Issue Brief:

Economic Impacts of Ethanol Production

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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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Inside

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 2007, some 125 U.S. plants produced seven billion gallons annually — with another 80 plants under construction. Average plant size was nearly 60 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 100 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. Donis N. Petersan is a senior economist for the Nebraska Public Power District, a publicly owned electric utility in Nebraska. Dr. Petersan has studied the ethanol industry for many years and conducted 38 local economic impact studies for prospective ethanol projects. The latest in this series examines the local effects of a prospective 100 mgpy plant in Burt County, an agricultural area in north central Nebraska.

According to Dr. Petersan:

- The total annual value of outputs from this project is $192,257,800. Of that amount, $165,000,000 comes from ethanol produced at the plant; $13,000,000 in other products (primarily distillers grains) and secondary output effects of $14,257,800.
- Total employment opportunities will increase by 113 jobs (full time equivalent): 34 jobs at the plant with 56 indirect jobs and 23 induced jobs spread throughout the community and surrounding area.
- The 34 jobs at the plant will raise annual labor income by $1,750,000 (including benefits) along with an estimated $4,450,000 in other property-type income (including rents, royalties and dividends). Total income effects for the community, including 113 jobs created and property income is $9,981,700—each year.
- The ethanol plant will pay $784,000 in direct property taxes on plant and equipment. It will generate an additional $272,000 of indirect business taxes, including taxes on other property, excise taxes, fees, licenses, sales taxes, etc. When secondary (indirect and induced) effect of $486,000 are added, total annual business taxes related to the operation are $1,542,300.
- The increased employment and income associated with the ethanol facility will result in additional disposable personal income and purchase power, which is expected to increase retail sales in the trade area by $1,251,500 annually.

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.

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.

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 General Accounting Office reports a 50% decline in ethanol production would cost the U.S. Treasury $3.2 billion annually.

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 fourth quarter of 2006, Union Pacific Railroad reported increased income of 64%. 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?

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

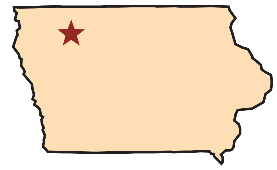
In late 2007, the Nebraska Public Power District released the results of a statewide study showing the state's ethanol industry has created more than 700 permanent jobs—with another 1500 jobs created in related industries and from increased economic activity.

Annual salaries for jobs at Nebraska ethanol plants average $49,000, according to a recent study by the Nebraska Ethanol Board — well above the state average of $34,300 reported by the U.S. Department of Labor, Bureau of Labor Statistics.

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.

Community Case Studies

Emmetsburg, IA



Many local communities struggle to sustain economic vitality and constantly seek businesses as 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 Emmitsburg, 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 28-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 July 2005 report by the U.S. Department of Commerce 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:

- $910 million in corn purchases are made annually—and this impact is projected to increase each year.
- More than $82.4 million is expended on wages each year.
- The ethanol industry purchases more than $161.6 million in ingredients for plant operations annually.
- More than $203.7 million in energy is purchased each year with much of the energy provided by Iowa-based companies.
- About $2.40 is added to the value of each bushel of corn processed at the plants.

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.

As of February 2005, the ethanol industry has added more than $25 billion to the nation's gross economic output through operating spending and capital spending for new plants; it has supported more than 147,000 jobs across all sectors of the economy; and $4.4 billion went directly to consumers this past year through increased economic activity and new jobs.

United States Department of Commerce, February 2007

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 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.

The U.S. trade deficit set a record for a fifth straight year in 2006. The gap between what the U.S. sells abroad and what it imports rose to $763 billion. The biggest factor was a surge in the U.S. foreign oil bill, which rose to a record $302 billion.

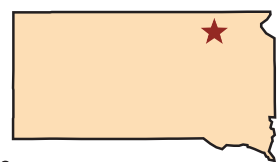
United States Department of Commerce, February 2007

Community Case Studies *(continued from page 5)*

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 announced plans to convert the plant into one of the nations' 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.

The Farm Credit System (FCS), a nationwide network of borrower-owned financial institutions, has provided much of the debt financing to the rapidly growing ethanol industry. "Estimates suggest FCS institutions have acted as the lead lender or as a participant in syndications provided financing for about 57% or 3.9 billion gallons of existing U.S. ethanol production," said John Urbanchuk, director of LEGG, LLC.

In a recent study, Urbanchuk quantifies the impact of FCS-financed ethanol projects on rural, state and national economies:

- The construction of 3.9 billion gallons of ethanol capacity added $23.3 billion of gross output to the economy during the construction period.
- This activity generated $5.5 billion in household income and supported 136,345 jobs in all sectors of the economy.
- The combination of spending for annual plant operation and ethanol transportation adds $13.7 billion to the U.S. gross domestic product.
- The increased economic activity supports 99,188 jobs in all sectors of the economy. Included are more than 15,000 jobs in America's manufacturing sector.
- The full impact of the annual operations of these ethanol plants generates about $1.6 billion of tax revenue for the federal government and nearly $1.3 billion of tax revenue for state and local governments.

Economic Contribution of the Farm Credit System to the U.S. Biofuels Industry, John M. Urbanchuk, LEGG, LLC 2007

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

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 67% of crude oil supplies in 2006 — and spent more than $300 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

> *"Since 9/11 and the rise in crude oil price from $25 per barrel to $70-plus, transfers of total dollars to OPEC have increased dramatically. OPEC revenue has gone from an average of $70 billion per quarter in 2004 to an average of $280 billion per quarter in 2006. This is an aggregate increase in the financial flow to OPEC of $2.25 trillion."*
>
> William J. Hudson, Ethanol Opinion — Beyond the Eighth Grade, 2007; The ProExporter Network

State Case Studies

The Missouri Outlook

In Missouri, the ethanol industry is fast becoming a major contributor to the state's economy. According to a 2007 study, Employment and Economic Benefits of Ethanol Production in Missouri, conducted by University of Missouri economists Dr. Vern Pierce, Dr. Joe Horner and Dr. Ryan Milhollin:

- By 2009, Missouri's annual ethanol production capacity will reach 800 million gallons. At that level of production, ethanol plants will provide 520 full-time jobs — and income to directly employed labor will increase by nearly $52 million.
- When indirect and induced jobs are considered, total job creation will reach 11,220 statewide with a corresponding $408 million annual increase in labor income.
- Value added to the state's economy will grow by $86 million and Missouri's total manufacturing output will increase by $839 million. Add the indirect and induced impacts, and the numbers increase to $723 million and $1.577 billion respectively.
- In addition to the value added by processing corn, the purchase of 282 million bushels of corn to feed Missouri ethanol plants is estimated to raise the value of Missouri's corn crop by $83 million at the farm level.
- Tax revenues collected at the federal, state and local level will be $160 million annually.

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Ethanol Industry Impact on the U.S. Economy: 2006

- The ethanol industry spent $6.7 billion on raw materials, goods and services, and other inputs to produce an estimated 4.9 billion gallons. Included in that figure was 1.8 billion bushels of corn valued at $4.1 billion. An additional $410 million 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 $41.9 billion of gross output to the U.S. economy in 2006.
- The increase in gross output supported the creation of 163,034 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 $6.7 billion in the pockets of American consumers.
- The full impact of annual operations of the ethanol industry and spending for new construction generated about $2.7 billion in tax revenue for the federal government. In addition, the industry generated $2.2 billion in additional tax revenue for state and local governments.

Contribution of the Ethanol Industry to the Economy of the United States, LEGG, LLC December 2006

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 six billion gallons of ethanol used in the U.S. in 2007 reduced the country's dependency on foreign oil supplies by more than 200 million barrels. This alone means a reduction of $13 billion annually in the growing trade deficit. Achieving the 7.5 billion gallons of domestic fuels target defined by the federal Renewable Fuels Standard (RFS) will reduce imports even more — and the savings will be even greater.

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

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

See *Ethanol Today* (Ace Magazine), June 2005,
"Ethanol Production's Impact on the Local Community": **www.ethanol.org**
Clean Fuels Development Coalition: **www.cleanfuelsdc.org**
Ethanol Across America: **www.ethanolacrossamerica.net**

world demand for liquid energy have combined to increase the investment in ethanol production.

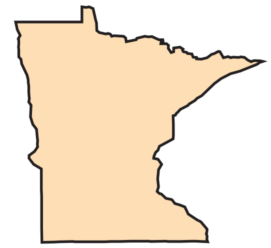
Using its Food and Agriculture Policy Simulator (FAPSIM) model, the U.S. Department of Agriculture has assessed the impact of an eight billion gallon-per-year ethanol market in the United States. Studying the direct and indirect effects on the U.S. farm economy, USDA concluded:

- An eight billion gallon ethanol market in 2007 will result in an average annual increase in corn demand of 685 million bushels.
- This increase in corn demand results in a price increase of 8% during early years of the program, rising to 12% per bushel by 2013.
- Importantly, increased corn prices have a negligible effect on retail food prices. The model analysis projects no effect on the Consumer Price Index for food until 2009 — and then it is only one-tenth of one percent rising to three-tenths of one percent by the conclusion of the program.

One of the key areas for measuring the impact on the farm economy is to examine farm cash receipts and net farm income. The RFS will result in a $1.4 billion increase in net farm income over the period of 2006-2013 and higher corn prices will reduce federal farm subsidies by nearly $1 billion over the same period.

State Case Studies *(continued from page 9)*

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:

- The ethanol industry generated $2.8 billion in economic impacts in 2007 and supported more than 10,000 jobs.
- The state will have total annual ethanol production of more than one billion gallons by 2008.
- By late 2008, total economic impacts will surpass $5 billion and support more than 18,000 jobs.
- By 2008, 25% of the state's corn crop will be used to produce ethanol and its co-products; 17% of the state's corn will be fed to livestock and much of the remaining 58% will be 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**

CFDC CLEAN FUELS DEVELOPMENT COALITION
www.cleanfuelsdc.org

AMERICAN COALITION FOR ETHANOL
www.ethanol.org

Maryland Grain Producers Utilization Board
www.marylandgrain.com

Nebraska Public Power District
Always there when you need us
www.nppd.com

Nebraska Ethanol Board
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