

# Ethanol

## Background

NDARE promotes the development and use of home grown ethanol as it helps reduce our dependence on foreign oil and adds value to North Dakota resources. We work to improve public awareness and provide verifiable information to help increase public acceptance and demand for advancing development of new technologies that add to the diversity of feedstocks and processes for ethanol and biofuel production.

As the first renewable fuel in the United States, ethanol has created a strong foundation for biofuel usage. Its continued use can increase energy independence while lessening greenhouse gas emissions. With the Federal Renewable Fuel Standard's call for the increased production of biofuels from 6.5 million gallons in 2007 to 36 billion gallons by 2022, there will likely be strong demand for ethanol produced by current North Dakota ethanol plants as well as those under construction. Innovations within the industry to increase the sale and use of ethanol include higher blends of ethanol fuels (E20, E25, and E30) and the development of blender pumps that allow gas stations to blend and sell directly at the pump. With continued research, the sector is becoming more innovative producing byproducts that provide opportunity for high value spin-off industries.

Challenges to the industry include: inflationary pressures on several elements of the ethanol production process; inability to move the product via pipeline; potential new pipelines not serving North Dakota; multiple blends posing problems for retailers; and public perception.

Many of the supply issues with ethanol in North Dakota have been addressed. Attention can now turn toward actions to address the infrastructure and blend choices needed to meet Environmental Protection Agency and local operational needs, along with growing consumer demand for domestic fuel sources.

There is interest within the industry in establishing the North Dakota Ethanol Utilization Council to promote ethanol with check-off dollars from ethanol plants.



## Renewable Fuel Standard

Congress passed a Renewable Fuel Standard (RFS) as part of the Energy Security and Independence Act of 2007 calling for the production of 36 billion gallons of biofuels by 2022. Corn based ethanol was capped at 15 billion gallons, double the current production capacity.<sup>15</sup>

In addition, Congress placed a Low Carbon Fuel Standard on all new biofuels in order to qualify for the federal RFS. The law sets the following sustainability targets:

- ☀ The life-cycle greenhouse gas emissions for conventional ethanol must be 20 percent lower than conventional fuel.
- ☀ Advanced biofuels, such as ethanol made from waste products or perennial prairie grasses, must reduce lifecycle greenhouse gas emissions by 60 percent.

## North Dakota Ethanol Plants

Plants are Geographically dispersed throughout the state

Plant Name	Location	Size	Status
Red Trail Energy	Richardton	50 MGY	Operational
Blue Fint Ethanol	Underwood	50 MGY	Operational
Verasun Hankinson	Hankinson	100 MGY	Operational but on Hold
Spiritwood Ethanol	Spiritwood	100 MGY	In Development
Theraldson Ethanol	Casselton	100 MGY	Under Construction
Yellowstone Ethanol	Williston	62 MGY	Planning Stages
Buffalo Creek Ethanol	Gascoyne	62 MGY	Planning Stages
Alchem, LTD.	Grafton	10 MGY	Production on Hold
ADM	Walhalla	25 MGY	Operational

Sources: North Dakota Department of Agriculture and Randy Senger

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## Potential

Biofuels such as ethanol have the potential to help our state and nation increase energy security and promote economic development, while decreasing global warming pollution. In the agriculture sector, increased demand for lower-carbon biofuels will create new markets for biomass crops and new demand for old by-products. The U.S. economy as a whole will benefit from the development and deployment of new technologies, which provide new job opportunities for scientists, engineers, construction workers, and many others.

The biofuels market will continue to grow as global petroleum supplies face growing pressures and China, India and other nations become more affluent and motorized. The North Dakota Department of Commerce estimates that North Dakota has an ethanol capacity in excess of 500 million gallons per year, consuming approximately 200 million bushels of Corn, increasing local corn producers returns, and making available 1.8 million tons of livestock feed.<sup>1</sup> The estimated annual economic impact of operating and announced Ethanol Plants (Based on NDSU, Agribusiness & Applied Economics estimates) for construction; utilities; retail trade; finance, insurance, real estate; business & personal services; professional/social service; households; and other benefactors creates a total impact of \$563,210,000.<sup>2</sup>

A study for the Renewable Fuels Association found that the Ethanol industry has "generated an estimated \$33.4 billion in tax revenue for the Federal government and nearly \$17 billion of additional tax revenue for State and Local governments since 1978, reduced America's tab for imported oil by \$97.5 billion, helped reduce farm



## Ethanol reducing oil imports

"The production and use of 6.5 billion gallons of domestic ethanol in 2007 reduced oil imports by 228 million barrels, saving \$16 billion of taxpayer dollars. These increases in tax revenues and savings in federal program payments and oil imports totals more than \$30 billion. That compares to the \$3.4 billion that oil companies received for blending ethanol in 2007."<sup>16</sup>

Source: Renewable Fuels Association

## Breakthrough Opportunity: Cracking the Cellulosic Code



While it is more difficult to break down cellulose to convert it into usable sugars for ethanol production, making ethanol from cellulose dramatically expands the types and amount of available material for ethanol production. This includes many materials now regarded as wastes requiring disposal, as well as corn stalks, rice straw and wood chips or "energy crops" of fast-growing trees and grasses.

Producing ethanol from cellulose promises to greatly increase the volume of fuel ethanol that can be produced in the U.S. and abroad. The USDA and DOE's 2005 report on bioenergy, known as the "billion ton study," found that land resources in the U.S. are capable of producing a sustainable supply of 1.3 billion tons per year of biomass, enough to displace 30 percent or more of the country's present petroleum consumption.

Advanced ethanol produced from feedstocks such as perennial prairie grasses presents the greatest potential for energy gains. For example, switchgrass yields more than five times the energy used to grow and convert it, according to a 2008 study published by the National Academy of Sciences. Detractors say that for years the cellulosic ethanol boom has been predicted without demonstrated progress. While it is true that cellulosic ethanol has been slow to emerge, there does seem to be some progress made. Since 2001, the cost of cellulosic-digesting enzymes has dropped from \$5 per gallon to roughly 10-18 cents per gallon of ethanol, which in turn brings the total production cost of cellulosic ethanol to within about 50 cents of the production cost of corn ethanol. Private equity and venture capital investments in biofuels increased more than fourfold in just the last several years, from \$650 million in 2005 to \$2.8 billion in 2006, as noted by New Energy Finance, a provider of financial information and research on the clean tech industry.<sup>3</sup>

program payments by more than \$3 billion annually since 2006, and put some \$66 billion more into the pockets of Americans in the form of increased household income since its inception in 1978.”<sup>4</sup>



## Goals

Goals set by others in the region:

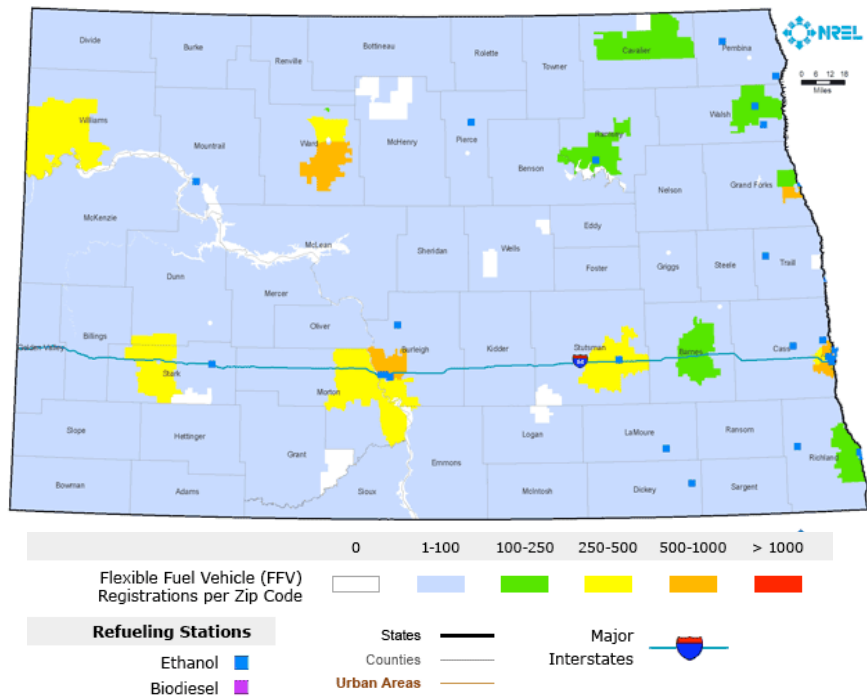
- ☼ Produce 450 million gallons of ethanol by 2011 and develop both in-state and out-of-state markets for ethanol and associated byproducts. (EMPOWER Commission 2008)<sup>5</sup>
- ☼ By 2012: Advanced cellulosic and other low-carbon transportation fuels should be commercially produced in the region. (Midwestern Governors Association (MGA) 2007)<sup>6</sup>
- ☼ By 2015: E85 will be offered at 15 percent of retail filling stations, or around 4,400 stations, approximately a five-fold increase. Currently, E85 is available at 3 percent of filling stations regionally. (MGA 2007)<sup>6</sup>
- ☼ BY 2025: E85 will be offered at 33 percent of retail filling stations, or around 9,700 stations, approximately a 10-fold increase. (MGA 2007)<sup>6</sup>
- ☼ By 2025: Average fossil fuel inputs in the production of conventional biofuels in the region will be reduced by at least 50 percent. (MGA 2007)<sup>6</sup>
- ☼ By 2025: At least 50 percent of all transportation energy consumed in the region will be supplied by regionally produced biofuels and other low-carbon advanced transportation fuels, with the expectation that a significant and additional portion of the region’s biofuel production will help the U.S. meet a national 25 x 25 goal. (MGA 2007)<sup>6</sup>
- ☼ Become a national leader in the development of economically viable production scale cellulosic ethanol production facilities. (EMPOWER 2008)<sup>5</sup>

## Net Energy of Ethanol

It is often asked if ethanol produces more energy and greenhouse gas emission reductions than it takes to produce it. This issue has been the subject of numerous scientific studies. The majority verify that, using current technology, corn-based ethanol delivers a net gain. For one unit of liquid energy it takes .74 units of fossil energy inputs (life-cycle). By contrast, one unit of refined gasoline requires 1.23 units of fossil energy over its life-cycle. (Gasoline from Canadian tar sands would be significantly more energy intensive).<sup>17</sup>

Source: Argonne National Laboratory

**Flex Fuel Vehicle and E85 Penetration: North Dakota**



DOE Alternative Fuels and Advanced Vehicles Data Center

## Best Practices

**Minnesota:** has established ethanol producer incentives that foster in-state production facility development (rather than fuel pump based tax credits, that foster increased ethanol use, but from out-of-state suppliers) paired with consumer incentives.



Project financing incentives include: Ethanol Production Facility Loan Program; Value-Added Stock Loan Participation Program; Agricultural Improvement Loan Program; Job Opportunity Building Zones; and Renewable Energy Equipment Accelerated Depreciation Tax Incentive. In addition, the state fosters ethanol use via the: Alternative Fuel Credit for E85; State Procurement Preference for Cleaner Vehicles; and E85 Flexible Fuel Vehicle Program.<sup>7</sup>

**Iowa:** has established the following incentives:

- ☼ A tax credit for selling E85 (a blend of 85 percent ethanol with 15 percent gasoline) that starts at 25 cents per gallon. The tax credit phases out by 2021.
- ☼ A tax credit of 6.5 cents per gallon of ethanol sold. However, the tax credit is lowered if the retail dealer falls short of the state's goals for total biofuel sales.
- ☼ Cost-shared funding to encourage biofuel conversions at fuel terminals and retail stations.<sup>8</sup>

**New York:** has available two grants for a total of \$25.2 million for the Construction of Cellulosic Ethanol Pilot Production Facilities.<sup>9</sup>

State Economic Incentives Profile			
Incentive Type	U.S. States w/ Incentive	Eastern States w/ Incentive	List of States
Excise Tax Exemption	20	7	AK, AR, CA, CT, HI, ID, IL, IA, KS, ME, MN, MT, NY, NC, ND, PA, RI, SD, TX, VA
Producer Credits	30	7	CA, CT, DE, FL, HI, IL, IN, KS, KY, LA, ME, MD, MI, MN, MS, MO, MT, NE, NM, NY, NC, OK, PA, SC, SD, TX, VA, WA, WI, WY
Distributor/ Wholesale Credits	9	0	AR, HI, ID, IN, IA, KY, MT, ND, WA
Retail Outlet Incentives	12	3	IL, IN, IA, KY, MN, NY, ND, OH, OK, RI, SC, WA
Infrastructure Payments	8	4	AR, CO, FL, ME, NJ, NY, NC, TE
Vehicle Rebates or Incentives	5	3	IL, KS, ME, RI, WV
Fuel Rebates	4	2	IL, MO, NJ, NY

**Appendix A provides a state-by-state analysis of current state economic incentives for biofuels.**

Source: Northeast Regional Biofuels Action Plan, 2008

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## North Dakota Policy in Place

**Ethanol Production Incentive:** The ethanol production incentive currently in place for North Dakota is a counter-cyclical program. This means it helps producers during adverse times when ethanol prices are unusually low and/or corn prices are unusually high. When these prices are normal or better than normal, the incentive is phased out and market conditions are allowed to prevail. The fund had \$4.6 million available in the 2007-2009 biennium.<sup>10</sup>

**Biofuels Loan Program:** The Biofuels Partnership in Assisting Community Expansion (PACE) Loan Program provides a 5 percent interest buy down to the following: biodiesel and ethanol production facilities; livestock operations feeding byproducts of a biodiesel or ethanol facility; biofuels retailers for refueling infrastructure installation; and grain handling facilities which provide condominium storage of grain used in biofuels production.<sup>11</sup>

**E85 Tax Reduction:** The sale of ethanol blended gasoline fuel containing 85 percent ethanol (E85) is exempt from the \$0.23 per gallon tax, and is instead subject to a reduced tax of \$0.01 per gallon on all E85 fuel sold or used in the state.<sup>12</sup>

**Regional Biofuels Corridor:** North Dakota has joined Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, South Dakota, and Wisconsin in adopting a cooperative initiative under the Midwestern Governors Association Energy Security and Climate Stewardship Platform Plan (Platform). The Platform establishes a regional biofuels corridor program and directs state transportation, agriculture, and regulatory officials to develop a system of coordinated signage across the Midwest for biofuels and advanced transportation fuels and to collaborate to create regional E85 corridors.<sup>13</sup>

**25 x 25:** The North Dakota Legislature supports the goal that 25 percent of the nation's energy consumption will come from renewable sources by the year 2025. Additionally, the Legislature supports the North Dakota energy corridor initiative to increase funding for research development and commercialization of hydrogen fuel cells and biofuels produced from biomass for long-term viability.<sup>14</sup>

## Federal Policy in Place

See Appendix A



## Food vs. Fuel

For every dollar consumers spend on food, only 20 percent is attributable to the actual costs of the food itself. The remaining 80 percent is tied to increases in labor, energy, transportation, advertising, packaging, and other costs. The greatest inflationary engine in our current grocery bills has been \$100+ cost barrel of oil.

Biofuels consume 4 percent of world grain. Most of the commodities, like rice, that are experiencing the greatest increases are not even biofuels feedstocks.

Speculation on the commodity markets is another often cited cause of food inflation.<sup>18</sup>

**“There’s been a big effort by others to blame ethanol for increased feed and food costs and certainly ethanol production has been a small portion of that. But it’s easy to kick around the new kid on the block, and so we attack the ethanol industry.”**

Remarks of Secretary of Agriculture Ed Schafer, October 27, 2008<sup>19</sup>