

ETHANOL AND THE LOCAL COMMUNITY

John M. Urbanchuk, Executive Vice President, AUS Consultants
Jeff Kapell, Associate Principal, SJH & Company

June 20, 2002

Executive Summary

The ethanol industry in the United States is poised on the threshold of the most significant growth in more than three decades. The Renewable Fuel Standard (RFS) provision of the comprehensive Energy Bill currently in Conference combined with the need to replace MTBE in the nation's motor fuel supply is expected to increase the demand for ethanol from current levels of about 1.8 billion gallons to five billion gallons over the next decade. This increase in demand will require a substantial investment in new ethanol production facilities ... an investment that largely will be made in the nation's rural communities.

The purpose of this study is to examine the economic benefits to a local community of building and operating an ethanol plant. To illustrate these impacts, we have based our analysis on a 40 million gallon per year (MGY) dry mill ethanol plant that uses grain as the feedstock for ethanol production.

In overview, a new 40 million gallon per year ethanol plant would have the following impacts on the community in which it is located:

- It will cost approximately \$60 million to build and equip a 40 MGY dry mill ethanol plant. This cost represents expenditures for goods and services, most of which will be made in the local economy. Construction of a production facility typically takes a year and the spending it pumps into the economy will generate a one-time boost of \$142 million in final demand as each dollar of spending circulates throughout the local economy.
- The most significant value of building a new ethanol plant comes from the impact of spending for operations. A 40 MGY ethanol plant will spend more than \$56 million annually on goods and services ranging from corn or other grains to labor and utilities such as water, electricity, and natural gas. Virtually all of these

purchases will be made from local suppliers and every dollar spent on annual operations will circulate several times throughout the entire local economy. On an annual basis, a 40 MGY ethanol plant will generate the following economic benefits to the community in which it is located:

- Expand the economic base of the local economy by \$110.2 million
- Generate an additional \$19.6 million of household income
- Support the creation of as many as 694 permanent new jobs throughout the entire economy
- Generate at least \$1.2 million in new tax revenue for the state and local governments
- Generate additional revenue for local grain farmers by increasing demand, which in the case of corn, in most circumstances results in an increase to the average local basis of an estimated 5 to 10 cents per bushel

The Study Approach

We have selected a 40 MGY dry mill plant on which to base our analysis because most of the new ethanol plants are expected to be dry mill technology and 40 MGY appears to be a reasonable size operation to finance while still taking advantage of significant economies of scale. Currently ethanol is being produced in 62 plants in 19 states. While some of these facilities are large wet milling plants, the average size of currently operating facilities is 39 MGY. An additional 14 ethanol plants are under construction and are expected to come on line within the next year. All of these are dry mill plants and more than half will have an annual capacity of 40 MGY.

Even if half of the additional ethanol required over the next decade comes from new large wet milling production facilities, there would still be the need for over thirty more 40 MGY dry mill ethanol plants, placed primarily in rural communities, in addition to those already in operation and in construction. The ethanol industry will invest more than \$10.5 billion on structures,

machinery and equipment, and supplies needed to build new production plants and to expand existing facilities to meet this new demand. Additional investments in infrastructure will be made for storage facilities and transportation infrastructure to handle the larger production of ethanol. Most of these new production facilities are likely to be located in or near rural communities in which grain – the major input for ethanol – is grown.

Local Effects of Ethanol Production

The expansion of ethanol demand resulting from the Renewable Fuel Standard provisions of the Energy Bill and replacement of MTBE in the nation's motor fuel supply will provide significant benefits to the entire American economy. More specifically, the attendant increase in ethanol production over the next decade will prove to be extremely beneficial to the economies of the communities where new production facilities are located.

The spending associated with building new ethanol production capacity will stimulate aggregate demand, create new jobs, and generate additional household income. The gross output, household income, and job impacts were estimated by applying the most appropriate final demand multipliers calculated by the U.S. Bureau of Economic Analysis (BEA) for output, earnings, and employment to the estimates of new capital spending and annual operating expenditures associated with a 40 MGY dry mill ethanol plant.¹ The multipliers for the grain milling industry were used to estimate the impact from annual operations since the main input for ethanol production is grain while the most appropriate multipliers for new plant construction are those for the construction sector.

The estimates summarized below result from a static analysis of the impact of building and operating an ethanol plant. That is, they reflect the combination of a series of snapshots of the economy rather than a dynamic flow analysis. The major economic benefits of a 40 MGY dry mill ethanol plant include the following:

¹ The multipliers used in this analysis are the current two-digit industry RIMS II multiplier estimated by the Bureau of Economic Analysis, U.S. Department of Commerce. The final demand multiplier for the grain milling and construction sectors are 1.9623 and 2.4266, respectively; the household income multipliers are 0.349 and 0.7878; and the employment multipliers are 10.5623 for grain milling and 24.607 for new construction.

- The capital spending associated with building a 40 MGY ethanol plant will add \$142.2 million to final demand in a local economy and generate \$46 million in new household income. This is a transitory or “one-shot” impact that will last as long as construction takes place.
- The major economic benefits of an ethanol plant will be derived from continuing profitable operations. Annual operating expenses for a 40 MGY ethanol plant will average \$56 million over a ten-year period. The major input for ethanol production- grain (corn in the case of our example)- accounts for about 71 percent of operating costs. Virtually all of these expenditures represent purchases of goods and services from local suppliers and every dollar spent on annual operations will circulate several times throughout the entire local economy.
- New jobs will be created as a consequence of the expansion of the local economic base. The direct effect of operating a 40 MGY ethanol plant will create approximately 41 permanent new jobs. However, as the dollars expended for goods and services in the local economy are spent and re-spent thereby creating new final demand for local businesses, an estimated 694 additional new permanent jobs will be created in all other sectors of the economy as a result of the ethanol plant (includes the 41 direct jobs).
- Increased economic activity and new jobs will result in more income for local households. The continued profitable operation of a 40 MGY ethanol plant will create an additional \$19.6 million annually of household income for the community in which the ethanol plant is located.
- State and local governments will benefit from increased tax revenue associated with higher levels of business gross receipts, and taxes on income and retail sales. Using the average state and local tax rates in the 19 states where ethanol is currently produced as a guide, a 40 MGY ethanol plant will contribute at least \$1.2 million annually to state and local tax revenue. This represents new revenue that will be available for investment in schools and education, emergency services, or community infrastructure projects.

The economic impacts stemming from annual operations of a 40 MGY ethanol plant are detailed in Table 1.

Table 1
Impact of Operation of a 40 MGY Ethanol Plant
(Million \$)

Year	Local Spending (Mil \$)	Final Demand Impact (Mil \$)	Earnings Impact (Mil \$)	Employment Impact Jobs
1	\$50.2	\$98.6	\$17.5	531
2	\$53.7	\$105.4	\$18.7	567
3	\$54.1	\$106.2	\$18.9	572
4	\$54.7	\$107.3	\$19.1	578
5	\$55.6	\$109.1	\$19.4	587
6	\$56.8	\$111.4	\$19.8	599
7	\$57.6	\$112.9	\$20.1	608
8	\$58.8	\$115.4	\$20.5	621
9	\$59.9	\$117.5	\$20.9	632
10	\$60.0	\$117.7	\$20.9	634
Average	\$56.1	\$110.2	\$19.6	

In addition to these “macro” level impacts, an ethanol plant promises major positive benefits to those grain producers who invest directly in the ethanol facility as well as those local producers who do not.

The ethanol industry has provided farmers with a proven vehicle for capturing a greater share of the value added to their commodity by participating in the down stream processing of that commodity. Typically this has involved direct equity investment by farmers in ethanol facilities. There are several different business models that have been employed, but most provide participating farmers with a market for their grain through supply arrangements where the farmer is guaranteed a market for a set number of bushels. Additionally, the participating farmer benefits from distribution of profits from ethanol operations as an equity partner. Assuming an average corn price of \$2.40 and ethanol price of \$1.16 per gallon, a farmer who invests \$20,000 in a 40 MGY ethanol plant can expect to earn an average annual return on investment of 13.3 percent over a ten-year period.

Positive Impact on Local Price of Corn

Farmers who do not participate as equity members can also benefit from local placement of an ethanol plant. The nearly 15 million bushels of grain that a 40 MGY plant requires annually will increase the local price of corn relative to the historic reference or market price. We estimate this local basis improvement at between 5 to 10 cents per bushel, building upon the more general rise in grain prices created throughout the United States by the production of ethanol. The U.S. Department of Agriculture estimates that every 100 million bushels of corn used to produce ethanol increases the price of corn by 3 to 5 cents per bushel.

Essentially this means that farmers in the area surrounding an ethanol plant will receive on average between 5 and 10 cents per bushel more for their grain as a consequence of the ethanol plant. For every 100 acres of corn produced at the national average yield this translates into as much as \$1,350 of incremental new revenue.

The use of corn and other grains to produce ethanol does not reduce the availability of feedstocks for livestock and poultry growers. Livestock, dairy, and poultry farmers in communities near ethanol plants will benefit from the increased availability of Distillers Dried Grains (DDG), a medium-protein, nutrient rich feed ingredient that is a co-product of dry mill ethanol production. DDG can replace corn and, to some extent, more expensive soybean meal in livestock, dairy, and poultry rations, thereby offsetting the corn price impacts discussed earlier. A 40 MGY dry mill ethanol plant will produce nearly 126,000 tons of DDG annually.

Local Basis Impact Methodology

Historically, it has been extremely difficult for producers, grain traders, and policy makers to get a sense of the potential impact to local corn prices, referred to as local basis, from the addition into the local grain flow of a significant user of grain, such as an ethanol production facility. There are numerous factors that influence local and regional corn pricing such as weather, year-to-year swings in production, changes in components of the grain handling infrastructure, as well as other external influences on demand such as changes in export markets and additional local feed mill production. In particular, the planting flexibility and commodity support provisions contained in the 1996 Farm Bill triggered changes in cropping and rotation practices in some locations in close proximity to ethanol facilities that resulted in declining corn production. Many of these factors can and have had greater impacts to local basis than new ethanol production.

External factors notwithstanding, it is reasonable to believe that a relationship exists between the additional demand for grain (corn) as a percent of regional corn production (i.e. within 10 to 50 miles of the production facility) and its impact on local basis. For purposes of establishing a relationship between ethanol demand on grain and local pricing, we investigated local conditions for nine facilities: two in Missouri, five in Nebraska, and two in Minnesota.

Corn demand was determined by using a conversion factor of 2.7 gallons of ethanol for one bushel of corn. Supply characteristics for dry mill ethanol facilities show that the vast majority of required grain typically comes from within a fifty-mile radius of the plant in order to minimize costs for grain transport. Estimates were made to establish the relative contribution to corn demand from each ethanol facility where the fifty-mile supply zone for a particular plant overlaps with the supply region of other ethanol facilities. Corn production was based upon the six-year average USDA NASS county corn production data.

Estimated basis impacts were based upon previous work performed by SJH & Company for the two Missouri ethanol facilities, and on conversations and interviews with more than ten industry experts for the remaining seven-ethanol facilities. Available historic elevator prices do not always reflect the impacts to local basis, as these facilities will hedge their profitability by “staying” out of the market when prices are high. As a result, typically elevator volumes show local impacts before or simultaneous with impacts to published prices. Local facility managers, grain traders, and commodity purchasers typically have a realistic, intuitive understanding of the impacts on basis from local and regional shifts in demand, such as from a new ethanol production facility.

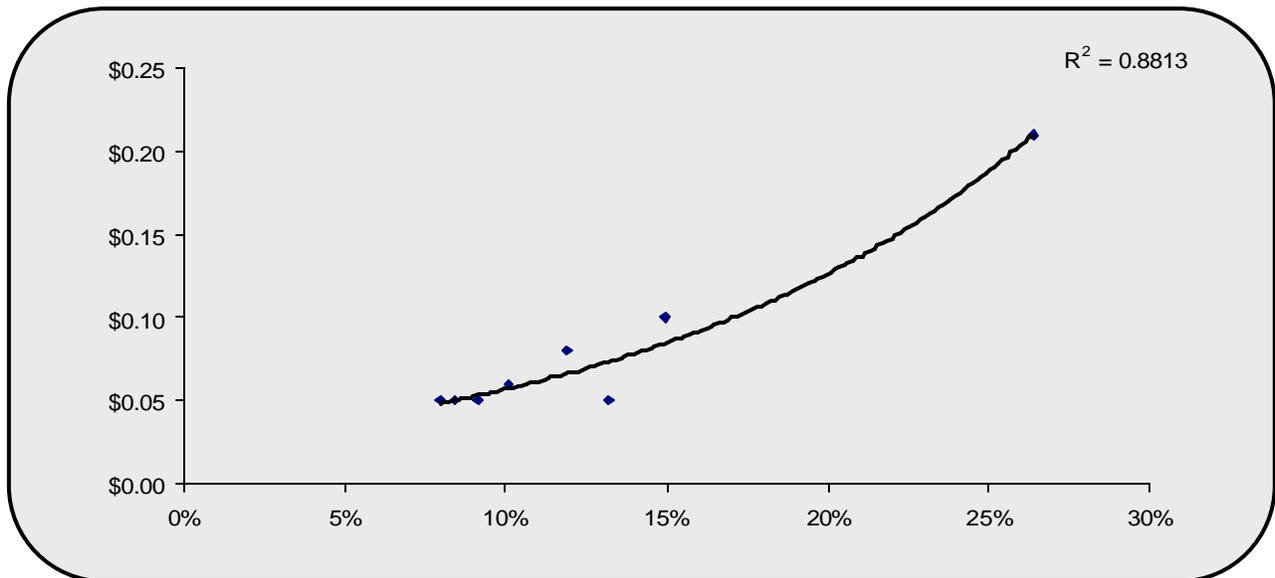
The analysis for the chosen ethanol facilities, along with determinations for ethanol-corn demand as a percentage of local corn production, and associated estimates for impact to local basis are indicated in Table 2.

Table 2
Ethanol Facility Corn Demand & Estimated Impacts on Local Basis

Facility	Location	Ethanol Output (M gpy)	Demand (% Of Available Corn) 10 Mile Radius	Demand (% Of Available Corn) 50 Mile Radius	Est. Impact on Basis
Golden Triangle	Craig, MO	20	51%	10%	\$0.06
NEMO	Macon, MO	18	322%	26%	\$0.21
Heartland Corn	Winthrop, MN	35	70%	8%	\$0.05
MCP	Marshall, MN	50	80%	8%	\$0.05
Williams-Aurora	Aurora, NE	76	79%	13%	\$0.05
High Plains	York, NE	50	53%	12%	\$0.08
AGP / Chief	Hastings, NE	52	154%	9%	\$0.05
MCP	Columbus, NE	100	93%	15%	\$0.10

Figure 1 shows the scatter graph representation of the fifty-mile demand and local basis impact estimates indicated in the above table.

Figure 1
Ethanol Facility Demand as % of Corn Production within 50 Miles



The resulting exponential trendline indicates a relatively high correlation for the data points in a relationship that generally meets expectations. Despite the complicating factors and influences, there does appear to be at least a directional relationship between corn demand from ethanol production measured as the percent of corn production within a 50-mile radius, and its level of impact on local basis. One caveat becomes clear. Placement of an ethanol facility into a region without adequate production can result in an impact to local basis that will have a detrimental effect on profitability margins, as well as a disruptive influence to existing players within the local corn marketplace.

However, placement of new ethanol facilities within regions with sufficient available corn (grain) production will have a positive impact on local basis, typically between 5 and 10 cents per bushel. This boost to local corn pricing exists on top of the national lift in corn (grain) pricing driven by U.S. ethanol production discussed above. As discussed earlier, the U.S. Department of Agriculture estimates that every 100 million bushels of corn used to produce ethanol increases the price of corn by 3 to 5 cents per bushel.

As a result of this beneficial local basis impact, farmers near an ethanol facility, even those who do not invest in the venture, will receive on average between 5 and 10 cents per bushel more for their grain as a consequence of the ethanol plant. In other words, for every acre of corn produced at the national average yield, the producer will receive more than \$10 additional revenue.

When calculated over the corn production within the home county of each ethanol facility, total contribution to values from increasing local basis can be quite substantial, as shown in Table 3.

Table 3
Improvement to Local Corn Revenue from Impacts to Basis

Facility	Location	Est. Impact on Basis	Home County Corn Production (million bushels)	Potential Value Added to County Corn Production
Golden Triangle	Craig, MO	\$0.06	12.3	\$750,000
Heartland Corn	Winthrop, MN	\$0.05	18.6	\$950,000
MCP	Marshall, MN	\$0.05	23.1	\$1,100,000
WilliamsAurora	Aurora, NE	\$0.05	35.6	\$1,750,000
High Plains	York, NE	\$0.08	35.1	\$2,800,000
AGP / Chief	Hastings, NE	\$0.05	27.5	\$1,350,000
MCP	Columbus, NE	\$0.10	40.0	\$4,000,000

In conclusion, building and operating an ethanol plant can provide significant economic benefits to the community in which it is located. These include new jobs, additional income and tax revenue, and an expansion of the base of the local economy.