



Issue Brief:

Economic Impacts of Ethanol Production

2011 Edition

A Publication of Ethanol Across America

Replacing imported oil with homegrown ethanol is an appealing prospect for a host of reasons — including national security and environmental benefits. But the economic benefits associated with the renewable fuels industry are among the most compelling — and most evident across the nation.

Producing ethanol from grain is one of the real success stories in the American economy, with production doubling in just the last four years. As the industry expands, so does the impact of its benefits at all levels. Some believe the rapid growth only benefits agriculture states. In fact, the economic impacts of ethanol production spread beyond rural America to virtually every sector of the nation’s economy.

From the technology sector that provides software for plant operations to the manufacturing sector that provides plant components; from the financial institutions that provide investment capital to the transportation sector that moves grain and ethanol— domestic ethanol fuel production creates jobs and stimulates economic activity. Using a variety of econometric models, economists measure this activity at the local, state and national levels. This publication examines some of the results.

Evolution of the Ethanol Industry

The production of ethyl alcohol or ethanol for fuel spans more than a century. In the late 19th and early 20th centuries, many of the earliest internal combustion engines ran exclusively on ethanol. But another new fuel—gasoline—produced in great quantities by the young petroleum refining industry, soon dominated the spark ignition fuel market—

and ethanol was retired to its more traditional roles as a beverage, heat source and solvent.

Oil embargoes in the 1970s and economically disastrous petroleum price spikes in the 1980s created the opportunity for a domestically produced renewable fuel such as ethanol. Another key factor was the federally mandated phase-out of tetraethyl lead, an additive used to boost gasoline’s octane rating. These factors, combined with increasing crude oil imports and staggering agricultural surpluses, led the federal government and several states to provide incentives to encourage ethanol development — and ethanol/gasoline blends emerged as a superior motor fuel.

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Dear Friends:

On behalf of my fellow board members of the Ethanol Across America education campaign, I am pleased to bring to your attention the latest in our series of Issue Briefs. Understanding the positive impacts of building an ethanol plant goes to the heart of what ethanol development is all about. As the case studies we have prepared in this Brief illustrate, there are significant economic benefits at the local, state and federal levels. Ethanol plant development is truly a lifeline to rural America, providing us with a homegrown answer to spiraling oil imports, and returning literally billions of dollars to our communities.

In this Brief you will see firsthand how these facilities create jobs, raise farm income and generate important tax revenue. And these benefits are not limited to the cornfield states—ethanol projects are being developed from California to New York, and we are on the verge of technological breakthroughs that can truly reduce our dependence on oil. As a member of the Senate Energy Committee, I am acutely aware of the perils of this dependence and it is critical that we stem the flow of hard-earned American dollars being used to buy foreign energy.

On behalf of all of us involved in this project, I hope you find this information helpful and that we foster a better understanding of the positive impacts of U.S. ethanol plants.

Sincerely,

*Tim Johnson
U.S. Senate*

The first U.S. commercial fuel ethanol producers began operation in the late 1970s and early 1980s. Most plants were small by today's standards, with capacities of ten to twenty million gallons per year (mgpy). Despite relatively small plants and powerful resistance from the petroleum industry, U.S. ethanol production topped one billion gallons by the early 1990s. Over the next decade, a new generation of larger plants evolved. Twenty-five to thirty mgpy became the standard and by 2000, U.S. production reached 1.5 billion gallons per year.

By 2005, 50 and 60 mgpy became the standard. These larger plants improved economies of scale with lower per gallon capital costs than their smaller predecessors. Newer plants were engineered with an eye toward expansion to meet future demand.

By late 2010, some 187 U.S. plants produced 13 billion gallons annually — with another 15 plants under construction. Average plant size was nearly 84 mgpy, with 100 mgpy becoming the new standard. As the number and size of producers grew, so did capital commitments, employment, grain utilization and tax revenues.

The impact of ethanol production transforms local economies by creating demand for local goods and services, stimulating investment, generating tax revenues, invigorating grain markets and paying salaries that exceed regional averages. States and federal governments see increased economic activity, rising tax revenues and trade balance improvements. The following sections examine these impacts on local, state and national economies.

Local Benefits of Ethanol Production

The long list of quantifiable economic benefits has led more than 180 U.S. communities to seek out and host ethanol plants. While corn remains the industry's primary feedstock, the growing diversity of alternatives means opportunities for all states. New feedstocks such as agricultural residues, scrap paper, residual food and dairy processing streams, and a myriad of other organic sources including cellulose will yield billions of gallons of ethanol.

Ethanol's Impact on Local Economies

Dr. Kenneth Lemke is an economist for the Nebraska Public Power District, a publicly owned electric utility in Nebraska. Lemke has studied the ethanol industry in Nebraska for many years and conducted economic projections for prospective ethanol projects and studied the real effects of the ethanol industry on Nebraska's economy. The latest study focuses on the cumulative economic and employment impact on Nebraska.

According to Dr. Lemke:

- Nebraska's 24 ethanol plants produced nearly 2 billion gallons in 2010. This created a total economic output of over \$3.5 billion and saved drivers \$200 million by lowering fuel prices.
- The ethanol industry directly created over 1,300 jobs in Nebraska. When accounting for indirect economic impacts, ethanol production has created nearly 3,000 full-time jobs in Nebraska.
- Ethanol production has added over \$240 billion in household income in Nebraska.
- Tax revenue generated by ethanol production and related industries tops \$30 million.
- Retail sales of ethanol totaled over \$100 billion, and ethanol boosts grain prices for farmers by \$0.05 to \$0.10 per bushel.

This diversity of feedstock is leading to similar diversity in geography. Twenty-six states are home to ethanol plants and new projects are underway from Hawaii to Washington, from Florida to New York.

Record high fuel prices, environmental concerns and public policy initiatives are driving interest in renewable fuels of all types. Communities seeking economic development opportunities, job creation, tax base diversification and new capital investment recognize the benefits. A number of reputable economic studies have analyzed the economic impact of ethanol

production from a variety of perspectives. One common theme emerges: Ethanol has a quantifiable and positive impact on the economic life of all Americans.

Other Local Impacts: Dividends

Local equity investment in ethanol plants can yield returns beyond the scope of econometric models. A newspaper story reported the impact of dividends paid to local owners of a plant near Minden, Nebraska: "When the first \$9 million in dividends from the KAAPA ethanol plant were distributed to investors, they lifted the entire community."

Lamoine Smith, a farmer who invested in the plant, said, “We’ve added lots of jobs to the area and any time you have that kind of money going out, it helps. My guess is that most of that money was spent locally.”

The dividend distribution came to around \$18,000 each to some 500 investors. Ron Horst, a local banker, said, “Some are using the money to retire debt, and it’s money that will help the overall profitability of a producer’s operation.”

...And Jobs

The construction and operation of ethanol plants is widely recognized as a catalyst for job creation beyond the plant site. Local economies feel the impact first. An Associated Press story from Wisconsin provides several examples. “Ethanol production is at an all-time peak,” said Mike Peterson, sales manager for Apache Stainless Equipment Corporation, where production of ethanol equipment makes up 25% of the work.

The fuel ethanol industry is a significant part of state and national economies. Two of the largest sectors in the U.S. economy — agriculture and energy — are directly affected. The Journal of Agrobiotechnology Management & Economics found that ethanol adds on average \$3.1 billion per year to farm income.

A&B Process Systems has doubled the size of a production plant and is hiring 60 more people to handle the extra business, said president Glenn Linzmeier. Ethanol equipment makes up about 30% of the company’s sales — and Linzmeier expected sales to double in the next year.

Paget Equipment Company has several months of ethanol equipment orders on the books — requiring more workers. “We have a workload that takes us out to next summer, and that’s just with ethanol,” said project engineer Brian Johnson.

For the second quarter of 2010, Union Pacific Railroad reported increased income of nearly 70%. According to company sources, “increased hauling of ethanol and agricultural products were key to the increased performance.” More ethanol production means more grain and chemicals hauled to plants and more ethanol hauled to market. More hauling means more trains, more activity and more jobs.

These are but a few of the sectors that benefit. New capital and profits ripple through the community — from equipment dealers to feed suppliers, from veterinarians to grocers, from retailers to car dealerships.

Still, numbers fall short of telling the entire story. While it is possible to quantify economic impacts, how does one place a value on the revitalization of an entire community? Or the ability of young people to return home to build a career and a family?

Community Case Studies

Economic Benefits of Ethanol Production and Use at the State Level

As ethanol production becomes a significant industry within a state, the economic benefits begin to radiate beyond the local communities and ripple across the entire state economy. Ethanol production has created new economic energy in several Midwestern states — helping add value to these states' agricultural output and generating a significant number of new jobs and tax revenues.

Thousands of New Jobs in Nebraska

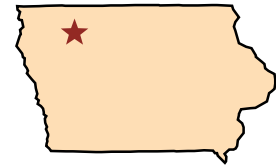
In late 2009, the Nebraska Public Power District released the results of a statewide study showing the state's ethanol industry has created more than 1,300 permanent jobs — with another 3,000 jobs created in related industries and from increased economic activity.

Annual salaries for jobs at Nebraska ethanol plants average \$53,592, according to a recent study by Nebraska Workforce Development — well above the state average of \$35,478 reported by the Nebraska Department of Labor.

According to Todd Sneller of the Nebraska Ethanol Board, "The ethanol industry provides employees with excellent compensation opportunities — and generates wealth for entire communities and, by extension, all of Nebraska. Income from ethanol industry jobs spurs more spending, which in turn creates additional jobs in communities and additional revenue in sectors such as housing, financial services and retail.

Emmetsburg, IA

Many local communities struggle to sustain economic vitality and constantly seek businesses



most likely to bring quality jobs to the area. Ethanol production has proven to be a perfect fit in many parts of the country. A plant located in a small Iowa community illustrates this point.

Poet Ethanol, LLC, built and operates a 60 mgpy plant in Emmetsburg, Iowa (pop. 3,867). According to local officials, the plant has created 40 new jobs. Along with wages from these jobs, plant purchases of corn and other goods and services pump \$60 million into the local economy each year. The price of corn is up substantially, with area farmers receiving near record prices for their crops.

"The town was dying a slow death," said Craig Brownlee, a third-generation corn farmer. "The farm community wasn't making any money and was living on crop subsidies. Now people are spending money like they haven't in a long time. There's a buzz around town." Rick Jones, vice president at Iowa Trust & Savings Bank, agrees. "The ethanol industry is changing things fast," he added.

Ethanol activity is reversing a decades-old trend of population decline and the loss of young people. Ben Gustafson, Poet's 29-year-old technology manager, never imagined he could work near home after earning a chemical engineering degree. "I went to college before the ethanol boom and figured I'd wind up leaving Iowa to work," he said.

New businesses are coming to town — chain stores, motels, a casino/resort and the area's first

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Tax revenues for local and state economies have increased dramatically. Ethanol is truly an economic catalyst for Nebraska.”

The Iowa Report Card

A 2009 report by the Iowa Renewable Fuels Association ranked the Iowa economy as one of the fastest growing in the nation. A key factor is the fact that almost all of the ethanol industry’s corn and labor, plus 44% of other inputs, are purchased within the state. The economic impacts in Iowa ripple throughout the state’s economy:

- Iowa GDP increases by nearly \$12 billion, or about 9 percent
- Generates \$2.8 billion of household income for Iowa households
- Supports nearly 83,000 jobs through the entire Iowa economy (or 5.4% of private, non-farm employment), and
- Generates \$576 million in state tax revenue.

According to the Iowa Renewable Fuels Association, “Every Iowan has good reason to support ethanol use. ‘Buying Iowa’ is a lot better for our economy than importing foreign oil.”

A Word on Econometric Models

While the studies cited in this publication were conducted by distinguished economists, economic models often fail to capture the full impact of an industry.

For example, much of the Nebraska data deals with economic benefits at the community level but impacts in other sectors are not fully measured. As a major cattle feeding state, Nebraska is a

A study from the University of Tennessee found that producing 25% of the United States’ energy from agricultural resources would generate over \$700 billion annually in economic activity, create 5.1 million jobs, and add \$180 billion to net farm income by 2025.

USDA, October 2010

significant market for high protein distillers grains, a co-product of ethanol production. Researchers at the University of Nebraska report the trend of feeding wet distillers grains to cattle generates an economic impact of \$55 million annually. Of this amount, 85% accrued to cattle feeders in the form of reduced cost of gain and 15% of the value went to ethanol producers in the form of lower energy costs associated with avoiding drying costs.

The point: While economic impacts cited in this publication are impressive, they may not present the entire spectrum of benefits across a state.

Beyond Corn Country

Today, ethanol production fuels economies in the agricultural states where the nation’s corn is grown. In coming years, other areas of the country will begin to benefit from increased domestic production of ethanol.

One example: A study conducted by the Northeast Regional Biomass Program investigated the construction of ethanol plants in Maine, New Hampshire, New York, New Jersey and Pennsylvania. Obviously, these are not large grain producing states, but they have an abundance of an alternative resource — wood.

The study focused on a 50 mgpy wood-to-ethanol plant. The authors determined the construction of this type of facility will generate \$170 million to \$200 million in income and create between 4,000 and 6,000 jobs. They also concluded the plant would create 540 to 830 permanent jobs with \$41 million to \$48 million in annual income. State tax revenue would range from \$1 million to \$3 million depending on the location.

If the cellulosic ethanol industry follows the evolution of corn ethanol plants, bigger will be better.

In 2009, over ten billion gallons of ethanol were used in the United States. This resulted in a gallon-for-gallon reduction in imported gasoline. Given average crude oil prices of \$94.04 paid by U.S. refiners in 2008, the use of ethanol replaced 9 billion gallons of oil and lowered the trade deficit by \$20 billion.

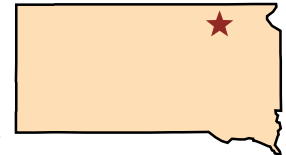
US Energy Information Administration, September 2010

McDonald's restaurant. Farm equipment suppliers and new vehicle dealers are seeing business increase. Mike Wentzel of Farmers National Company, a regional real estate firm, said farm real estate has dramatically increased in value — creating greater net worth for farmers and generating record rents for investors.

Poet Ethanol recently initiated the conversion of the plant into one of the nation's first commercial cellulosic biorefineries. The capacity of the plant will increase to 125 mgpy, 75% of which will come from corn while 25% will come from cobs and fibers. Poet believes the new process will squeeze 27% more fuel from each acre of corn.

Groton, South Dakota

Many rural communities across the Great Plains have mounted a grassroots



effort to attract quality jobs and value-added industries. Residents of rural communities fully understand that the ethanol industry is ideally suited to many of our nation's prime agricultural areas. Gerald Rix, mayor of Groton for 15 years, attributed the recent population growth in the area to several factors, perhaps most importantly to the start of ethanol production at the James Valley Ethanol plant in the spring of 2003. The new ethanol plant today produces nearly 50 mgpy of ethanol from locally produced corn. Groton now boasts a population of more than 1,300 residents, which includes families of employees attracted to quality jobs at the new plant. "I think that we are going to grow some more and James Valley is, too. We are tickled to death that they came here. To me, there is only one direction that we can go, and that is ahead," said Mayor Rix.

The nationwide impact of investment in the ethanol industry.

A study conducted by the Biotechnology Industry Organization (BIO) explored the effects of increasing advanced biofuels production on the U.S. economy. The study, "U.S. Economic Impact of Advanced Biofuels Production: Perspectives to 2030," analyzes job creation, economic output, energy security and investment opportunity.

Among the study's findings:

- The advanced biofuels industry could create nearly 30,000 new jobs and create \$5.5 billion in economic growth over the next three years.
- Increasing advanced biofuels production to levels mandated by the RFS will create more than 800,000 new jobs by 2022.
- Total economic impact, including indirect and induced economic effects, could total \$148.7 billion by 2022.
- Advanced biofuels production could save the U.S. \$350 billion by 2022 in reduced petroleum imports.
- Direct economic output from advanced biofuels production could rise to \$5.5 billion in 2012, \$17.4 billion in 2016, and \$37 billion by 2022.

U.S. Economic Impact of Advanced Biofuels Production: Perspectives to 2030, BIO-ERA, February 2009

A 100 mgpy wood-to-ethanol plant will generate 950 to 1,650 jobs with \$65 million to \$95 million in annual income — and \$2 million to \$6 million in increased state tax revenues.

Ethanol production from wood, agriculture residues, waste paper and other cellulosic sources will yield substantial economic benefits. Initially, operating costs for cellulosic ethanol plants will

likely be higher than those at typical grain-based plants — as will capital costs. These obstacles will diminish as the combination of federal research and development funds, preferred treatment of alternative feedstock ethanol in the Renewable Fuels Standard (RFS) and higher prices in gasoline and ethanol markets accelerate development of new technologies.

State Case Studies

Benefits of Ethanol Production and Use at the Federal Level

Energy Security, a publication of the “Ethanol Across America” series, explores the economic benefits of displacing petroleum with ethanol. Spending energy dollars at home instead of on products imported from foreign suppliers provides obvious benefits to the United States.

Many of the economic gains that come from producing domestic liquid fuels are also energy security gains. According to the Energy Information Administration, the United States imported nearly 70% of its oil used in 2009 — and spent nearly \$330 billion to do it. This outflow of dollars for energy accounted for 40% of the record U.S. trade deficit of \$763 billion.

This is clearly a serious economic issue that underscores the precarious nature of America’s

“We must force the cartel (OPEC) to compete against not just other oil suppliers, but other fuels and energy sources... One option is a simple technical fix which, according to General Motors, costs just \$70 per car: turning every new vehicle sold in the United States into a flex-fuel vehicle.”

Gal Luft, “How to Ruin OPEC’s Birthday,” *Foreign Policy Magazine*, September 2010

The Indiana Outlook

In Indiana, the ethanol industry is fast becoming a major contributor to the state’s economy. According to a 2010 study conducted by Informa Economics, an agricultural and commodities research firm:



- Indiana’s annual ethanol production capacity in 2010 reached 980 million gallons—seven percent of all U.S. ethanol production.
- The industry has created 3,227 full-time jobs, added \$499 million to the Gross State Product, and increased farm and household income by \$255 million.
- Indiana’s 11 operating ethanol facilities generate \$2.2 billion in ethanol and DDGS sales every year.
- Indiana drivers save up to \$27 million per year by buying ethanol-blended fuels.
- Environmental performance of the ethanol production facilities and feedstock producers has also increased. Water use by ethanol facilities has dropped by 26.6 percent from 2001 to 2006.
- Increased corn production has come from greater yields—not greater acreage.

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Ethanol Industry Impact on the U.S. Economy: 2009-2010

- The ethanol industry spent \$16 billion on raw materials, goods and services, and other inputs to produce an estimated 13.1 billion gallons. Included in that figure was 3.8 billion bushels of corn valued at \$13.3 billion. An additional \$1.7 billion went to transport ethanol from the plant to the blending terminal.
- The combination of spending for annual operations, ethanol transportation and capital spending for new plants under construction added \$2.9 billion of gross output to the U.S. economy in 2009.
- The increase in gross output supported the creation of nearly 400,000 jobs in all sectors of the economy.
- Increased economic activity and new jobs resulted in higher levels of income for U.S. households. The production of ethanol put an additional \$16 billion in the pockets of American consumers.
- The full impact of annual operations of the ethanol industry and spending for new construction generated about \$8.4 billion in tax revenue for the federal government. In addition, the industry generated \$7.5 billion in additional tax revenue for state and local governments.

Contribution of the Ethanol Industry to the Economy of the United States, LEGG, LLC February 2010

liquid energy supplies. Two-thirds of the world's petroleum reserves lay in Iran, Iraq and Saudi Arabia — countries not usually counted among those most friendly to the United States.

The more than 12 billion gallons of ethanol used in the U.S. in 2010 reduced the country's dependency on foreign oil supplies by more than

800 million barrels. This alone means a reduction of \$52 billion annually in the growing trade deficit. Achieving the 36 billion gallons of domestic fuels target required by the federal Renewable Fuels Standard (RFS) will reduce imports even more — and the savings will be even greater.

To Learn More About the Economic Benefits of Ethanol Production and Use...

See *Ethanol Today* (Ace Magazine)

"Ethanol Production's Impact on the Local Community": www.ethanol.org

Clean Fuels Development Coalition: www.cleanfuelsdc.org

Ethanol Across America: www.ethanolacrossamerica.net

More Ethanol. More Benefits.

The economic impacts documented in this publication are linear: The more ethanol produced, the greater the returns. The Renewable Fuels Standard, the demise of MTBE and increasing world demand for liquid energy have combined to increase the investment in ethanol production.

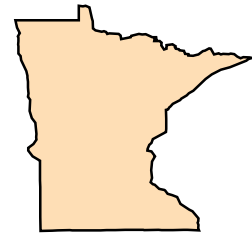
A 2010 study from the Economic Research Service of the USDA assessed the long-term impact of expanding biofuels production to 36 billion gallons per year by 2022. Studying the direct and indirect effects on the farm economy and related industries, USDA concluded:

- U.S. imports of crude oil could fall by \$61 to \$68 billion and lower gas prices by 8 to 9 percent.
- Increased biofuels production would add \$6 billion to GDP.
- The increase in corn demand could create up to a 5% increase in farm income.
- The effect on finished food and feed prices would be negligible, creating a maximum increase of less than 0.5 percent.

Increasing biofuels production will also raise real wages and disposable household income. The RFS2 will also increase net farm income by increasing demand for ethanol feedstocks like corn and sorghum.

Economic Growth in Minnesota

Minnesota, too, is seeing significant economic benefits from the developing ethanol industry. A 2007 study by the Minnesota Department of Agriculture quantifies the state's economic growth. That growth trend continues today:



- The ethanol industry generated \$2.8 billion in economic impacts in 2007 and supported more than 10,000 jobs.
- The state's total annual ethanol production topped more than one billion gallons.
- Total economic impacts surpassed \$5 billion and supported more than 18,000 jobs.
- By 2010, more than 25% of the state's corn crop was used to produce ethanol and its co-products. Most of the value-added feed products from Minnesota ethanol plants are used by local livestock producers, and the remaining protein feed is exported.

Nebraska Ethanol Board: www.ne-ethanol.org
 Nebraska Public Power District: www.nppd.com
 Renewable Fuels Association: www.ethanolrfa.com
 South Dakota Corn Council: www.sdcorn.org



www.cleanfuelsdc.org



www.ethanol.org



Maryland Grain Producers
Utilization Board

www.marylandgrain.com



Nebraska Public Power District

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www.ne-ethanol.org



www.zimmatic.com



www.burnsmcd.com

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