
	Lyons, KS	com	55.0	55.0	
		wood waste	1.5	1.5	
	Werrose, MN	cheese whey	2.6	2.6	100.0
		com	15.0	15.0	100.0
	NOTOIK, NE	corn	45.0	45.0	
Levelland/Hockley County Ethanol, LLC	Levelland, IX	corn	40.0	40.0	
Lifeline Foods, LLC	St. Joseph, MO	corn	40.0	40.0	

Lincolnland Agri-Energy, LLC*	Palestine, IL	corn	48.0	48.0	
Lincolnway Energy, LLC*	Nevada, IA	corn	50.0	50.0	
Little Sioux Corn Processors, LP*	Marcus, IA	corn	92.0	92.0	
Marquis Energy, LLC	Hennepin, IL	corn	100.0	100.0	
Marysville Ethanol, LLC	Marysville, MI	corn	50.0	50.0	
Merrick & Company	Aurora, CO	waste beer	3.0	3.0	
Mid America Agri Products/Horizon	Cambridge, NE	corn	44.0	44.0	
Mid America Agri Products/Wheatland	Madrid, NE	corn	44.0	44.0	
Mid-Missouri Energy, Inc.*	Malta Bend, MO	corn	50.0	50.0	
Midwest Renewable Energy, LLC	Sutherland, NE	corn	25.0	25.0	
Minnesota Energy*	Buffalo Lake, MN	corn	18.0	18.0	
NEDAK Ethanol	Atkinson, NE	corn			44.0
Nesiaa Energy, LLC	Scandia, KS	corn	10.0	10.0	
New Energy Corp.	South Bend, IN	corn	102.0	102.0	
North Country Ethanol, LLC*	Rosholt, SD	corn	20.0	20.0	
Northeast Biofuels	Volney, NY	corn	114.0		
Northwest Renewable, LLC	Longview, WA	corn			55.0
One Earth Energy	Gibson City, IL	corn			100.0
Otter Tail Ag Enterprises	Fergus Falls, MN	corn	57.5	57.5	
Pacific Ethanol	Madera, CA	corn	40.0		
Pacific Ethanol	Stockton, CA	corn	60.0	60.0	
Pacific Ethanol	Burley, ID	corn	50.0	50.0	
Pacific Ethanol	Boardman, OR	corn	40.0	40.0	
Panada Ethanol	Hereford, TX	corn/milo			115.0
Parallel Products	Rancho Cucamonga, CA				
Parallel Products	Louisville, KY	beverage waste	5.4	5.4	
Patriot Renewable Fuels, LLC	Annawan, IL	corn	100.0	100.0	
Penford Products	Cedar Rapids, IA	corn	45.0	45.0	
Pinal Energy, LLC	Maricopa, AZ	corn	55.0	55.0	
Pine Lake Corn Processors. LLC	Steamboat Rock, IA	corn	30.0	30.0	
Platinum Ethanol. LLC*	Arthur, IA	corn	110.0	110.0	
Plymouth Ethanol 11C*	Merrill, IA	corn	50.0	50.0	
POET Biorefining - Alexandria	Alexandria, IN	corn	68.0	68.0	
POET Biorefining - Ashton	Ashton IA	corn	56.0	56.0	
POET Biorefining - Big Stope	Big Stope City SD	com	79.0	79.0	
POET Biorefining - Bingham Lake	Bingham Lake MN	com	35.0	35.0	
POET Biorefining - Caro	Caro MI	com	53.0	53.0	
POET Biorefining - Chancellor	Chancellor SD	com	110.0	110.0	
POET Biorefining - Chancellor	Coop Papids 1A	com	54.0	54.0	
POET Biorefining - Coolin Rapids		com	54.0	54.0	
POET Biorefining - Conning	Coming, IA	com	65.0 EE 0	65.0 EE 0	
POET Biorefining - Entimetsburg	Entimetsburg, IA	com	53.0	53.0	
POET Biorefining - Fostoria		com	68.0	08.0	
POET Biorefining - Gienville		corn	42.0	42.	
POET Biorefining - Gowrie	Gowrie, IA	corn	69.0	69.0	
	Haniontown, IA	corn	56.0	56.0	
POET Biorefining - Hudson	Hudson, SD	corn	56.0	56.0	
POET Biorefining - Jewell	Jewell, IA	corn	69.0	69.0	
POET Bioretining - Laddonia	Laddonia, MO	corn			5.0
POET Bioretining - Lake Crystal	Lake Crystal, MN	corn	56.0	56.0	
POET Bioretining - Leipsic	Leipsic, OH	corn	68.0	68.0	
POET Biorefining - Macon	Macon, MO	corn	46.0	46.0	
POET Bioretining - Marion	Marion, OH	corn			65.0
POET Biorefining - Mitchell	Mitchell, SD	corn	68.0	68.0	
POET Biorefining - North Manchester	North Manchester, IN	corn	68.0	68.0	
POET Biorefining - Portland	Portland, IN	corn	68.0	68.0	
POET Biorefining - Preston	Preston, MN	corn	46.0	46.0	

POET Biorefining - Scotland	Scotland, SD	corn	11.0	11.0	
POET Biorefining - Groton	Groton, SD	corn	53.0	53.0	
Prairie Horizon Agri-Energy, LLC	Phillipsburg, KS	corn	40.0	40.0	
Quad-County Corn Processors*	Galva, IA	corn	30.0	30.0	
Range Fuels	Soperton, GA	wood waste			20.0
Red Trail Energy, LLC	Richardton, ND	corn	50.0	50.0	
Redfield Energy, LLC *	Redfield, SD	corn	50.0	50.0	
Reeve Agri-Energy	Garden City, KS	corn/milo	12.0	12.0	
Renew Energy	Jefferson Junction, WI	corn	130.0	130.0	
Renova Energy	Torrington, WY	corn	5.0	5.0	
Riverland Biofuels	Canton, IL	corn	37.0	37.0	
Show Me Ethanol	Carrollton, MO	corn	55.0	55.0	
Siouxland Energy & Livestock Coop*	Sioux Center, IA	corn	60.0	60.0	
Siouxland Ethanol, LLC	Jackson, NE	corn	50.0	50.0	
Southwest Georgia Ethanol, LLC	Mitchell Co., GA	corn	100.0	100.0	
Southwest Iowa Renewable Energy, LLC *	Council Bluffs, IA	corn	110.0	110.0	
Sterling Ethanol, LLC	Sterling, CO	corn	42.0	42.0	
Tate & Lyle	Ft. Dodge, IA	corn			105.0
Tate & Lyle	Loudon, TN	corn	67.0	67.0	38.0
Tharaldson Ethanol	Casselton, ND	corn	110.0	110.0	
The Andersons Albion Ethanol LLC	Albion, MI	corn	55.0	55.0	
The Andersons Clymers Ethanol, LLC	Clymers, IN	corn	110.0	110.0	
The Andersons Marathon Ethanol, LLC	Greenville, OH	corn	110.0	110.0	
Trenton Agri Products, LLC	Trenton, NE	corn	40.0	40.0	
United Ethanol	Milton, WI	corn	52.0	52.0	
United WI Grain Producers, LLC*	Friesland, WI	corn	49.0	49.0	
Utica Energy, LLC	Oshkosh, WI	corn	48.0	48.0	
VeraSun Energy Corporation (Total)			1,635.0	450.0	
55 1 4 7	Albert City, IA	corn			
	Charles City, IA	corn			
	Dversville. IA	corn			
	Et Dodge IA	corn			
	Hartley IA	corn			
	Linden, IN	corn			
	Lake Odessa, MI	corn			
	Janesville MN	corn			
	Welcome MN	corn			
	Hankinson ND	corn			
		corn			
	Central City NE	corn			
	Ord NF	corn			
	Bloomingburg OH	corn			
		corn			
Verenium	lennings I A	Sugar Cane bagasse	15	15	
Western New York Energy 11 C	Shelby NY	corn	50.0	50.0	
Western Plains Energy 11C*	Campus KS	corn	45.0	45.0	
Western Wisconsin Renewable Energy LLC*	Bovceville WI	com	40.0	40.0	
White Energy		milo/wheat starch	40.0	40.0	
White Energy	Hussen, KS	nino/wileat starch	40.0	40.0	
		com/mino	100.0	100.0	
	Plainview, IX	corn	110.0		
Wind Gap Farms	Baconton, GA	brewery waste	0.4	0.4	
Xethanol BioFuels, LLC	Blairstown, IA	corn	5.0	5.0	
Yuma Ethanol	Yuma, CO	corn	40.0	40.0	
TOTALS			12,475.4	10,569.4	2,066.0

* locally owned ^ under construction or expanding

Updated: January 2009

INNOVATING IN THE INFORMATION AGE

It is increasingly clear that Americans are getting their information from sources other than the daily newspaper and nightly news. To better educate the public, America's ethanol industry has recognized this changing dynamic and is developing and improving upon a number of online and digital tools to better communicate our message.



ETHANOLRFA.ORG: The homepage for the RFA provides up to date information on federal policies and regulations, industry statistics, and current news events impacting this industry.

GOODFUELS.ORG: Wanting to get involved in the online discussion about renewable fuels? GoodFuels offers a place to begin your discussion as well as links to other sites covering the renewable fuels industry. In addition, daily emails from GoodFuels alert subscribers to interesting and important events of the day.

"OUR ENERGY FUTURE STARTS AT HOME": The RFA has

developed online video content that creatively furthers our message of economic, environmental and energy security through a green economy. View the videos, download them for your use, or upload them to your sites at www.EthanolRFA.org/energyfuture.



U.S. CELLULOSIC ETHANOL PROJECTS UNDER DEVELOPMENT AND CONSTRUCTION

Company	Location	Technology	Production Capacity (millions of gallons per year)	Feedstock
Abengoa	York, NE Hugoton, KS		11.6 mgy 11.6 mgy	corn stover, wheat straw, milo stubble, switchgrass, and other biomass
AE Biofuels	Butte, MT	Ambient Temperature Cellulose Starch Hydrolysis	small scale	switchgrass, grass seed, grass straw, and corn stalks
Bluefire	Corona, CA Lancaster, CA	Arkenol Process Technology (Concentrated Acid Hydrolysis Technology Process)	18 mgy 3.1 mgy	green waste, wood waste, and other cellulosic urban wastes (post-sorted municipal solid waste)
California Ethanol + Power, LLC (ce+p)	Brawley, CA		55 mgy	local Imperial Valley grown sugarcane; facility powered by sugarcane bagasse
Coskata	Madison, PA	biological fermentation technology; proprietary microorganisms and efficient bioreactor designs in a three-step conversion process that can turn most carbon-based feedstock into ethanol	40,000 gal/yr	any carbon-based feedstock, including biomass, municipal solid waste, bagasse, and other agricultural waste
DuPont Danisco Cellulosic Ethanol LLC	Vonore, TN	enzymatic hydrolysis technology	250,000 gal/yr	switchgrass, corn stover, corn fiber, and corn cobs
Ecofin, LLC	Washington County, KY	Solid state fermentation process developed by Alltech	1.3 mgy	corn cobs
Flambeau River Biofuels LLC	Park Falls, WI	Thermo-chemical conversion of biomass using advanced gasification technologies followed by Fisher-Tropsch catalytic conversion into renewable liquid fuels and waxes ("Thermal 1" process)	6 mgy	softwood chips, wood, and forest residues
ICM Inc.	Shelley, ID	enzyme technology	18 mgy	agricultural residues including wheat straw, barley straw, corn stover, switchgrass, and rice straw
KL Process	Upton, WY	thermal-mechanical process	1.5 mgy	soft wood, waste wood, including cardboard, and paper
Lignol Innovations/Suncor	Grand Junction, CO	biochem-organisolve	2.5 mgy	woody biomass, agricultural residues, hardwood, and softwood
Mascoma/ New York State Energy Research and Development Authority/ New York State Department of Agriculture and Markets	Rome, NY		5 mgy	lignocellulosic biomass, including switchgrass, paper sludge, and wood chips
Mascoma/Michigan Economic Development Corporation/Michigan State University/ Michigan Technological University	Chippewa County, Michigan	"consolidated bioprocessing" refinery would use genetically modified bacteria to break down and ferment local wood chips	40 mgy	
NewPage Corp. (formerly Stora Enso North America)	Wisconsin Rapids, WI		5.5 mgy	woody biomass, mill residues
New Planet Energy (formerly Alico)	Vero Beach, FL	INEOS Bio Ethanol process (gasification, fermentation and distillation)	1st stage 8 mgy; 2nd stage 21 mgy; 3rd stage, 100 mgy	municipal solid waste (MSW); unrecyclable paper; Construction & Demolition debris (C&D); tree, yard and vegetative waste; and energy crops
Pacific Ethanol	Boardman, OR	BioGasol	2.7 mgy	Wheat straw, stover, and poplar residuals
POET	Scotland, SD Emmetsburg, IA	BFRAC [™] separates the corn starch from the corn germ and corn fiber, the cellulosic casing that protects the corn kernel	20,000 gal/yr 31.25 mgy	corn fiber, corn cobs, and corn stalks
Range Fuels Inc.	Soperton, GA	two-step thermo-chemical process (K2)	20 mgy	woodchips (mixed hardwood)
Verenium	Jennings, LA Highlands County, FL	C5 and C6 fermentations	1.4 mgy 36 mgy	sugarcane bagasse, specially-bred energy cane, high-fiber sugar cane
ZeaChem	Boardman, OR		1.5 mgy	poplar trees, sugar, wood chips

For more information on these projects visit www.EthanolRFA.org.

NEW TECHNOLOGIES, NEW OPPORTUNITIES

Since its humble beginnings in the late 1970s, innovation has defined the U.S. ethanol industry. A steady stream of new technologies and cutting edge production practices have improved the industry's efficiency and economics over the past several decades. And when it comes to innovations for the biofuels industry of tomorrow, the sky is the limit.



The rapid evolution of the starch-based ethanol industry in this country is well documented. Technologies such as fractionization and low heat fermentation have lowered energy use, improved efficiencies, and increased yields at ethanol biorefineries across the country. Likewise, improvements in farming techniques and advances in corn hybrid technology are producing more corn with less inputs on the same acre of land than ever before.

While these improvements are impressive and extremely important, greater innovation is already upon us.

FROM THE LABORATORY TO THE MAINSTREAM

For the better part of the last 25 years, the development of cellulosic and next generation ethanol technologies has often been just around the corner. But, that is all changing today. As a senior engineer at the National Renewable Energy Laboratory in Golden, Colorado told *USA Today* earlier this year, "The old joke was that cellulosic ethanol was always just five years down the road. Now, there's steel going in the ground."

From California to Pennsylvania, South Dakota to Florida, ethanol producers are rapidly commercializing technologies that utilize new feedstocks in addition to corn and other grains. These cellulosic feedstocks – woodchips, native grasses, corn stover, dedicated energy crops, and municipal solid waste – are found in abundance across the country and offer the opportunity to dramatically increase ethanol production while continuing to improve upon ethanol's already green footprint.





Examples of the innovation that defines American ethanol production abound.

In Louisiana, cellulosic ethanol producer Verenium has begun production of ethanol from sugar cane bagasse. At just over one million gallons a year, this demonstration facility is proving that the technology works. In fact, Verenium has announced plans to build a similar facility in south Florida.

In Nebraska, ethanol producer Abengoa is producing ethanol from a wide variety of feedstocks including corn stover, wheat straw, switchgrass, and other biomass. The company is currently designing a full scale commercial biorefinery to be located in Hugoton, Kansas.

In California, Indiana, and Pennsylvania, ethanol companies Bluefire Ethanol and Coskata are developing technologies and choosing locations to build large-scale ethanol production facilities that utilize municipal solid waste as a feedstock.

In Georgia, Range Fuels has begun construction on a commercial-scale ethanol biorefinery that will utilize woodchips and other waste materials from the state's wood and paper industry to produce clean-burning ethanol.

In dozens of other states across the country, companies such as POET, Mascoma, New Planet Energy and others are rapidly commercializing technologies that will greatly expand the basket of feedstocks from which ethanol is produced.

1. ABENGOA

Cornstover, wheat straw, milo stubble, switchgrass and other biomass.

2. ABENGOA

3. AE BIOFUELS

Switchgrass, grass seed, grass straw and corn stalks.

4. BLUEFIRE Green waste, wood waste, and other cellulosic urban wastes.

5. BLUEFIRE

6. CALIFORNIA ETHANOL + POWER, LLC

Local Imperial Valley grown sugarcane facility powered by sugarcane bagasse.

7. COSKATA

Any carbon-based feedstock, including biomass, municipal solid waste, bagasse, and other agricultural waste.

8. DUPONT DANISCO CELLULOSIC ETHANOL LLC

Switchgrass, corn stover and corn cobs

9. ECOFIN, LLC Corn cobs.

10. FLAMBEAU RIVER BIOFUELS LLC Softwood chips, wood, and forest residues.

11. ICM INC. Switchgrass, forage, sorghum, stover.

12. IOGEN CORP. Agricultural residues including wheat straw, barley straw, corn stover, switchgrass and rice straw.

13. KL PROCESS Softwood, waste wood, including cardboard and paper.

14. LIGNOL INNOVATIONS

Woody biomass, agricultural residues, hardwood and softwood.

15. MASCOMA

Lignocellulosic biomass, including switchgrass, paper sludge, and wood chips.

16. MASCOMA

Consolidated bioprocessing refinery using bacteria to break down and ferment local wood chips.

17. NEWPAGE CORP. Woody biomass, mill residues.

18. NEW PLANET ENERGY

Municipal solid waste (MSW); unrecyclable paper; construction & demolition debris; tree, yard and vegetative waste; and energy crops.

19. PACIFIC ETHANOL

Wheat straw, stover, and poplar residuals.

20. POET Corn fiber, corn cobs and corn stalks.

21. POET

22. RANGE FUELS INC. Wood residues and wood-based energy crops, grasses and corn stover.

23. RSE PULP & CHEMICAL LLC Woodchips (mixed hardwood).

24. VERENIUM Sugarcane bagasse and specially bred energy cane.

25. VERENIUM

26. ZEACHEM

Poplar trees, sugar, and wood chips.

ETHANOL'S EVER-IMPROVING CARBON FOOTPRINT

With issues of climate change and greenhouse gas (GHG) emissions likely to dominate headlines in 2009 and the years to come, ethanol's importance as a tool to mitigate the global warming consequences resulting from the use of petroleum will continue to increase. The primary GHG emitted by human activities in the United States is carbon dioxide, representing nearly 85% of total U.S. GHG emissions. Not surprisingly, the largest source of carbon dioxide is fossil fuel combustion. Thus, the technologies utilized and being developed by America's ethanol producers are becoming increasingly environmentally sound, sustainable, and absolutely essential.

TAR SANDS: A CASE STUDY IN THE WRONG DIRECTION

According to Environmental Defence Canada, the production of oil from tar sands in Canada emits up to 300% more greenhouse gases than traditional oil production. Additionally, oil from tar sands is more difficult to refine, resulting in the increase of CO_2 emissions from oil refineries throughout the Midwest by up to 40%.

Source: "Canada's Tar Sands: The Most Destructive Project on Earth." Enviromental Defence Canada, February 2008 and "Refinery Pollution May Soar," Chicago Tribune, February 12, 2008.

REDUCING GREENHOUSE GAS EMISSIONS

Compared to gasoline, ethanol is a clear winner when it comes to GHG emissions. Because ethanol is made from renewable, plant-based feedstocks, the carbon dioxide released during a vehicle's fuel combustion is "recycled" by the plant as it grows. Numerous lifecycle analyses conducted by various government and university researchers have been performed on biofuels in the last decade. Most recently, work from the University of Nebraska - Lincoln found today's ethanol reduces direct GHG emissions between 48-59% compared to gasoline.

The GHG benefits of ethanol will be even more significant in the future, as the carbon footprint of ethanol production continues to shrink and new technologies reduce the energy intensity of the process. According to the U.S. Department of Energy's Argonne National Laboratory, "In terms of key energy and environmental benefits, Argonne's GREET (model) shows that corn starch ethanol clearly outpaces petroleum-based fuels, and that tomorrow's cellulose-based ethanol would do even better." Indeed, Argonne's analysis shows ethanol produced from cellulosic feedstocks promises to reduce GHGs by more than 80% compared to gasoline.





IMPROVING RESOURCE USE THROUGH INNOVATION

New technologies and outside-the-box thinking are increasing ethanol yields, improving efficiencies, and allowing ethanol biorefineries to make better use of the natural resources they need.

The U.S. Department of Energy's Argonne National Laboratory, based on survey data compiled by the Renewable Fuels Association, found tremendous improvements in efficiency between 2001 and 2006. Argonne's research determined:

- Water consumption at America's ethanol biorefineries had decreased 26.6%
- Ethanol production was using 15.7% less electricity
- On the whole, total energy use decreased 21.8% over that 5 year period alone

Likewise, a survey of ethanol producers by the private consulting firm Christianson and Associates, found similar efficiency improvements over a period from 2004-2007. Christianson determined that total energy and electricity used at dry mills fell by 13%. On average, a gallon of ethanol containing 77,000 British Thermal Units (BTUs) requires just 31,588 BTUs to produce at the biorefinery.

As technologies improve and new ones are developed, the efficiency and carbon footprint of American ethanol production will only continue to improve.



Source: Renewable Fuels Association

QUICK FACT

The production and use of 9 billion gallons of ethanol in the U.S. reduced CO_2 -equivalent greenhouse gas (GHG) emissions by approximately 14 million tons in 2008, the equivalent of removing more than 2.1 million cars from America's roadways.

Source: GREET 1.8 model.

ETHANOL AND LAND USE

With carbon emissions front and center in the policy debates in Washington, the role of ethanol and other biofuels is a hot topic. In particular, the impact of increasing ethanol production on land use decisions by people in nations around the world has drawn the spotlight.

> Known as land use change, this debate focuses on whether using corn and other grains for ethanol production in the U.S. and around the world is resulting in the clearing of rain forests and other native lands. Cultivation of these environmentally-sensitive lands would release carbon into the atmosphere that has been stored in the soil. Therefore, the question is to what extent, if any, the production of ethanol in the U.S. is responsible for the decisions to utilize these virgin lands by people and governments around the world. And, if it is responsible, how much of the carbon released should be counted against U.S. ethanol production as part of a lifecycle greenhouse gas emission analysis?

> This debate over the causes and effects of land use change has serious implications for the future of the U.S. ethanol industry. As required by the 2007 energy bill, the U.S. Environmental Protection Agency (EPA) is establishing a methodology for determining the lifecycle greenhouse gas (GHG) emissions from the production of

various biofuels, including GHGs from so-called indirect land use changes. Too often, sensationalism supersedes science in this debate. Determining the impact, if any, of ethanol production on land use decisions elsewhere in the world is imprecise and must include a comprehensive analysis and accounting of a host of factors.

QUICK F A C T

The amount of agricultural land required to produce 15 billion gallons of grain ethanol in the United States by 2015, as required by the 2007 Energy Independence and Security Act (EISA), is likely to be less than 1 percent of total world cropland.

Source: "Understanding Land Use Change and U.S. Ethanol Expansion," Renewable Fuels Association.

Minimal use of farmland for biofuels production.

"Despite increases in the amount of coarse grains being used for ethanol, the amount of land dedicated to coarse grains (corn, grain sorghum, barley, oats, rye, and millet) production globally has decreased over the past 30 years. Global area for coarse grains has decreased 8 percent since 1980, while world grain ethanol production has increased dramatically. Global coarse grains area peaked at 349 million hectares in 1981 and is estimated at 313 million hectares in 2008," according to the U.S. Department of Agriculture.

In fact, the total net amount of cropland dedicated to American ethanol production in 2007 was just 0.6% of total cropland worldwide, an area roughly the size of West Virginia.

Global agriculture's increasing productivity is meeting rising demand.

Production agriculture, particularly in the United States, has dramatically increased its productivity through the use of technology. For example, using average global corn yields from 40 years ago (1967), more than 330 million hectares would be required to produce the world corn crop grown on 158 million hectares in 2007. In other words, it would have taken more than twice as much land in 1967 to grow a crop equivalent in size to the 2007 world corn crop.

Arable farmland is available for sustainably increased production.

Though it seems unlikely that significant amounts of land will be needed to support future growth of the U.S. biofuels industry, vast amounts of land are available, if needed, for agricultural expansion. A report by the Food and Agriculture Organization (FAO) of the U.N. found:

"There is still potential agricultural land that is as yet unused. At present some 1.5 billion [hectares] of land is used for arable and permanent crops, around 11% of the world's surface area. A new assessment by FAO and the International Institute for Applied Systems Analysis (IIASA) of soils, terrains and climates compared with the needs of and for major crops suggests that a further 2.8 billion [hectares] are to some degree suitable for rainfed production. This is almost twice as much as is currently farmed."

Ethanol feed co-products contribute substantially to the global feed market and provide a considerable land use "credit."

One hectare of corn used for ethanol produces more than 1000 gallons of fuel as well as an amount of feed equivalent to the volume of corn coming from 30% of a corn dedicated hectare and the amount of soybean meal from 50% of a soybean dedicated hectare.

THE BOTTOM LINE ON LAND USE CHANGE

"Based on available projections, we think crop yields will continue to improve (especially in the U.S., but also elsewhere), and that this should be properly incorporated into the land use change analysis. Secondly, we believe new government analysis shows that the land use credit for feed co-products coming from corn-based ethanol production is much higher than 33%. When these factors are incorporated into land use change analysis, as we have done in this study, no new pasture or forest land will need to be converted in the U.S. or outside the U.S. to meet the 15 bgy RFS requirement for corn ethanol in 2015. Thus, the GHG emissions from land use change due to expansion of U.S. corn-based ethanol to meet the RFS are likely zero."

Source: "Land Use Effects of Corn-Based Ethanol in the United States," Tom Darlington, Air Improvement Resource, Inc., 2009.

2008 U.S. ETHANOL PRODUCTION REQUIRED LESS THAN 1% OF GLOBAL CROPLAND (Million Acres)

- Global Arable Land Area (3,510 acres)
- Global Major Crop Area (2,160 acres)
- U.S. Crop Area (445 acres)
- 2008 U.S. Corn Area (86 acres)
- 2008 U.S. Corn Ethanol Area (Net Distillers Grains) (14.5 acres)



ETHANOL AND WATER

Water is the most precious of our natural resources.
It is the basis for life and is necessary in the production of all forms of energy including power generation and transportation fuels production. That is why America's ethanol producers are developing and adopting new technologies that are reducing water use.

An analysis by Argonne National Laboratory of industry data found that water usage by ethanol plants in 2006 averaged 3.45 gallons per gallon of ethanol produced. This is significantly less than in years past. Indeed, a 2007 National Academy of Sciences report noted, "consumptive use of water is declining as ethanol producers increasingly incorporate water recycling and develop new methods of converting feedstocks to fuels that increase energy yields while reducing water use."

More efficient use of water is a trend that will continue within the ethanol industry. New technologies promise to more efficiently use and recycle the water required for cooling towers, boilers and other processing components. Engineering and design firms estimate the average water use per gallon of ethanol produced is likely to continue to drop substantially in the next several years. One such firm estimates water requirements will soon be reduced "...to less than 1.5 gallons per gallon of ethanol produced." Some ethanol producers are now using waste water, or gray water to produce ethanol.

CONTEXT IS KEY

As is always the case, offering comparisons and putting issues in context is critical to a complete and accurate understanding. Ethanol's relationship with water is no different. Consider some of these facts:

- According to the U.S. Geological Survey (USGS), approximately 408 billion gallons of water are used per day for all purposes in the United States. Industrial water use (including water used in ethanol production) is estimated at 18.5 billion gallons per day. Based on expected ethanol production of 9 billion gallons in 2008, the industry's total water use is estimated at 85 million gallons per day. It is important to remember that ethanol is helping displace those incremental gallons of crude oil from sources like the Canadian tar sands. According to the University of Alberta, it takes 7 barrels of water to produce just one barrel of crude from the tar stands.
- The daily public water usage by the city of Chicago alone is five times greater than the entire U.S. ethanol industry's water requirement.
- A typical 50 million gallon per year ethanol plant uses about 400,000 gallons of water per day. This is roughly equivalent to the daily water use of an 18-hole golf course. Water usage at the Sherman Hills Golf Course in Florida, for instance, averaged 363,000 gallons per day over a 12-month period, according to the St. Petersburg Times.

- According to the National Renewable Energy Laboratory (NREL), "Water use ranges between 65 and 90 gallons per barrel of crude oil processed and wastewater discharge ranges between 20 and 40 gallons, leaving 45 to 50 gallons of water consumed per barrel, or 2 to 2.5 gallons of water per gallon of gasoline."¹ Thus, using NREL's conservative estimate, the current per-gallon water requirement for gasoline is similar to that of ethanol. But the aggregate quantity of water required to produce the gasoline consumed in the United States is nearly 1 billion gallons per day.
- It is true that corn requires large amounts of water to grow; a bushel of corn needs approximately 4,000 gallons of water in a growing season. But what often goes unreported is that nearly nine out of every 10 corn acres in the United States are rain-fed and require no irrigation other than natural rainfall. Further, because most ethanol production occurs in the central Corn Belt where corn is primarily rain-fed, NREL says "As much as 96% of the field corn used for ethanol production is not irrigated at all."²
- Additionally, much of the water taken into a corn plant is released back into the air through transpiration. In fact, one acre of corn gives off about 4,000 gallons of water per day through evapo-transpiration, according to the USGS.

IMPORTANT WATER FACTS

- 3 gallons of water are required to produce a gallon of ethanol.
- 2-2.5 gallons of water are required to produce a gallon of gasoline, which is similar to that of ethanol
 (3 gallons). Some estimates suggest as much as 8 gallons of water are needed to refine a gallon of gasoline.
- 4 gallons of water are needed to produce a pound of hamburger.
- 11.6 gallons of water are needed to produce one pound of chicken.
- A typical 40 MGY ethanol plant uses an amount of water daily that is equivalent to the daily water use of a standard 18-hole golf course.
- 3/5 gallon of water is required per kilowatt hour at a coal fired power plant (1 kWh is required for a 100 watt light bulb to burn for 10 hours).
- 3/4 of a gallon of water is required per kilowatt hour at a nuclear power plant.
- 300 million gallons of water are needed to produce a single day's supply of U.S. newsprint.

Source: U.S. Geological Survey, National Renewable Energy Laboratory.



² Aden.

¹ Aden. "Water Usage for Current and Future Ethanol Production." http://epw.senate.gov/public/index.cfm?FuseAction=Files. View&FileStore_id=3d2f1427-d51d-4a54-8739-166853ee1c44

FEEDING THE WORLD, FUELING A NATION

In 2008, U.S. ethanol producers utilized approximately 3.2 billion bushels of corn to produce nearly 27 million tons of high quality livestock feed (23 million metric tons of distillers grains, 3 million metric tons of corn gluten feed, and 600,000 metric tons of corn gluten meal) and 9 billion gallons of clean burning, renewable ethanol. To put these production volumes in context, consider that the amount of feed produced by the ethanol industry in 2008 is roughly equivalent to the combined annual amount of *total* feed consumed by cattle on feed in Texas, Kansas, Nebraska, and Colorado—the nation's four largest fed cattle states.

NOT A BYPRODUCT; A CO-PRODUCT

Feed co-products represent an increasingly important share of profit opportunities for ethanol producers. The estimated market value of feed co-products from ethanol production in 2007/08 was \$3 billion. An estimated additional \$1.7 billion was realized through sales of corn oil, a high value co-product of the wet mill ethanol process. In recent years, ethanol co-product feeds have typically been priced at a discount to the feed ingredients they replace, meaning livestock and poultry feeders often take advantage of the value of these products in least-cost ration formulations.



THE ETHANOL PRODUCTION PROCESS (Dry Mill)



In addition, ethanol producers are investing in new technologies to improve the quality and quantity of the livestock feed they produce. For instance, a number of dry mills are installing technology that allows them to separate crude corn oil from the stillage on the back end of the process. This crude corn oil can be sold into the feed market (particularly for poultry), further refined and sold into the human food market, or used as a feedstock for biodiesel.

Dry fractionation, a process to separate the corn germ and other components from the starch on the front end of the ethanol process, is another technology that is emerging in the dry mill ethanol industry. This separation allows ethanol producers more flexibility in feed manufacturing and potentially provides customers with products that are more tailored to their specific nutritional needs. Animal scientists and nutritionists are also participating in the innovation process, continually studying the feeding of ethanol feed co-products to animals. Though beef, dairy, swine and poultry have been the primary consumers of these co-products historically, an increasing amount of research is being conducted that examines the effects of feeding co-products to other species, such as goats, sheep, and fish. The use of ethanol co-products in human food applications is another area of increasing scientific interest.

While new technologies and practices promise to change the complexion of the ethanol co-products market in the years ahead, one certainty exists about the future of feed co-products: the ethanol industry will continue to take very seriously its role as a producer of safe, quality feed.



FOOD AND FUEL: DISPELLING THE MYTHS

Driven by the American public's demand for alternatives to high-priced foreign oil, the production of ethanol in the United States has more than tripled since 2003. This dramatic increase led some to erroneously manufacture hysteria and panic about the relationship between ethanol production and food. This orchestrated public relations hysteria sought to "obliterate" the welldocumented economic and environmental benefits of expanded biofuels production by sensationally pitting ethanol production against food prices in the grocery store and feeding people around the world.



The facts surrounding the misnamed and emotionally charged "food versus fuel" debate reveal there is no need to choose between using grain for feed and food or using grain for fuel. American farmers and ethanol producers can do both.

The fallacy of the "food versus fuel" debate was fully exposed by the end of 2008, a full year after the public relations campaign against ethanol had been waged. By late 2008, the prices of agricultural commodities like corn had fallen by some 60% compared to highs seen in June. At the same time, ethanol production continued to increase. The fact that food prices continued to rise while agricultural commodity prices plunged and ethanol production continued to increase in the second half of 2008 is proof that grain and other farm products play a minor role in retail food prices.



HISTORIC U.S. CORN YIELD

A BOUNTY FOR FOOD, FEED, AND FUEL

Tremendous increases in the productivity of U.S. farmers -- 71.9 bushels of corn per acre in 1974 compared to 153.9 bushels per acre in 2008 -- have ensured ample supplies of grain are available for domestic and international use as food, feed and fuel. Further, one-third of every bushel of grain processed into ethanol is enhanced and returned to the animal feed market in the form of distillers grains, corn gluten feed or corn gluten meal.

Increased yield per acre has allowed farmers to dramatically increase total corn production without significantly expanding corn acreage. In 1977, farmers planted 84.3 million acres and harvested 6.5 billion bushels. In 2007, growers planted 93.6 million acres and produced a record crop of 13.1 billion bushels. Thus, the size of the crop more than doubled, while acreage expanded just 11%.

As American farmers demonstrated once again in 2008, they are capable of feeding the world and helping renewably fuel a nation.

RECENT U.S. CORN PRODUCTION STATISTICS

		03/04	05/06	07/08
Corn Area Planted	m. acres	78.6	81.8	93.6
Corn Area Harvested	m. acres	70.9	75.1	86.5
Average Yield	bu./acre	142.2	148.0	150.7
Corn Production	m. bu.	10,089.0	11,114.0	13,038.0
Beginning Stocks	m. bu.	1,087.0	2,114.0	1,304.0
Total Corn Supply	m. bu.	11,176.0	13,228.0	14,362.0
Gross Corn Use for Ethanol	m. bu.	1,334.0	2,125.0	3,026.0
Distillers Grains Production	m. bueq.	293.0	553.0	811.0
Net Corn Use for Ethanol	m. bu.	1,041.0	1,572.0	2,215.0
Corn Available for Other Uses	m. bu.	10,135.0	11,959.0	12,147.0

WHAT THE EXPERTS SAY:

- An April 2008 study by Texas A&M University concluded that "...corn prices have had little to do with rising food costs." The authors of the study found that the "...underlying force driving changes in the agricultural industry, along with the economy as a whole, is overall higher energy costs, evidenced by \$100 per barrel oil."1
- The White House Council of Economic Advisors in May 2008 concluded that, "Ethanol accounts for somewhere between 2 and 3% of the overall increase in global food prices." The council also found, "Had it not been for ethanol, (U.S.) food prices would have gone up by 4.25% as opposed to 4.5%."²
- Numerous cost factors contribute to retail food prices. According to USDA, labor costs account for 38 cents of every dollar a consumer spends on food. Packaging, transportation, energy, advertising, profits and other marketing factors account for 43 cents of the consumer food dollar. In fact, just 19 cents of every consumer dollar can be attributed to the actual cost of food inputs like grains and oilseeds.
- A report by the USDA released in March 2008 discussed the impact of higher corn prices on retail food prices. The study stated, "Since U.S. ethanol production uses field corn, the most direct impact of increased ethanol production should be on field corn prices and on the price of food products based on field corn. However, even for those products heavily based on field corn, the effect of rising corn prices is dampened by other market factors." The study goes on to explain that a 50 percent increase in corn prices only raises the value of corn in a 12.9 ounce box of corn flakes by just 1.6 cents, or 0.5 percent the price of the corn flakes.³
- I "The Effects of Ethanol on Texas Food and Feed." www.afpc.tamu.edu/pubs/2/515/RR-08-01.pdf
- 2 "Fact Sheet: Leading the Fight Against Hunger." www.whitehouse.gov/news/releases/2008/05/20080501-22.html
- 3 "Corn Prices Near Record High, But What About Food Costs?" www.ers.usda.gov/AmberWaves/February08/Features/CornPrices.htm



GLOBALIZING THE ETHANOL MARKETPLACE

Innovations in ethanol production technologies and markets have led to an increasing role for ethanol in fuel supplies around the globe. Governments from Europe to Canada to the Phillipines to India are embracing domestic ethanol industries that promise economic opportunities, environmental benefits and greater energy (and therefore national) security. The investments made by these nations in their domestic renewable fuels industries can be seen in the record volume of ethanol production in 2008: 17.3 billion gallons. This increase in global production will find a home as many nations this year implemented renewable fuel use requirements. Even as ethanol's opponents were spending millions attempting to sully ethanol's reputation, Canada, the European Union and other nations forged on adopting requirements for renewable fuel use of their own.

According to the International Energy Agency, the growth of ethanol production worldwide has led to a 1 million barrel per day decrease in global oil demand. As a result, as an analyst from Merrill Lynch noted, the increasing reliance on ethanol helped keep oil prices from spiking even more than we experienced last year.

Clearly, the importance of robust, domestic renewable fuels industries is being realized by countries across the globe. As the world market for ethanol expands, opportunities for increased trade, technology development, and increased economic activity will abound. U.S. ethanol producers remain committed to working with our international colleagues to ensure these opportunities come to fruition. After all, there is much more that unites the global biofuels community than divides us.



The growing production of ethanol across the globe has also brought an increased sense of community and cooperation among ethanol producers. On more than one occasion, the ethanol industries in the U.S., Canada, Brazil and Europe joined together to bring the facts of ethanol production to light and dispel the misinformation being propagated by the Organization of Petroleum Exporting Countries (OPEC) and other anti-biofuel interests. Joined by India and a growing number of nations, this informal coalition continues to promote, defend, and advocate for the continuing development of a global biofuels industry.

2008 WORLD FUEL ETHANOL

PRODUCTION (In Millions of Gallons)

U.S.A.	9,000.0
Brazil	6,472.2
European Union	733.6
China	501.9
Canada	237.7
Other	128.4
Thailand	89.8
Colombia	79.2
India	66.0
Australia	26.4
Total	17,335.2

Source: Renewable Fuels Association, F.O. Licht 2008 Estimates

HISTORIC U.S. ETHANOL IMPORTS

	2002	2003	2004	2005	2006	2007	2008
MGY	45.5	60.9	159.9	135.5	653.3	435.2	600.0*

Source: International Trade Commission, Renewable Fuels Association

UNDERSTANDING THE CREDIT OFFSET

* Estimated

OIL

The U.S. offers gasoline refiners a tax credit for every gallon of ethanol they blend, regardless of where the ethanol is produced. To avoid subsidizing foreign producers of ethanol with American tax dollars, an equivalent credit offset is placed on imported ethanol. History has shown that foreign ethanol arriving in the U.S. can pay the credit offset and still compete effectively in the marketplace.



As the national trade association for the U.S. fuel ethanol industry, the Renewable Fuels Association (RFA) has been the "Voice of the Ethanol Industry" since 1981. The RFA serves as a vital link between the ethanol industry and the federal government, including Congress and the administration, to promote increased production and use of ethanol through supportive policies, regulations, and research and development initiatives. The RFA also works with state governments, agriculture, petroleum, environmental and public interest groups, and ethanol advocates across the country.

The RFA is recognized nationwide as a highly effective and professional organization dedicated to the continued vitality and growth of ethanol in the fuel marketplace. The RFA hosts the annual National Ethanol Conference: Policy & Marketing.

MEMBERSHIP

RFA membership includes a broad cross-section of businesses and organizations dedicated to the expansion of the U.S. fuel ethanol industry. Membership includes:

- Producer Members (public and private companies and farmer-owned cooperatives)
- Prospective Producer Members (plants under construction and development)
- Associate Members (companies that provide products and services to the industry)
- Supporting Members (non-profit organizations, academia and government entities)

The RFA is governed by a Board of Directors comprised of a representative from each producer member. The Board meets several times a year to set Association policy.

BENEFITS OF MEMBERSHIP

Benefits of membership include providing input on RFA policies, activities, and priorities through participation in RFA meetings, timely industry alerts and issue briefs, industry publications and studies, access to technical guidelines and specifications for plant operations and blending, reduced registration fee for the National Ethanol Conference, and links from the RFA web site at **www.ethanolRFA.org**.

RFA COMMITTEES

Within the association, the RFA has a host of committees that address issues ranging from blending and performance standards to safety concerns to the development of cellulosic ethanol technology. The committees include:

TECHNICAL COMMITTEE ENVIRONMENTAL COMMITTEE CELLULOSE COMMITTEE MEMBERSHIP COMMITTEE CO-PRODUCTS COMMITTEE PLANT & EMPLOYEE SAFETY COMMITTEE

> For membership information, call 202.289.3835 or log on to www.ethanolRFA.org.



The Renewable Fuels Foundation (RFF) is dedicated to meeting the educational, research, and strategic planning needs of the U.S. fuel ethanol industry.

The goal is to assure a growing and healthy renewable fuels industry well into the future. The focus of the RFF is on academia, industry and public policy makers as we address issues related to new uses, new feedstocks, and new technologies that will impact the future of ethanol.

To achieve its goals, the RFF is partnering with the National FFA Organization to support the establishment of a Renewable Energy Learning Center for high school students. Additionally, the RFF is working with two-and four-year colleges to develop programs of study directly related to the ethanol industry.

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