Building a Secure Energy Future



Renewable Fuels Association

Ethanol Industry Outlook 2003

Renewable Fuels Association

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February 2003

"Building a Secure Energy Future" is exactly what the U.S. ethanol industry has been doing throughout 2002, and we will continue to build into the foreseeable future in response to rising demand for domestic, clean and renewable fuels.

2002 was a year of record growth in the industry, with annual ethanol production surpassing two billion gallons, a 20 percent increase over 2001 production and a 45 percent increase over 1999. Production capacity now exceeds 2.7 billion gallons and is growing. A record number of new ethanol plants were constructed and many more are scheduled for completion in 2003. With all major refiners in California committed to blending ethanol beginning in early 2003, a major new marketplace has opened that will add significant new demand.

The U.S. ethanol industry has demonstrated its ability to expand production quickly and cost-effectively to meet our nation's rising energy needs. Recent events have once again focused attention on our growing dependence on energy from unstable regions of the world. Ongoing concern over the threat of war with Iraq and political unrest in Venezuela has created troubling volatility in world oil markets.

The increased production and use of domestic, renewable fuels provides a growing source of reliable supply for gasoline marketers. Clearly, ethanol must be part of the solution if we are to truly succeed in becoming "energy independent."

An important step towards energy independence is passage of the historic fuels agreement – including a renewable fuels standard – supported by an unprecedented coalition of agriculture, oil and environmental interests. This agreement would provide for a growing market for renewable fuels such as ethanol while addressing concerns regarding MTBE water contamination and providing flexibility in the fuels marketplace. In 2003, the Renewable Fuels Association will continue to work with our partners toward enactment of federal legislation that includes the fuels agreement.

The U.S. ethanol industry and American farmers have demonstrated their ability to build a more secure energy future for the United States. While we fully expect to set new industry growth records in 2003, the Renewable Fuels Association will continue to develop new markets and new uses for ethanol in the U.S. and around the world.

Bob Dinneen President and CEO, Renewable Fuels Association

The U.S. ethanol industry is comprised of 68 production facilities in 20 states capable of producing more than 2.7 billion gallons of ethanol each year. – February 2003

2002 U.S. ETHANOL INDUSTRY RECORDS

- ▲ Record Number of New Ethanol Plants Completed
- ▲ Record Ethanol Production Capacity
- ▲ Record Ethanol Production
- ▲ Record Ethanol Use
- ▲ Record Market Penetration

"Ethanol can deliver a number of important benefits to gasoline. For example, it is a valuable source of octane, and it will help refiners meet air toxics emissions standards. Because of these properties, its use is likely to substantially increase."

 Red Cavaney, President and CEO of the American Petroleum Institute, speaking to RFA's 2002 National Ethanol Conference

Building A Secure Energy Future

2002 was a year of unprecedented expansion for the U.S. ethanol industry. The industry responded to rising demand for a clean alternative to MTBE and for increased use of domestic fuels. The headline of the year was **record growth**: growth in the number of ethanol plants; growth in ethanol production; and, growth in ethanol use across the country.

While the U.S. ethanol industry has sustained steadily increasing production over the past two decades, 2002 clearly stands out. For the first time, ethanol production exceeded 2 billion gallons. Twelve new state-of-the-art ethanol production facilities came on line. And ethanol opened a major new market in California. U.S. fuel marketers are increasingly turning to ethanol as a stabilizing, cost-effective, high octane gasoline additive.

Record Ethanol Production Capacity

In response to growing market opportunities, the ethanol industry built annual production capacity to a record 2.7 billions gallons at the end of 2002. This represents an increase of more than one billion gallons compared to only three years ago.

Growth will continue to dominate the ethanol industry. With several plants under construction and a number of expansions to existing facilities under way, ethanol production capacity will surpass 3 billion gallons during 2003. Dozens of projects under development will ensure continued growth in the future.



ANNUAL U.S. ETHANOL PRODUCTION CAPACITY



STATE ETHANOL PRODUCTION CAPACITY

/year

State	Million gallons
Illinois	766
lowa	695
Nebraska	422
Minnesota	393.6
South Dakota	371
Indiana	95
Missouri	80
Kansas	79.5
Wisconsin	79
Tennessee	65
Michigan	45
North Dakota	33.5
Kentucky	24
New Mexico	15
California	9
Idaho	6
Wyoming	5
Florida	4
Colorado	
Washington	
T ()	

Total 3189.8 mgy Includes gallons currently under construction.

> "Over the last two years, ethanol plant designers and builders around the country proved we could rapidly expand ethanol production capacity to meet new demand. And we can continue this pace for years to come."

- Jeff Broin, Broin Companies President and CEO



California Refiners Switch to Ethanol

"We considered all of the factors within our control and determined that we could transition from MTBE to ethanol early. We look forward to providing our customers with the same quality gasoline, only without MTBE."

- Bob Malone, BP Regional President, May 2, 2002

"This switch to ethanol is the embodiment of our earlier commitment to move away from MTBE in our products as soon as it was feasible. We feel certain that the necessary supply of ethanol is available."

- Rob Routs, President of Shell Oil Products US, June 12, 2002

"In keeping with our commitment to providing California consumers with gasoline that meets the state's environmental standards, we will phase out MTBE and convert to ethanol by early 2003."

- Prem Nair, ExxonMobil Spokeswoman, July 10, 2002

"We have fulfilled a commitment to our customers and to the state to offer non-MTBE gasoline as quickly as possible."

 Mark Harper, Phillips Petroleum Company Vice President, July 22, 2002



Source: U.S. Energy Information Administration/Renewable Fuels Association

Record Ethanol Production

response to the growing demand for domestic, renewable fuels from coast to coast, the U.S. ethanol industry produced a record **2.13 billion gallons** in 2002. This represents a 20 percent increase over 2001 and a 45 percent increase over 1999. The industry set an all-time monthly production record of 176,000 barrels per day in December.

Seeds for Growth

The seeds for 2002's record growth were planted in June of 2001 when, following two years of scientific analysis and public comment, the U.S. Environmental Protection Agency (EPA) denied a request by the state of California to be exempted from the federal Clean Air Act (CAA) reformulated gasoline (RFG) oxygenate requirement. California sought the waiver after banning the use of MTBE due to widespread water contamination. In the absence of a waiver, California refiners need a practical substitute oxygenate – ethanol.

> Although California's MTBE ban doesn't take affect until the end of 2003, all major refiners in California are responding to customer demands for MTBE-free gasoline and are voluntarily switching to ethanol in early 2003. It is estimated that ethanol-blended fuels will account for approximately 80 percent of the California market in 2003.

2002 ETHANOL USE

Market	Purpose	Million gallo
Federal reformulated gasoline	Oxygenate	700
Federal winter oxygenated fuels .	Oxygenate	250
Minnesota oxygenated fuels	Oxygenate	250
Conventional gasoline	Octane/Extender	900



Building Energy Security One Ethanol Plant At A Time

The announcement that California would not be granted a special waiver from the CAA oxygenate requirement set off the largest ethanol plant construction boom in the history of the industry. A record twelve new ethanol plants were completed and brought on line in 2002. This represents more than twice as many plants completed than in any previous year. These 12 new plants, combined with six expansions to existing facilities, added more than 400 million gallons of production capacity to the industry.

Ethanol Plants Under Construction

And the ethanol industry is not slowing down. Several ethanol plants are currently under construction. These plants, combined with expansions to existing plants, will increase ethanol production capacity by more than 400 million gallons. Many more plants are under development and are expected to begin construction in 2003.

Demand for Clean, High Performance Ethanol Grows.

Demand for ethanol grew in both federal reformulated gasoline (RFG) markets as an oxygenate and in conventional gasoline markets as a cost-effective octane enhancer. It is estimated that more than 18 percent of all U.S. gasoline is blended with ethanol. "We need an energy bill in America. An energy bill that enhances renewables like ethanol. An energy bill that makes us less dependent on foreign sources of crude oil."

- President George W. Bush, September 19, 2002

"We have to realize that our fuel distribution... systems are almost certainly going to come under attack in some way. Their high degree of centralization and their fragility to terrorist attack is a serious matter. One thing we have to be looking at is how to decentralize and how to make more flexible and less fragile our energy distribution networks. It means local production of renewable fuels...rather than relying on imports and central fuel stations."

R. James Woolsey, former Director,
U.S. Central Intelligence Agency, November 1, 2001





Source: U.S. Energy Information Administration



Source: U.S. Energy Information Administration

Building Energy Security

An unfettered supply of affordable energy is crucial to U.S. security and economic health. Yet, recent events have reminded us of the high price we pay for imported energy. With U.S. dependence on foreign oil projected to grow from 57% in 2002 to 68% in 2025, our country increasingly relies on crude oil supplies from very unstable regions of the world, including some counties, like Iraq, that sponsor world terrorism. Continued unrest and the shadow of war in the Middle East coupled with political upheaval in Venezuela have focused attention on the need to develop a comprehensive, national energy policy.

Domestic, Renewable Fuels Are Part of the Solution

Citing the need to decrease the nation's reliance on imported energy, in 2002 the 107th Congress came close to passing comprehensive national energy legislation. The 108th Congress will continue to pursue energy legislation in 2003. To be successful, U.S. energy policy must include both incentives to conserve energy as well as to increase domestic energy production. Increasing

> the production and use of ethanol will directly increase fuel supplies, and reduce our need for imported crude oil and refined petroleum products. Ethanol use also helps to mitigate possible disruptions in the fuel supply that could result due to the refining industry operating at near capacity levels.

Renewable Fuels Protect American Consumers

Energy legislation considered in 2002 included an historic fuels agreement supported by a unique and remarkable coalition of agriculture, petroleum, environmental and public health interests. The agreement sought to ensure greater flexibility in the fuels marketplace for refiners while addressing concerns regarding MTBE water contamination, protecting air quality, and providing a growing market for renewable fuels such as ethanol and biodiesel by creating a Renewable Fuels Standard (RFS). The RFS would gradually increase the amount of renewable fuels in the U.S. fuels marketplace to 5 billion gallons a year by 2012.

As Congress continues to debate energy legislation in 2003, the fuels agreement and the RFS will again be a central component. By increasing fuel supplies and diversifying the energy sector, an RFS stands to benefit consumers by reducing fuel prices at the pump and protecting against the environmental threat and increasing costs associated with MTBE.

RFS Fuels Agreement Reduces Gasoline Prices

Enactment of the fuels agreement and the RFS would reduce the cost of gasoline, according to recent studies completed by the U.S. Energy Information Administration and the American Petroleum Institute. The RFS fuels agreement replaces the reformulated gasoline oxygen requirement with a nationwide RFS that allows petroleum refiners to use renewable fuels where and when it is most cost-effective, thereby increasing flexibility in the fuels marketplace. In addition, the fuels agreement includes a national ban on MTBE and measures to ensure air quality gains from federal clean fuel programs are maintained.

Implementing a renewable fuels standard would reduce crude oil imports by 1.6 billion barrels and cut the U.S. trade deficit by \$34.1 billion through 2012.

Every 1 Btu of liquid fuel used to produce ethanol yields a 6.34 Btu output, thereby greatly enhancing U.S. energy security. – U.S. Department of Agriculture, July 2002 "[The renewable fuels standard] is a provision the Administration supported and will continue to support next year."

> U.S. Department of Agriculture Secretary Ann Veneman, December 4, 2002

U.S. Fuel Ethanol Production Capacity

Company	Location	Feedstock	Current Capacity (mgy)	Under Construction/ Expansions (mgy)
Ace Ethanol	Stanley WI	Corn	15	
	Lena II	Corn	19	
A E Stolov		Corn	40	
	Hostings NE	Corn	63 E2	
		Corn	32	
		Corn	37	
	Crofton ND	Corn	10 5	
Alchem Clean Fuel t		Corn	10.5	
		Corn	30	00
Algoma Ethanol 🔶	Usnkosn, WI	Corn	1070	20
Archer Daniels Midland	Decatur, IL Cedar Banida, IA	Corn	1070	
	Clinton, IA	Corn		
	Columbus, NE	Corn		
	Marshall, MN	Corn		
	Peoria, IL	Corn		
	Wallhalla, ND	Corn/barley		
Badger State Ethanol, LLC ★	Monroe, WI	Corn	40	
Big River Resources, LLC **	West Burlington, IA	Corn		40
Broin Enterprises, Inc.	Scotland, SD	Corn	9	
Cargill, Inc.	Blair, NE	Corn	83	
	Eddyville, IA	Corn	35	
Central MN Ethanol Coop 🛧	Little Falls, MN	Corn	20	
Chief Ethanol	Hastings, NE	Corn	62	
Chippewa Valley Ethanol Co. ★	Benson, MN	Corn	21	20
Commonwealth Agri-Energy, LLC ★ 🕈	Hopkinsville, KY	Corn		20
Corn Plus ★	Winnebago, MN	Corn	44	
Dakota Ethanol, LLC ★	Wentworth, SD	Corn	47	
DENCO, LLC ★	Morris, MN	Corn	20	
ESE Alcohol Inc.	Leoti, KS	Seed corn	1.5	
Ethanol2000, LLP ★	Bingham Lake, MN	Corn	30	
Glacial Lakes Energy, LLC ★	Watertown, SD	Corn	45	
Golden Cheese Company of California ★	Corona, CA	Cheese whey	5	
Golden Triangle Energy, LLC ★	Craig, MO	Corn	20	20
Gopher State Ethanol	St. Paul, MN	Corn	15	
Grain Processing Corp.	Muscatine, IA	Corn	10	
Great Plains Ethanol, LLC ★ 🕈	Chancellor, SD	Corn		40
Heartland Corn Products ★	Winthrop, MN	Corn	35	
Heartland Grain Fuels, LP ★	Aberdeen, SD	Corn	8	
	Huron, SD	Corn	14	
High Plains Corp.	York, NE Colwich, KS Portales, NM	Corn/milo	50 20 15	
Husker Ag, LLC ★ 🕈	Plainview, NE	Corn		20

Company	Location	Feedstock	Current Capacity (mgy)	Under Construction/ Expansions (mgy)
lames Valley Ethanol II C 🐟	Groton SD	Corn		45
J.R. Simplot	Caldwell, ID Burley, ID	Potato waste	6	
KAAPA Ethanol, LLC ★◆	Axtell, NE	Corn		40
Land O' Lakes ★	Melrose, MN	Cheese whey	2.6	
Lincolnland Agri-Energy Coop **	Robinson, IL	Corn		40
Little Sioux Corn Processors, LLC **	Marcus, IA	Corn		40
Manildra Energy Corp.	Hamburg, IA	Corn/milo/ wheat starch	8	
Merrick/Coors	Golden, CO	Waste beer	1.5	
Michigan Ethanol, LLC	Caro, MI	Corn	45	
MGP Ingredients, Inc.	Pekin, IL Atchison, KS	Corn/wheat starch	78	
Midwest Grain Processors *	Lakota, IA	Corn	45	
Miller Brewing Co.	Olympia, WA	Brewery waste	0.7	
Minnesota Energy ★	Buffalo Lake, MN	Corn	18	
New Energy Corp.	South Bend, IN	Corn	95	
Northeast Missouri Grain, LLC ★	Macon, MO	Corn	22	18
Northern Lights Ethanol, LLC ★	Big Stone City, SD	Corn	45	
Permeate Refining	Hopkinton, IA	Sugars/starches	1.5	
Pine Lake Corn Processors, LLC **	Steamboat Rock, IA	Corn		20
Plover Ethanol	Plover, WI	Corn	4	
Pro-Corn, LLC ★	Preston, MN	Corn	40	
Quad-County Corn Processors *	Galva, IA	Corn	18	
Reeve Agri-Energy	Garden City, KS	Corn/milo	12	
78th Street Ethanol, LLC	Blairstown, IA	Corn	5.5	
Siouxland Energy & Livestock Coop ★	Sioux Center, IA	Corn	14	
Tall Corn Ethanol, LLC ★	Coon Rapids, IA	Corn	45	
Tri-State Ethanol Co., LLC ★	Rosholt, SD	Corn	18	
U.S. Energy Partners, LLC	Russell, KS	Milo/wheat starch	40	
U.S. Liquids	Louisville, KY	Beverage waste	4	
	Bartow, FL R. Cucamonga, CA		4 4	
VeraSun Energy Corp. 🔶	Aurora, SD	Corn		100
Williams Bio-Energy	Pekin, IL Aurora, NE	Corn Corn	100 35	
Wyoming Ethanol	Torrington, WY	Corn	5	
Total Existing Capacity			2706.8	
Total Under Construction/Expansions				483.0

TOTAL CAPACITY

3189.8

"Ethanol-blended gasoline is superior to non-oxygenated fuels in terms of reducing harmful emissions and maintaining the existing air quality benefits of the reformulated gasoline program. Additionally, for each gallon of gasoline replaced by ethanol, carbon dioxide emissions – a key contributor to global warming – are reduced by 35 percent." – Brooke Coleman, Renewable Energy Action Project (REAP) Director



Ethanol Protects Our Environment

Ethanol is a preferred motor fuel because of its proven ability to reduce harmful vehicle emissions, thereby protecting the environment and public health. Ethanol contains 35% oxygen by weight. By increasing the amount of oxygen in fuel, ethanol enhances engine combustion and reduces harmful tailpipe emissions of carbon monoxide (CO), particulate matter (PM10), oxides of nitrogen (NOx) and other ozone-forming pollutants. Ethanol also displaces gasoline additives like benzene, a known human carcinogen, and aromatics which are highly toxic. For these reasons, ethanol is widely used in federal and state clean fuel programs.

Reformulated Gasoline (RFG)

The Clean Air Act Amendments of 1990 (CAA) established the federal RFG program, which requires the addition of oxygenates, to reduce harmful ground level ozone (smog) in urban areas. As states ban the use of MTBE, a petroleum derived chemical, ethanol is increasingly the oxygenate of choice.

Winter Oxygenated Fuels

The CAA also created the federal winter oxygenated fuels program in order to reduce carbon monoxide (CO) pollution. Because of its higher oxygen content, ethanol has been the oxygenate of choice in this program. More than two-thirds of the original nonattainment areas have successfully reduced CO pollution.

Gross Polluters

Although they make up only 10% of the vehicle fleet, over half of vehicle emissions come from gross polluters (older vehicles and new cars with malfunctioning pollution control systems). Studies show ethanol-blended fuels reduce emissions of CO and hydrocarbons by 20% and fine particulate by 40% in these vehicles.

Off-Road Engines

Ethanol is one of the best tools for reducing pollution from off-road engines, such as motorcycles, ATVs, snowmobiles, personal watercraft, and lawn mowers, which lack pollution control devices.

Ethanol Harnesses the Power of the Sun

Plants used in ethanol production harness the power of the sun to grow. By releasing the energy stored in corn and other feedstocks, ethanol production utilizes solar energy, replacing fossil energy use.

In fact, a life cycle analysis of ethanol production – from the field to the car – by the U.S. Department of Agriculture in 2002 found that ethanol has a large and growing positive fossil energy balance. Simply put, ethanol yields 34% more fossil energy than is used to grow and harvest the corn and process it into ethanol. Ethanol is the ONLY liquid transportation fuel that can make this statement. Other fuels, including MTBE and gasoline, take more fossil energy to produce than they yield.

Renewable Fuels Reduce Greenhouse Gas Emissions

As a renewable fuel, ethanol helps reduce greenhouse gases (GHG) emitted from vehicles, including carbon dioxide (CO₂), methane, and other gases that contribute to global

warming. Recognition of ethanol's ability to reduce GHG emissions has spurred several countries, including Canada, the European Union and Japan to promote its production and use.

The production and use of ethanol represents a carbon cycle. Plants absorb CO_2 during growth, thereby "recycling" the carbon released during fuel combustion. A fuel cycle analysis by Argonne National Laboratory concluded the use of ethanol-blended fuels reduces GHG emissions by 12 to 19%. "In 2002, ethanol use in the U.S. reduced CO_2 -equivalent greenhouse gas emissions by approximately 4.3 million tons, equal to removing the annual emissions of more than 636,000 cars from the road."

Source: Argonne National Laboratory

ENERGY YIELD OF TRANSPORTATION FUELS FOR 1 BTU OF FOSSIL INPUT

Ethanol1.389	Btu
Gasoline	Btu
MTBE	Btu
Source: Argonne National Laborate	ory





ETHANOL HAS A POSITIVE NATIONAL IMPACT

The benefits of ethanol production are felt throughout the entire country as the ripple affect of local activity reaches from coast to coast. The production of ethanol in the U.S.:

- ▲ Boosts total U.S. employment by 192,000 jobs
- ▲ Improves the U.S. trade balance by \$2 billion
- ▲ Adds over \$450 million to state tax receipts
- ▲ Increases net farm income by \$4.5 billion
- Provides a net savings to the Federal Treasury of \$3.6 billion each year

Source: Dr. Michael Evans, Kellogg School of Management, "The Economic Impact of the Demand for Ethanol"



Building Rural Economies Today

Ethanol production facilities are local economic engines throughout rural America – creating high-paying jobs, investment opportunities, value-added markets for farmers, and increased local tax revenue. Communities will often compete to attract a proposed ethanol plant to their area because of their tremendous economic benefits.

Ethanol and the Local Community

A recent study found that an average 40 million gallon per year ethanol plant will have the following positive economic impacts on a local community:

- Provide a one-time boost of \$142 million to the local economy during construction.
- Expand the local economic base of the community by \$110.2 million each year through the direct spending of \$56 million.
- Create 41 full-time jobs at the plant and a total of 694 jobs throughout the entire economy.
- ▲ Increase the local price of corn by an average of 5-10 cents a bushel, adding significantly to farm income in the general area surrounding the plant.
- ▲ Increase household income for the community by \$19.6 million annually.
- Boost state and local sales tax receipts by an average of \$1.2 million (varies depending on local rates).
- Provide an average 13.3% annual return on investment over ten years to a farmer who invests \$20,000 in an ethanol production facility.

Source: "Ethanol and the Local Community," John Urbanchuk, AUS Consultants and Jeff Kapell, SJH & Company, June 2002

Securing the Future of the American Farm

Ethanol production is the third largest and fastest growing market for U.S. corn. In 2002, over 800 million bushels of corn were processed into ethanol and valuable feed co-products, boosting corn prices by 30 to 40 cents per bushel nationally. Additionally, 45 million bushels of grain sorghum were used in the production of ethanol.

Farmers Invest in Their Future

The recent boom in ethanol plant construction has been spearheaded by farmers seeking to capture new valueadded markets for the commodities they grow. Since 1999, farmer-owned ethanol plants have increased their percentage of total production capacity from 20% to over 35%. Today, 70% of the ethanol plants under construction are farmer-owned.

Renewable Fuels Standard Grows Farm Economy

According to a study conducted on behalf of the National Corn Growers Association, enacting a renewable fuels standard that increases ethanol use to 5 billion gallons by 2012 would:

- ▲ Boost corn use to more than 2 billion bushels per year
- ▲ Increase corn prices by 6.8% above baseline projections
- ▲ Add \$51 billion to farm income through 2012
- ▲ Reduce direct government payments to farmers by \$5.9 billion through 2012

Source: "Impact of the Renewable Fuels Standard on the U.S. Agriculture Sector," John Urbanchuk, AUS Consultants, September 2002



CORN UTILIZED IN ETHANOL PRODUCTION

Source: National Corn Growers Association



Find more information on the nutritional benefits of ethanol feed co-products at: www.ethanolRFA.org/pubs_reports.shtml#feedco



"We currently are using DDGS in our swine operation. The use of DDGS reduced our ileitis by 80-90%. In less than one year we were able to decrease our drug use by 50%, increasing our bottom line."

- Jim Heinricy, Heinricy Brothers



Value-Added Processing Yields Quality Co-Products

Ethanol producers are also food producers. In addition to ethanol, which is produced from the starch in the grain, the production process concentrates the vitamins, minerals, protein and fiber in a high-value feed for livestock, including beef, poultry, pork and dairy. Ethanol production is a clear example of value-added agricultural processing.

Dry mill facilities grind the grain and process it without separating the various components. The resulting feed co-product is Distillers Dried Grains with Solubles (DDGS). Instead of grinding, wet milling facilities soak or "steep" the grain to separate its many parts. The germ is processed for corn oil. The fiber and concentrated steeping liquid are co-dried and sold as corn gluten feed. The gluten (protein) is dried to produce gluten meal, a highly sought after feed for poultry.

In 2002, dry milling facilities represented approximately 60% of U.S. ethanol production, while wet mills accounted for 40% of production. Ethanol dry mills produced approximately 4 million short tons of DDGS. Ethanol wet mills produced approximately 450,000 short tons of corn gluten meal, 2.5 million short tons of corn gluten feed and germ meal, and 530 million pounds of corn oil.

FOOD AND FUEL PRODUCTS

Gluten Feed 11.4 Pounds — Corn Oil 1.6 Pounds — Gluten Meal 3 Pounds — Starch 32 Pounds —



1 bushel of corn = 2.7 gallons of ethanol Source: National Corn Growers Association

Fueling the Future

CONSUMERS' demand for high performance, environmentally friendly fuels and technological advances in vehicle propulsion present new market opportunities for ethanol. Whether reducing emissions from diesel fuel, providing a renewable source of hydrogen for fuel cells, or expanding feedstock options, the opportunities for ethanol stretch well beyond current gasoline markets. The Renewable Fuels Association (RFA) is working to promote ethanol in these cutting edge markets.

Reducing Diesel Emissions

The Renewable Fuels Foundation, the research and education arm of the RFA, is home to the E diesel[™] Consortium. The use of E diesel[™], a mixture of ethanol, diesel, and a blending agent, could result in hundreds of millions of gallons of additional ethanol use. Positive demonstrations in trucks, farm equipment and buses have indicated great promise, but significant challenges, both technical and regulatory, remain before commercialization of E diesel[™] can become a reality. The E diesel[™] Consortium is committed to providing the technical expertise and financial support to identify and address these issues.

Growing the Ethanol Industry with Cellulose

Much progress has been made by both the private and public sectors on the technology of converting cellulose feedstocks, including corn stalks, rice straw, forest thinnings, yard waste, switchgrass and municipal solid waste, into ethanol. In the future, cost-effective cellulose conversion will dramatically increase production capabilities for ethanol while solving environmental waste disposal issues as well.

Providing a Clean Source of Hydrogen for Fuel Cells

The RFA Fuel Cell Task Force works to promote the advantages of ethanol as a fuel source for both mobile and stationary fuel cells. As a renewable fuel, ethanol used in fuel cell applications generates far fewer greenhouse gases than conventional fuels such as gasoline or natural gas. Unlike other alternative fuels such as hydrogen or methanol, ethanol has a very positive environmental, health and safety footprint with no major uncertainties or hazards. Ethanol can be used alone or blended with gasoline to create an improved fuel cell fuel that is easily stored and dispensed. Unlike most other options, ethanol's distribution infrastructure is complete to the terminal level.

The U.S. Department of Energy has partnered with Caterpillar Inc., Nuvera Fuel Cells and Williams Bio-Energy to demonstrate the nation's first commercial ethanol powered fuel cell. With the design complete and fabrication well underway, the 13-kilowatt

stationary fuel cell system is scheduled to power Williams' visitor center in Pekin, Illinois this year.

NUVERA ETHANOL FUEL CELL



View the RFA Fuel Cell white paper at: www.ethanoIRFA.org/RFA_Fuel_Cell_ White_Paper.PDF

Renewable Fuels Association Associate Members

Addition to producer members, the RFA includes ethanol production facilities under construction and a broad cross-section of businesses and organizations that provide goods and services to the ethanol industry. Associate Members play a critical role in the success and growth of the RFA.

Associate Members

AAE Technologies, Inc. Falls Church, VA

Adkins Energy, LLC Lena, IL

Alltech Biotechnology Nicholasville, KY

BBI International Cotopaxi, CO

Badger State Ethanol, LLC Monroe, WI

Bratney Companies Des Moines, IA

Byrne & Company Limited *Preston, MN*

California Renewable Fuels Council *Fullerton, CA*

Christianson & Associates, PLLP Willmar, MN

Delta-T Corp. Williamsburg, VA

Didion Milling Inc. Johnson Creek, WI

Dorsey & Whitney LLP Minneapolis, MN

Eco-Energy, Inc. Nashville, TN

Ethanol Products, LLC Wichita, KS

Fagen, Inc. Granite Falls, MN

FCStone, LLC West Des Moines, IA First Capitol Group, LLC Platteville, WI

GE Betz The Woodlands, TX

Genencor International, Inc. *Rochester, NY*

Grace Davison Molecular Sieves Houston, TX

Growmark, Inc. Bloomington, IL

The Hays Group Minneapolis, MN

ICM, Inc. Colwich, KS

Iogen Corp. Ottawa, Ontario, Canada

KAAPA Ethanol, LLC Axtell, NE

Kinergy, LLC Davis, CA

Land O'Lakes Farmland Feed, LLC *Shoreview, MN*

Lindquist & Vennum PLLP Minneapolis, MN

Little Sioux Corn Processors, LLC Marcus, IA

Lubrizol Corporation Wickliffe, OH

Lurgi PSI, Inc. Memphis, TN

Masada Oxynol, LLC Birmingham, AL Monsanto St. Louis, MO National Corn Growers Association

North America Bioproducts Corp. Lawrenceville, GA

Novozymes North America, Inc. Franklinton, NC

Octel Starreon, LLC Littleton, CO

St. Louis, MO

Pioneer, A DuPont Company Johnston, IA

Pure Energy Corp. Paramus, NJ

Quad County Corn Processors Galva, IA

The Scoular Company Overland Park, KS

SJH & Company, Inc. Danvers, MA

Starcon International, Inc. Manhattan, IL

Stearns Bank, N.A. St. Cloud, MN

Tall Corn Ethanol, LLC Coon Rapids, IA

Tranter PHE, Inc. Wichita Falls, TX

VeraSun Energy Corporation Brookings, SD

Wittig Energy Resources, LLC McPherson, KS



Renewable Fuels Association

Established in 1981, the Renewable Fuels Association

(RFA) is the national trade association representing the U.S. ethanol industry. The RFA is dedicated to expanding the production and consumer use of renewable ethanol in U.S. fuel markets. Membership includes ethanol producers, marketers and blenders, equipment manufacturers, engineering and design companies, agricultural organizations, and members of consumer and environmental groups.

Goals and Objectives:

- Promote policies and programs advantageous to the development and use of ethanol fuels to the U.S. Congress, the Administration, and other federal, state and local government entities.
- Provide technically accurate and timely information on ethanol to consumers, gasoline marketers, auto manufacturers and technicians and the media.
- Participate in educational activities to increase public awareness concerning the production and use of ethanol as well as an understanding of ethanol's contribution to the environment, America's energy independence and national security.

RFA Committees:

- Education and Promotion Committee
- ▲ E diesel[™] Consortium
- Fuel Cell Task Force
- Membership Committee
- Technical Committee

For more information about the RFA, including membership inquiries, please contact the RFA office at 202-289-3835, or visit our web site at www.ethanolRFA.org.