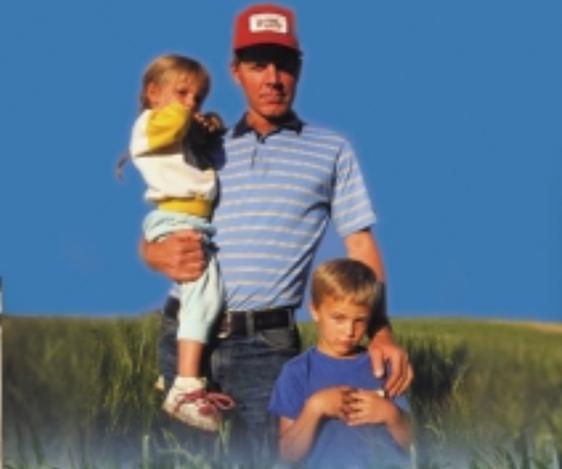


# ETHANOL

*Clean Air, Clean Water, Clean Fuel*

INDUSTRY OUTLOOK 2001



biomass H H domestic  
oxygenate engine performance home-grown energy  
flexible employment RFA C C O H  
consumer benefits Renewable Fuels Association environmentally-friendly  
renewable H H

# RENEWABLE FUELS ASSOCIATION

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Vice Chairman: Gary Smith, High Plains Corp.

Treasurer: L. Dan Thompson, Minnesota Corn Processors

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February, 2001

For the U.S. ethanol industry, 2000 was a year marked by record growth and development. Anticipation of a greater role for ethanol in clean burning fuel programs as well as high oil prices, a bumper corn crop, limited refining capacity and promising new market opportunities resulted in record production of more than 1.63 billion gallons of ethanol.

Today the industry boasts the capacity to produce more than 2 billion gallons of production annually. New plants scheduled to begin production in 2001 will contribute to the industry's ability to respond to growing market demand for clean burning octane and oxygenates. Importantly, these new facilities will provide much-needed economic stimulus to rural communities faced with record low commodity prices and shrinking export markets.

The unfortunate controversy surrounding widespread water contamination from the use of MTBE presents both an opportunity and a challenge for the ethanol industry. The expanded use of ethanol, a biodegradable and renewable oxygenate, represents an opportunity to continue the clean air gains attributable to the addition of oxygenates to gasoline without the threat to water resources. The ethanol industry is committed to providing a safe, clean burning oxygenate to clean fuel programs across the nation, and has demonstrated that ethanol can be supplied and blended cost-effectively from coast to coast.

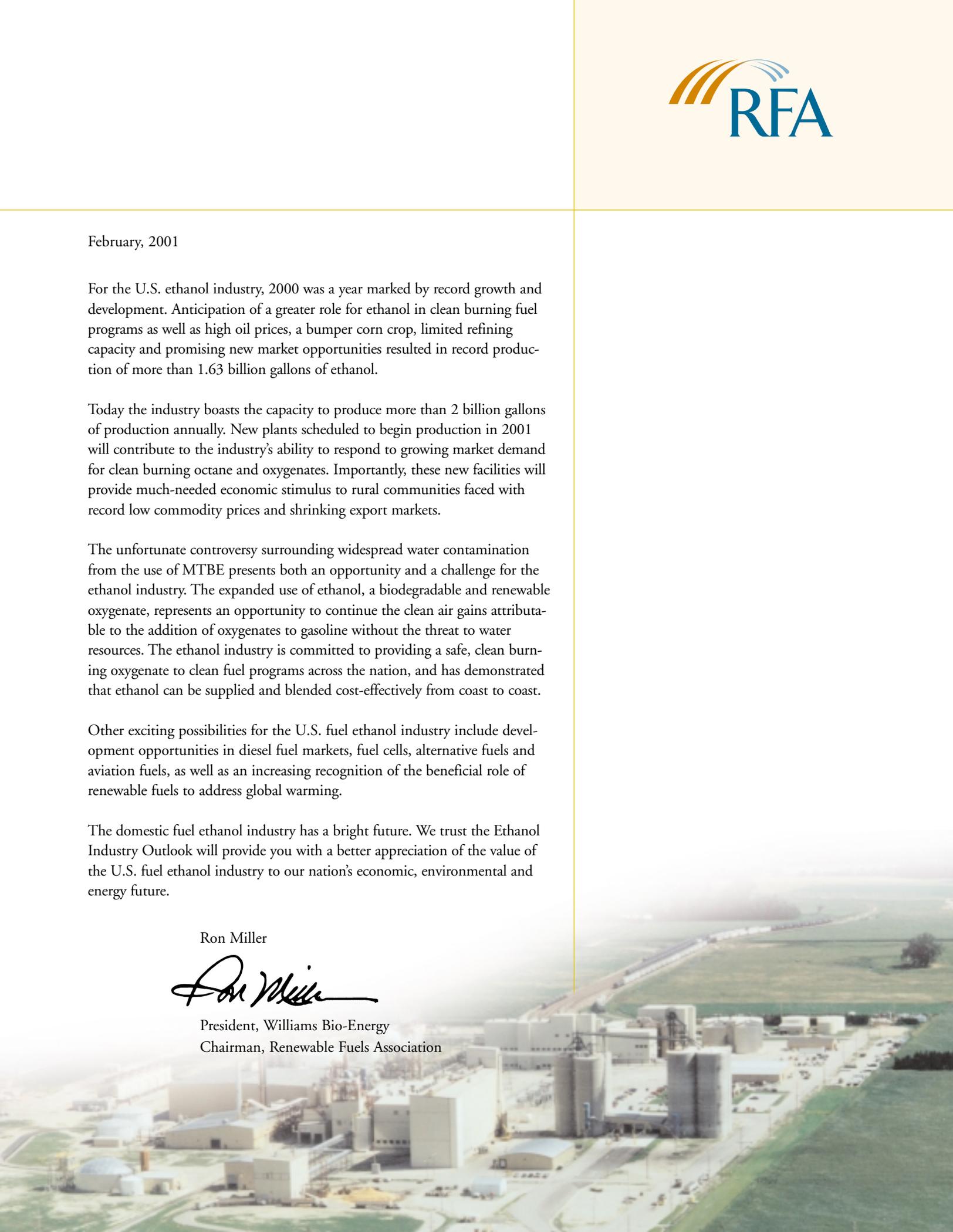
Other exciting possibilities for the U.S. fuel ethanol industry include development opportunities in diesel fuel markets, fuel cells, alternative fuels and aviation fuels, as well as an increasing recognition of the beneficial role of renewable fuels to address global warming.

The domestic fuel ethanol industry has a bright future. We trust the Ethanol Industry Outlook will provide you with a better appreciation of the value of the U.S. fuel ethanol industry to our nation's economic, environmental and energy future.

Ron Miller

A handwritten signature in black ink that reads "Ron Miller".

President, Williams Bio-Energy  
Chairman, Renewable Fuels Association



# ETHANOL TODAY

MORE THAN THREE TRILLION MILES HAVE BEEN DRIVEN ON ETHANOL-BLENDED GASOLINES, AND INTEREST IN EXPANDING THE ROLE OF CLEAN-BURNING, RENEWABLE ALTERNATIVES TO FOSSIL FUELS ENSURES THAT ETHANOL WILL REMAIN AN IMPORTANT PART OF OUR NATION'S FUEL SUPPLY.

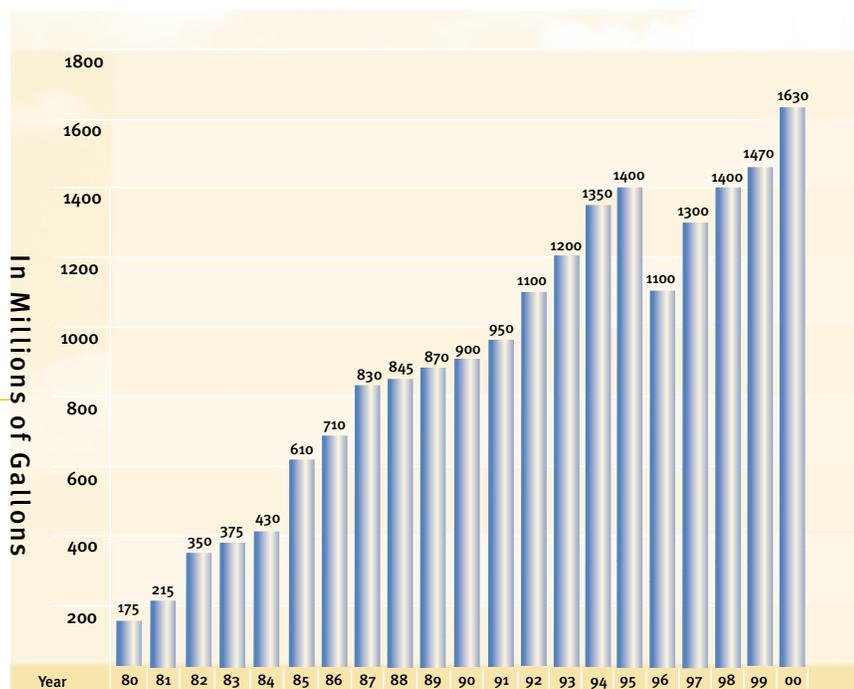
**ETHANOL** *is* **WIDELY MARKETED** across the country to increase octane and reduce emissions through its clean burning properties as an oxygenate. For these reasons, ethanol is blended with gasoline and can be used in concentrations as high as 85% ethanol in specially designed flexible fuel vehicles. Today, more than 15% of U.S. motor fuels contain ethanol.

Ethanol has seen continued growth since the late 1970s when it was used as a product extender (gasohol) during the OPEC oil embargoes, a time of frustrating gasoline shortages and long lines at the pump. In the mid-1980s, when gasoline was again in plentiful supply, ethanol began to see widespread use as a source of octane, replacing other environmentally harmful components of gasoline such as lead and benzene.

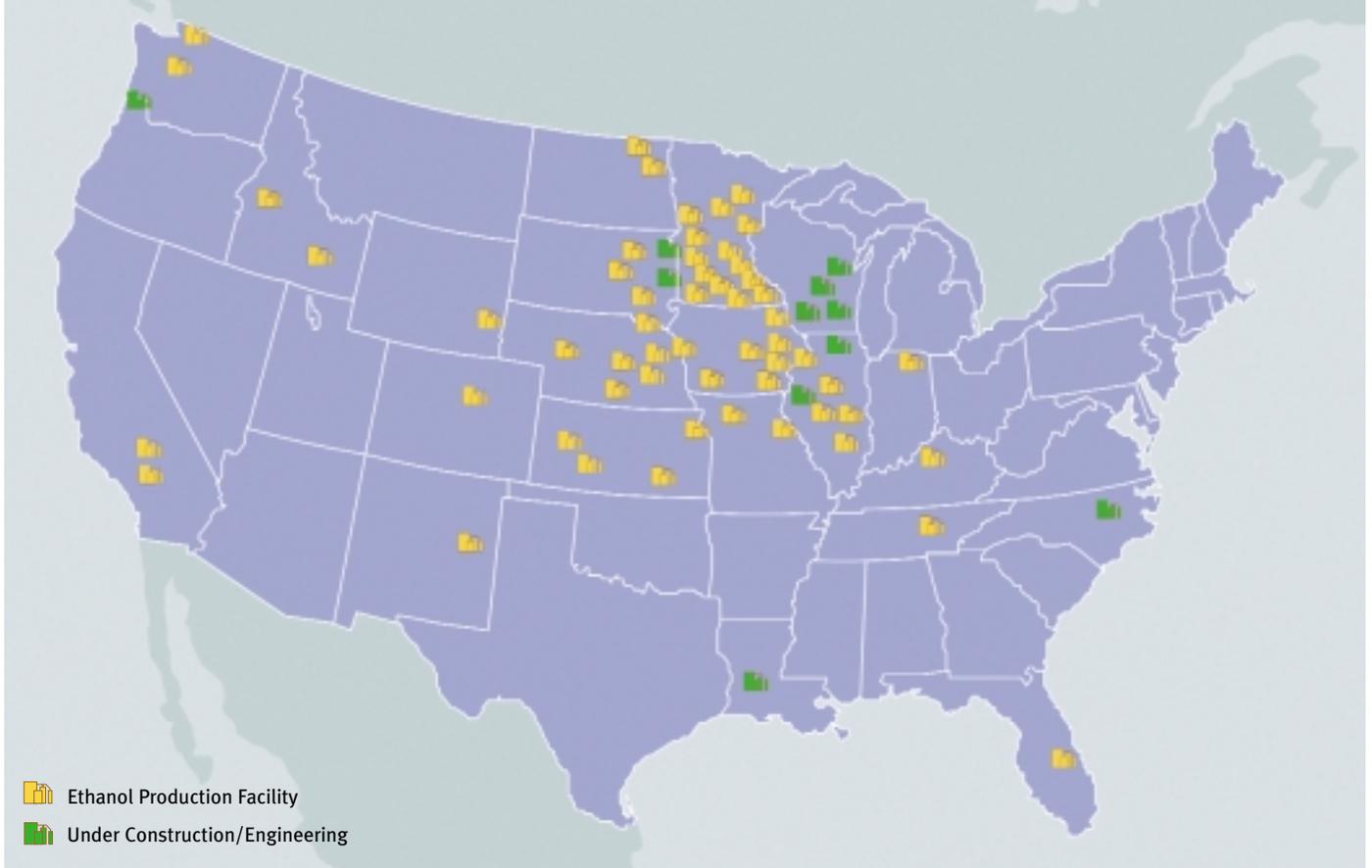
Because of the positive economic and environmental impacts, by a more than 2 to 1 margin Americans support a government requirement that all gasoline contain a small percentage of ethanol, rather than leaving the decision up to the oil industry.

INTERNATIONAL COMMUNICATIONS RESEARCH, OCTOBER 2000

## U.S. Fuel Ethanol Production



Source: Energy Information Administration and Renewable Fuels Association



## U.S. Ethanol Production Facilities

Ethanol's use as an oxygenate increased with the passage of the Clean Air Act Amendments of 1990, which require the addition of oxygenates to gasoline in the nation's most polluted areas. Ethanol, which contains approximately 35% oxygen, enhances combustion and therefore contributes to a more efficient burn of gasoline, reducing carbon monoxide emissions, a contributor to harmful ozone formation, by as much as 30%.

Ethanol's popularity surged to an all-time high in 2000, achieving monthly and annual production records. The U.S. fuel ethanol industry today boasts more than 2 billion gallons of annual production capacity, and will continue to break new records in 2001.

Ethanol is one product that helps America's farmers and aids in making our air cleaner. I support the current ethanol program and would support its extension beyond the 2007 expiration date. I also believe we should encourage the development of new technologies for cost-effectively producing ethanol, bio-diesel fuels, as well as other products.

PRESIDENT GEORGE W. BUSH

# ECONOMIC BENEFITS

**ACROSS AMERICA,** the robust and growing domestic ethanol industry stimulates economic development, particularly in rural communities where ethanol production is often based. Millions of dollars of capital investment has been made in 62 ethanol production facilities located in 20 states. The ethanol industry adds more than \$2 billion to the U.S. economy each year.

Growth in the ethanol industry offers enormous potential for overall economic development and additional employment in these smaller communities. The U.S. Department of Agriculture (USDA) estimates that a 100 million gallon ethanol production facility will create 2,250 local jobs for a single community.

Ethanol production stimulates economic growth in local communities throughout the country. According to a Midwestern Governors' Conference report, ethanol production in the U.S. boosts total employment by 195,200 jobs, improves the U.S. trade balance by \$2 billion, adds over \$450 million to state tax receipts, and increases net farm income by \$4.5 billion. Importantly, the federal ethanol program benefits U.S. taxpayers, resulting in a net savings to the U.S. Treasury of \$3.6 billion each year.

## Positive Impact of Ethanol Program on Federal Budget

TYPE OF REVENUE GAIN/LOSS	\$ MILLIONS
Personal Income Taxes, Wages, Salaries	532
Personal Income Taxes, Farm Income	675
Social Security Taxes	1,608
Decline in Unemployment Benefits Aid	561
Corporate Income Taxes	846
Less Ethanol Tax Incentive	-648
<b>ANNUAL SAVINGS TO FEDERAL BUDGET</b>	<b>\$ 3,574</b>

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

# MARKET GROWTH

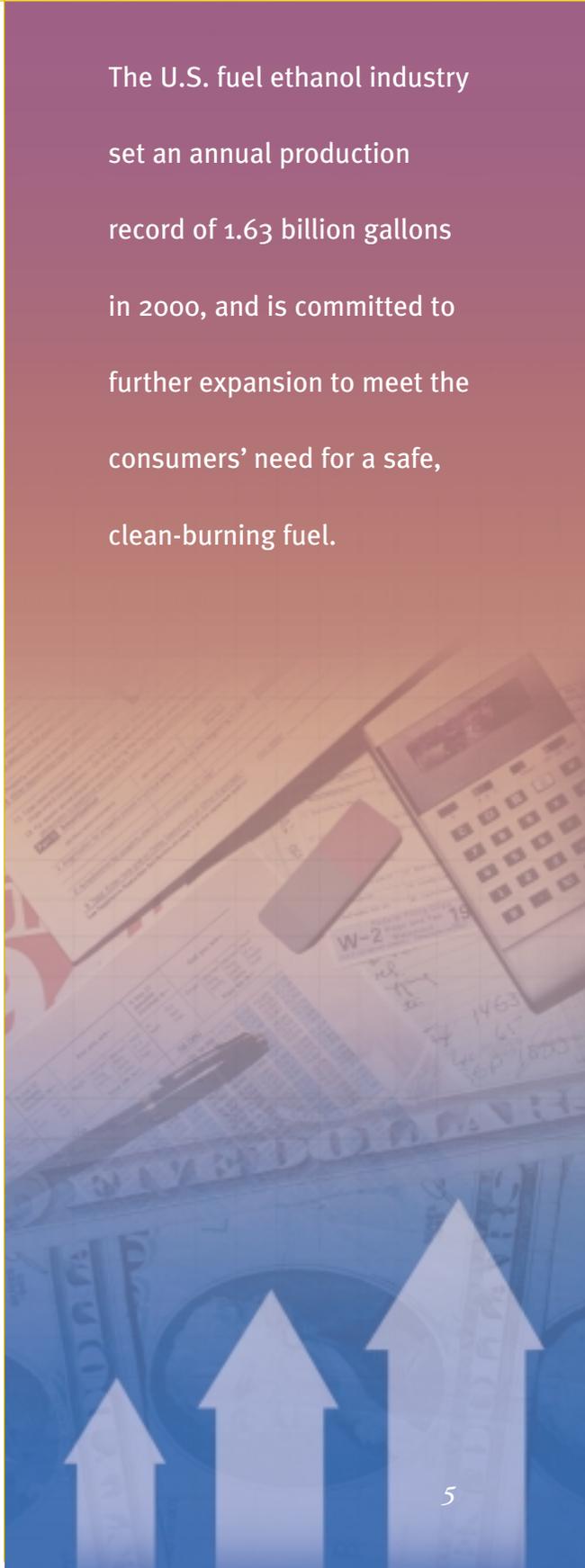
## MORE *and* MORE COMMUNITIES

across the country are looking to ethanol to replace MTBE as the oxygenate of choice in cleaner burning fuels, creating the opportunity for significant industry growth. According to a report completed for the Governors' Ethanol Coalition, *Ability of the U.S. Ethanol Industry to Replace MTBE*, the ethanol industry can double production capacity within two years to meet new demand as MTBE is removed from gasoline. The report finds:

- Replacing MTBE with ethanol would increase the demand for ethanol to nearly 3.2 billion gallons per year by 2004;
- The ethanol industry can increase production capacity to 3.5 billion gallons per year by 2004 - more than will be needed to replace MTBE and meet all other current markets for ethanol;
- The increased capacity would come from increased utilization of existing plants, expansion of existing facilities, new plants currently under construction, and proposed facilities currently in various stages of development;
- Using ethanol to replace MTBE will prevent an oxygenate supply shortage that could result in increased gasoline prices;
- Expanding ethanol capacity will result in \$1.9 billion in new investment;
- Construction activity and increased commodity demand will add \$11.7 billion to real GDP by 2004 and increase household income by \$2.5 billion; and
- Switching to ethanol will create more than 47,800 new jobs throughout the country, many in areas where job creation is difficult.



The U.S. fuel ethanol industry set an annual production record of 1.63 billion gallons in 2000, and is committed to further expansion to meet the consumers' need for a safe, clean-burning fuel.



# ENVIRONMENT & PUBLIC HEALTH

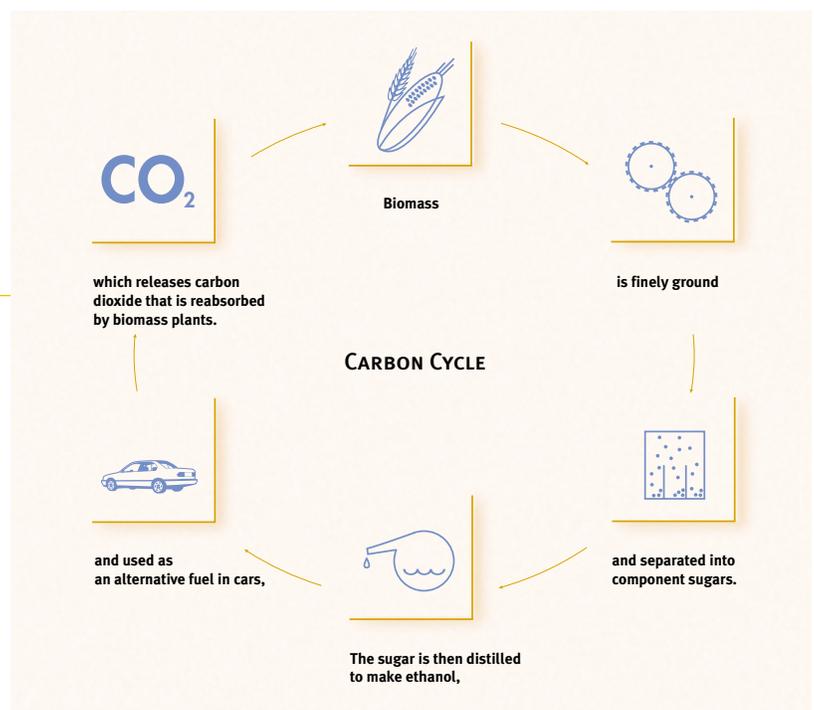
*The USE of ETHANOL* and biofuels for transportation provides an environmentally friendly alternative to fossil fuels. As an oxygenate (ethanol contains 35% oxygen), ethanol enhances the combustion of gasoline, resulting in fewer emissions. The use of ethanol reduces emissions of all the major pollutants regulated by the U.S. Environmental Protection Agency (EPA), including ozone, carbon monoxide (CO), particulate matter (PM10) and oxides of nitrogen (NOx). Ethanol is also an effective tool for reducing air toxics such as benzene and 1,3 Butadiene in gasoline, which the EPA classifies as known or probable human carcinogens.

Because ethanol is a renewable fuel, it reduces greenhouse gas emissions including carbon dioxide (CO<sub>2</sub>), a major contributor to global warming. Plants grown for ethanol production absorb CO<sub>2</sub> from the atmosphere. The carbon from these plants is then converted to ethanol. A recent study by Argonne National Laboratory concluded ethanol produced from corn reduces greenhouse gases by 35-46% compared with gasoline, and there is an even greater reduction from cellulose ethanol.

Ethanol is a safe, biodegradable fuel that does not pose a threat to water, soil or public health, and has been awarded a clean bill of health.

CALIFORNIA ENVIRONMENTAL  
POLICY COUNCIL

Ethanol Reduces  
Greenhouse Gases:





## CLEAN BURNING FUELS

The Clean Air Act Amendments of 1990 created clean fuel programs to help reduce emissions from automobiles in cities across the country that exceed public health standards for ozone and carbon monoxide (CO). These clean fuels contain oxygenates, which provide clean octane and replace cancer-causing aromatics. Today, oxygenated fuels represent about 35% of the nation's gasoline, and ethanol plays an important role in reducing vehicle emissions and improving air quality.

## WINTER OXYGENATED FUELS PROGRAM

The winter oxygenated fuels program targets CO pollution. Because of its high oxygen content, ethanol has been the oxygenate of choice in this program. The "oxyfuel" program has been a tremendous success, with the number of nonattainment areas decreasing by two-thirds since 1990, and areas continue to demonstrate attainment each year.

## REFORMULATED GASOLINE PROGRAM

The reformulated gasoline (RFG) program targets urban areas with severe ozone pollution, better known as smog. The law requires reductions in emissions of ozone-forming volatile organic compounds (VOCs) and toxics. RFG represents about 30% of the nation's total gasoline supply, or 35 billion gallons annually. While the RFG oxygen market has been primarily met with the use of methyl tertiary butyl ether (MTBE), a petroleum-derived chemical, ethanol is used almost exclusively in the Midwest. Ethanol's use in RFG is increasing rapidly with the phase-out of MTBE.

From an air quality perspective, the RFG program has also been a tremendous success. Indeed, about 75 million people are breathing cleaner air because of RFG. According to the U.S. Environmental Protection Agency (EPA), the use of RFG is the equivalent of taking 16 million vehicles off the road each year. The Northeast States for Coordinated Air Use Management credit RFG with reducing the cancer risk from gasoline by about 20%.

The overwhelming majority of evidence suggests that the Clean Air Act's oxygen requirement has substantially reduced air pollution from vehicle emissions.

BLUEWATER NETWORK



## CONSUMERS BENEFIT

*The AVAILABILITY of* ethanol expands our fuel supplies, increasing competition in the marketplace and reducing overall gasoline prices paid by the driving public. Ethanol provides high quality octane for exceptional performance.

The federal ethanol program encourages gasoline marketers and blenders to use ethanol by providing a tax reduction. Gasoline marketers and blenders that use ethanol are eligible for up to a 5.3 cent per gallon reduction from the federal excise tax on gasoline of 18.3 cents/gallon. The incentive, in turn, has enabled smaller, independent gasoline marketers to compete with the major international petroleum companies and provide consumers with an exceptionally cost-competitive fuel. Consumers benefit further because the federal ethanol program provides a net savings to the U.S. Treasury of \$3.6 billion a year.



## A HIGH PERFORMANCE FUEL

Ethanol is a high quality, high-octane fuel capable of reducing air pollution and improving automobile performance. Because ethanol boosts octane, it helps your car run more smoothly. It also keeps your fuel system clean for optimal performance and acts as a gas-line antifreeze. According to the American Institute of Chemical Engineers, pre-ignition and dieseling (run-on) are noticeably reduced and acceleration can be improved with ethanol.

Over the past twenty years, auto manufacturers have made design changes to make vehicles ethanol-compatible and take advantage of ethanol's benefits. Today, every vehicle marketed in the U.S. is approved for the use of up to 10% ethanol-blended fuels. In fact, DaimlerChrysler, Ford and General Motors recommend the use of cleaner-burning fuels such as ethanol because of ethanol's clean air benefits.

## SMALL ENGINE MANUFACTURERS APPROVE OF ETHANOL

Ethanol-blended fuels have been used in small engines and other non-automotive gasoline engines since they first came into the marketplace over 25 years ago. Today, all mainstream manufacturers of power equipment, motorcycles, snowmobiles and outboard motors permit the use of ethanol blends in their products. The Portable Power Equipment Manufacturers Association, representing manufacturers of gasoline-powered hand held equipment such as chain saws and weed trimmers, conducted extensive research on reformulated gasolines and found no operating problems associated with the fuel.

Ethanol is safe to use in any type of engine... Ethanol helps keep fuel injection systems clean so they perform better... Using ethanol-blended fuel in the winter means you won't need to add expensive and possibly harmful additives to your fuel. Ethanol in your gasoline will protect your vehicle from gas-line freeze-up... Using ethanol-blended fuel is one of the easiest ways you can help reduce air pollution and our dependence on imported oil.

MOBIL CORP.  
POINT-OF-SALE BROCHURE



# A VERSATILE FUEL

**ETHANOL** is a versatile fuel that can be blended with gasoline for its octane and oxygen value. It can also be used as an alternative fuel, a source of fuel for fuel cells, blended with diesel, and as an aviation fuel.

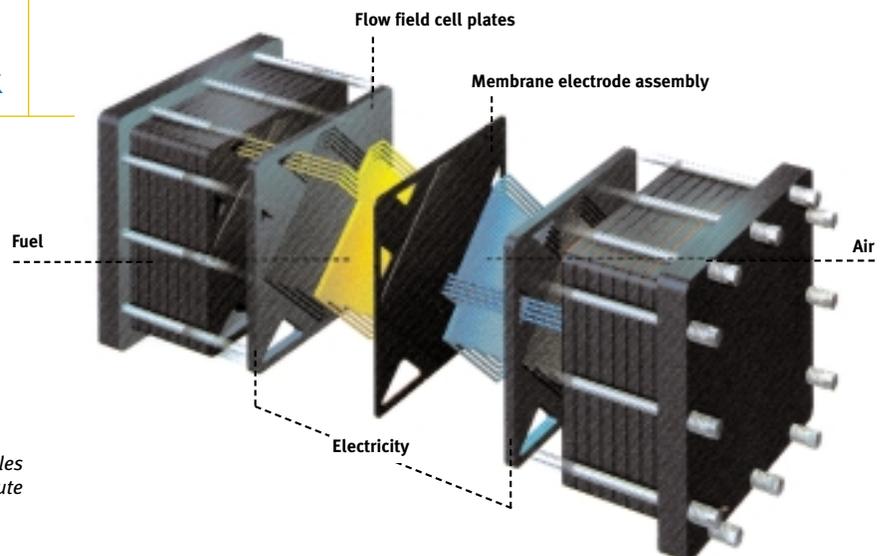
## ETHANOL DIESEL BLENDS

With the introduction of tough new standards for diesel aimed at reducing pollution, the blending of ethanol with diesel presents a significant opportunity to reduce exhaust emissions from diesel-fueled vehicles and equipment. Several companies are currently demonstrating ethanol-blended diesel in programs across the country, and the outlook is bright for this potential new market for ethanol. If ethanol used in diesel fuel achieves the same market penetration as it currently has in gasoline, it would create new demand for nearly 500 million gallons of ethanol.

## FUEL CELLS

The widespread introduction and use of fuel cells could have a major impact on improving air quality in urban areas and reducing petroleum consumption. One challenge has historically stood between fuel cell vehicle technology and its successful commercialization - the storage and supply of hydrogen. The ability to reform, or extract, hydrogen from liquid fuels such as ethanol offers a practical solution to that challenge. Ethanol overcomes both the vehicle storage and fuel infrastructure challenges of hydrogen. Ethanol is also much easier to distribute and is widely used today in the U.S. gasoline distribution system. Demonstrations have shown ethanol provides higher efficiencies, fewer emissions, and better performance than other fuel sources, including gasoline.

### Typical Fuel Cell Stack



Source: *Fuel Choices: For Fuel Cell Powered Vehicles*  
American Petroleum Institute



## BENEFITS OF ETHANOL FOR FUEL CELLS

- High energy density liquid stores well on vehicles
- Reduced greenhouse gas emissions
- Can be easily delivered through existing fuel infrastructure
- Less toxic than methanol and gasoline
- Easier to reform than gasoline, hydrocarbons and most alternative fuels due to its relatively simple molecular structure
- Reduced reliance on fossil fuels and imported energy
- Blendable with gasoline for seamless motor fuel transition

## E85

The Energy Policy Act of 1992 requires many federal, state and fuel provider fleets to replace their gasoline-powered vehicles with alternative fuel vehicles over time. As a result, many fleets are choosing flexible fuel vehicles (FFVs) that can operate on 85% ethanol (E85), gasoline, or any combination of the two fuels in the same tank. Ford, DaimlerChrysler and General Motors produce FFVs that are available to fleet managers and the general public, at either the same cost or less than the cost of a gasoline vehicle. The number of refueling stations providing E85 grows each year.

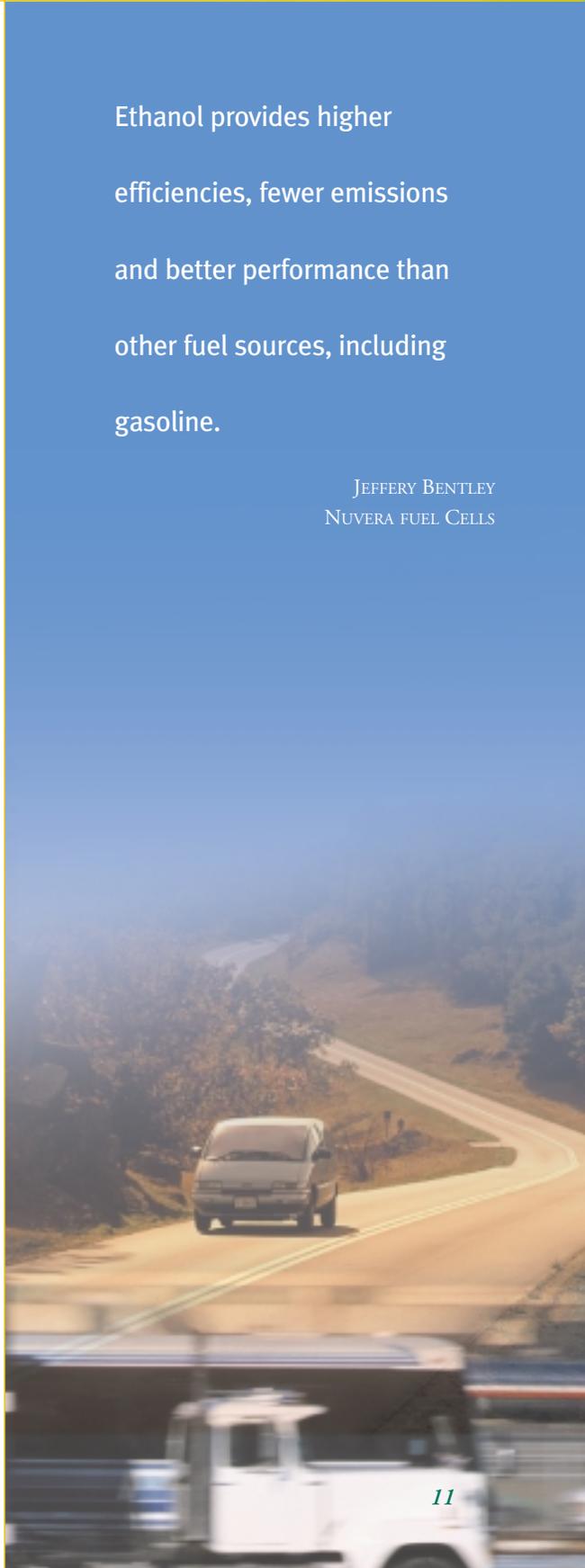
University engineering students involved in the multi-year Ethanol Vehicle Challenge have demonstrated that vehicles optimized for ethanol use dramatically reduce emissions while maintaining performance standards. In fact, teams have achieved both low emission vehicle (LEV) and ultra-low emission vehicle (ULEV) standards with E85.

## AVIATION

As a replacement for leaded aviation fuel, ethanol provides the high-octane fuel necessary for aircraft while reducing pollution at the same time. The Federal Aviation Administration (FAA) recently certified an ethanol-based, lead-free fuel for piston-engine aircraft. The fuel, which contains about 85 percent ethanol, is known as AGE85. In flight tests and engine teardown inspections, AGE85 has been demonstrated to meet or exceed FAA performance, materials compatibility and engine component wear specifications, and has been approved for use in several different models of Cessna aircraft equipped with Continental engines.

Ethanol provides higher efficiencies, fewer emissions and better performance than other fuel sources, including gasoline.

JEFFERY BENTLEY  
NUVERA FUEL CELLS



# U.S. ETHANOL PRODUCTION CAPACITY

COMPANY	LOCATION	FEEDSTOCK	MGY million gallons/year
Adkins Energy ♦ ★	Lena, IL	corn	30
A.E. Staley	Louden, TN	corn	45
AGP ★	Hastings, NE	corn	52
Agri-Energy, LLC ★	Luverne, MN	corn	17
Alchem	Grafton, ND	corn	10.5
Al-Corn Clean Fuel ★	Claremont, MN	corn	17
Archer Daniels Midland	Decatur, IL Peoria, IL Cedar Rapids, IA Clinton, IA Walhalla, ND	corn/barley	797
BC International ♦	Jennings, LA	bagasse/rice hulls	20
Broin Companies	Scotland, SD	corn	7
Cargill, Inc.	Blair, NE Eddyville, IA	corn	100
Central Minnesota ★	Little Falls, MN	corn	18
Chief Ethanol	Hastings, NE	corn	62
Chippewa Valley Ethanol Co. ★	Benson, MN	corn	20
Corn Plus ★	Winnebago, MN	corn	20
DENCO, LLC. ★	Morris, MN	corn	15
ESE Alcohol	Leoti, KS	seed corn	1.1
Ethanol2000, LLP ★	Bingham Lake, MN	corn	28
Exol, Inc. ★	Albert Lea, MN	corn	17
Georgia-Pacific Corp.	Bellingham, WA	paper waste	7
Golden Cheese ★	Corona, CA	cheese whey	5
Golden Triangle Energy Cooperative ★	Craig, MO	corn	15
Gopher State Ethanol	St. Paul, MN	corn	15
Grain Processing Corp.	Muscatine, IA	corn	10
Heartland Corn Products ★	Winthrop, MN	corn	35
Heartland Grain Fuels, LP ★	Aberdeen, SD Huron, SD	corn corn	8 14

COMPANY	LOCATION	FEEDSTOCK	MGY million gallons/year
High Plains Corp.	York, NE Colwich, KS Portales, NM	corn/milo	70
J.R. Simplot	Caldwell, ID Burley, ID	potato waste	6
Kraft, Inc.	Melrose, MN	cheese whey	2.6
Lake Area Corn Processors ♦ ★	Wentworth, SD	corn	15
Manildra Ethanol	Hamburg, IA	corn/milo/wheat starch	7
Merrick/Coors	Golden, CO	waste beer	1.5
Midwest Grain	Pekin, IL Atchison, KS	corn/wheat starch	78
Minnesota Corn Processors ★	Columbus, NE Marshall, MN	corn	110
Minnesota Energy ★	Buffalo Lake, MN	corn	12
Nebraska Energy ★	Aurora, NE	corn	30
New Energy Corp.	South Bend, IN	corn	85
Northeast MO Grain Processors ★	Macon, MO	corn	15
Pabst Brewing	Olympia, WA	brewery waste	.7
Parallel Products	Louisville, KY Bartow, FL Rancho Cucamonga, CA	beverage waste	12
Permeate Refining	Hopkinton, IA	sugars and starches	1.5
Plover Ethanol ♦	Plover, WI	seed corn	4
Pro-Corn ★	Preston, MN	corn	18
Reeve Agri-Energy	Garden City, KS	corn/milo	10
Spring Green Ethanol ♦	Spring Green, WI	cheese whey	.7
Sunrise Energy ★	Blairstown, IA	corn	7
Sutherland Associates	Sutherland, NE	corn	15
Tri County Corn Processors ♦ ★	Rosholt, SD	corn	15
Williams Bio-Energy	Pekin, IL	corn	100
Wyoming Ethanol	Torrington, WY	corn	5

★ farmer-owned company

♦ under construction

Source: BBI International, (January 2001)

**TOTAL U.S. ETHANOL PRODUCTION CAPACITY**

**2006.60 MILLION GALLONS**

# VALUE-ADDED AGRICULTURE

*The PROCESSING of GRAINS* for ethanol production provides an important value-added market for farmers, helping to raise the value of commodities they produce. American agriculture faces some of the toughest times in recent history. A record corn crop combined with declining export markets has resulted in the lowest corn prices in 20 years. As the third largest use of corn behind only feed and exports, ethanol represents a market for over 600 million bushels of corn, adding \$4.5 billion in farm revenue annually. USDA has determined that ethanol production adds 25 – 30¢ to every bushel of corn. The production of ethanol has sparked new capital investment and economic development in rural communities across America.

## HIGH VALUE CO-PRODUCTS

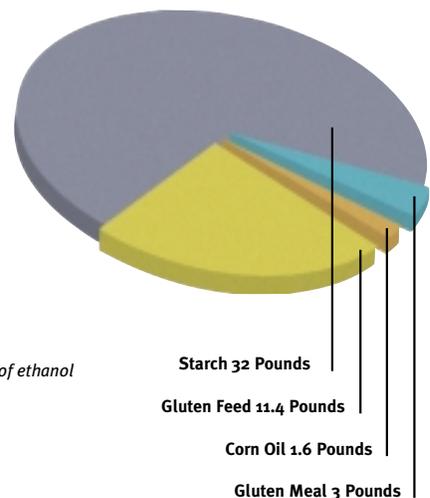
Ethanol production from grain utilizes only the starch, an abundant and low-value component. A variety of highly valuable feed co-products are produced from the remaining protein, fiber, vitamins and minerals. The market for co-products adds tremendous economic viability to the domestic ethanol industry. The primary co-products from the wet milling process include sweeteners, corn oil, gluten feed and gluten meal. Co-products from the dry milling process include dried distillers grains and corn meal. Gluten meal, gluten feed and distillers co-products are excellent sources of essential nutrients such as protein, energy in the form of highly digestible and effective fiber and key minerals like phosphorus and potassium. They also provide valuable pigments and palatability. Approximately 3 million short tons of distillers co-products, 1.5 million short tons of corn gluten meal, and 9.0 million short tons of corn gluten feed are produced in the U.S. and sold as livestock feed annually.

## Food and Fuel Products

*(from One Bushel of Corn)*

Source: National Corn Growers Association

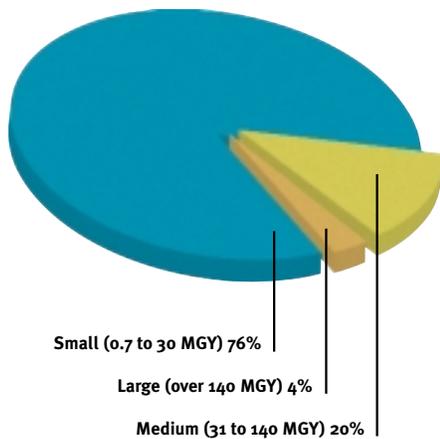
1 bushel of corn = 2.5 gallons of ethanol



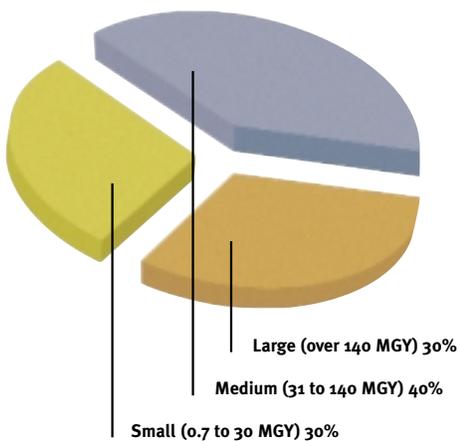


## FARMER-OWNED COOPERATIVE INVOLVEMENT

The majority of growth in the domestic ethanol industry in the last several years has been the result of farmer ownership of ethanol production facilities. These highly efficient dry mill plants typically go from drawing board to production in less than two years. Today, farmer-owned cooperatives account for one-third of all U.S. fuel ethanol production. Cooperatives help to ensure farmer members a value-added market for their crops and offer profit sharing dividends as the industry prospers.



## Number of Ethanol Plants



## Ethanol Production Capacity

# HOME-GROWN ENERGY

**TODAY THERE ARE** 62 production facilities located across the U.S. manufacturing renewable fuel ethanol. In the U.S., ethanol is primarily produced by the fermentation of sugars found in grains and other biomass. Today, the majority of ethanol is produced from corn. Approximately 55 percent of the corn used in ethanol production is processed in dry milling plants. The other 45 percent is processed by wet mill facilities.

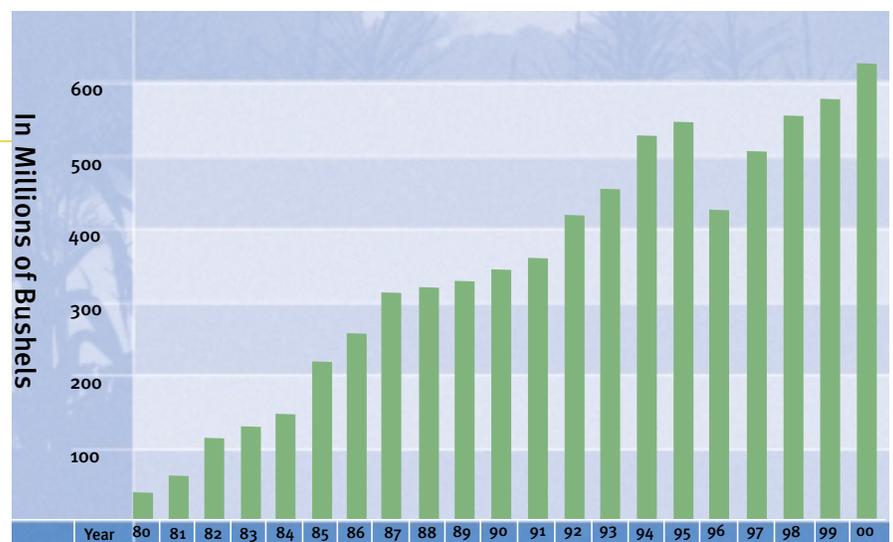
## CELLULOSE ETHANOL PRODUCTION

Today, technology enables the production of ethanol from cellulose. Continued progress is being made in the development of new enzymes and production processes that will allow for the cost-effective production of ethanol from these materials. These feedstocks offer tremendous opportunities for new jobs and economic growth outside the traditional “grain belt,” as well as additional environmental benefits through the reduction of greenhouse gases.

## FEDERAL BIOENERGY INITIATIVE

Recognizing the tremendous opportunity provided by bioenergy, Executive Order 13134 was issued to stimulate development in bio-based industries. The Executive Order outlines a goal of tripling the use of bio-based fuels, products and chemicals by 2010, which has the potential of creating billions of dollars in new income for American farmers and rural America. At the same time, it would substantially reduce greenhouse gas emissions. The initiative has strong backing from a majority in the U.S. Congress.

Corn Utilized in Ethanol Production



Source: National Corn Growers Association

## ENERGY EFFICIENT FUEL

Whether produced from corn or non-grain feedstocks, ethanol production is an extremely energy efficient process. With the introduction of improved farming practices such as precision and no-till farming, higher yielding corn varieties, and technological advances in ethanol production, such as the use of molecular sieves and natural gas, the U.S. Department of Agriculture (USDA) has concluded the ratio of energy input to energy output is 1 to 1.34, meaning ethanol contains 34% more energy than the energy used in production. This full fuel-cycle analysis includes the energy required to grow and harvest grain, distill it into ethanol, and transport the ethanol to gasoline terminals.

The Energy Department's Argonne National Laboratory recently concluded that ethanol produced from corn reduces fossil energy use by 50-60% compared with conventional gasoline. The study found that even further reductions in fossil energy use can be obtained in the production of ethanol from cellulosic biomass. According to the Agency, ethanol produced from biomass feedstocks generates 6.8 Btu for every Btu of fossil energy consumed. The production of reformulated gasoline generates only 0.79 Btu for every Btu of fossil energy consumed.



## Current and Potential Biomass Feedstocks

Crops		Cellulose	
Barley	Potatoes	Bagasse	Corn fiber
Corn	Sugar cane	Forest residues	Yard clippings
Grain sorghum	Wheat	Rice hulls	Wood waste
		Sawdust	MSW
		Pulp and paper sludge	Switch grass
		Rice straw	Fast-growing trees
Food and Beverage Wastes			
Beer	Ice cream	Popsicles	Sugar granules
Candy	Jam	Salad dressing	Tea
Cheese whey	Marshmallows	Soft drinks	Wine
Corn syrup	Maple syrup	Spirits	
Fruit juices	Perfume		

# ENERGY SECURITY

*The NEED for A STRONG*, domestic energy industry has never been greater. We are a nation in the midst of an energy crisis. Today we are more reliant than ever before on foreign nations to supply our insatiable and growing appetite for oil, importing 54% of our petroleum. At the same time, U.S. oil production has fallen to the lowest point in 30 years.

Furthermore, the continued high price of crude oil and lack of U.S. refining capacity exacerbate an already tight energy supply. The U.S. petroleum refining industry is operating at full capacity in an attempt to satisfy current demand, which continues to outpace supply. By importing more refined petroleum products than ever before, the U.S. is sending value-added refining jobs overseas. Meanwhile, demand for refined products will continue to grow.

According to the National Petrochemical & Refiners Association, “The U.S. is gravitating toward a situation in which demand for refined products is overtaking the capability of traditional supply sources.... With existing refining capacity essentially full, the U.S. will have to find additional sources to cover the incremental demand.”

Ten out of 11 Americans favor an energy policy that emphasizes the use of ethanol rather than continuing our reliance on foreign oil.

INTERNATIONAL COMMUNICATIONS  
RESEARCH, OCTOBER 2000

U.S Crude Oil  
Production vs. Imports



Source: Energy Information Administration

— Production  
— Imports



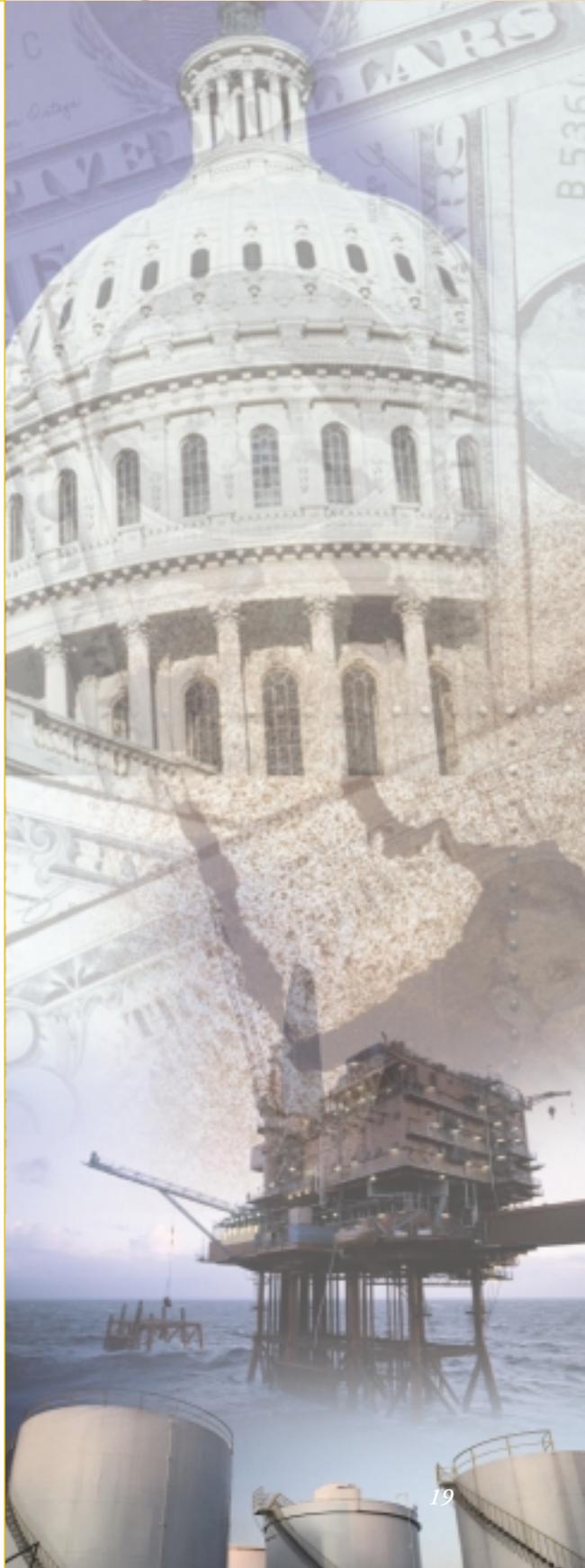
## ETHANOL – A SOLUTION

As a domestic, renewable source of energy, ethanol can increase fuel supplies, reduce our dependence on foreign oil and increase the United States' ability to control its own security and economic future. U.S. energy policy should first and foremost promote the production of domestic, renewable fuels and U.S. jobs, not foreign oil imports.

Ethanol can and should be a more consistent partner with domestic oil companies to provide the incremental additional supplies that are obviously needed. Ethanol is blended with gasoline after the refinery process. Therefore, blending ethanol adds an additional ten percent volume to the transportation fuel market and helps ease the burden on a refinery sector that barely has the capacity to meet current demand and has no hope for quick expansion. The ethanol industry is producing at a record pace. In 2001 we will again shatter all previous production records. And the ethanol industry can double production within two years to meet new demand created by a phase out of MTBE. We are prepared to meet the challenge of providing increased fuel supplies -- today.

I can simplify foreign policy with regard to Saddam Hussein and Iraq in one single syllogism. We buy his oil. We send him our dollars. We put his oil in our planes, and fly over and bomb him. He puts out a press release saying how many people we injured or killed, they rally around Saddam Hussein, and the process starts all over again.

U.S. SENATOR FRANK MURKOWSKI  
CHAIRMAN,  
ENERGY & NATURAL  
RESOURCES COMMITTEE



## CONCLUSION

**IN *the* NEAR TERM,** ethanol will continue to serve as a safe, renewable fuel providing valuable octane and oxygen for optimal vehicle performance and air quality benefits, while protecting our water resources. Using ethanol will also help keep gas prices in check. In the long term, encouraging new ethanol production from cellulose will provide additional environmental benefits and take a positive step toward a sustainable energy future.

As the U.S. continues to move toward a sustainable energy policy, ethanol will be in the forefront. Ethanol is good for clean air and clean water. As a renewable fuel, ethanol helps reduce global warming and climate change. Ethanol is produced domestically, creating American jobs and reducing our dependence on foreign oil. By whatever measuring stick you use, ethanol will continue to play an important role in America's energy future.

# RENEWABLE FUELS ASSOCIATION

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Established in 1981, the Renewable Fuels Association (RFA) is the national trade association representing the domestic 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, agri-business 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.

For more information about the RFA, including membership inquiries, please contact the RFA office, or visit our web site at [www.ethanolRFA.org](http://www.ethanolRFA.org).





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