

IMPORTANCE OF THE RENEWABLE FUELS INDUSTRY TO THE ECONOMY OF IOWA

Prepared for the Iowa Renewable Fuels Association

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January 28, 2013

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2012 was a challenging year for the renewable fuels industry. The ethanol and biodiesel industries started off the year on a positive note but suffered from declining profitability during the second half. Both industries were buffeted by weak gasoline and diesel fuel prices, high feedstock costs, and regulatory uncertainty.

The ethanol industry faced several major challenges in 2012. First, a weak economy and high prices resulted in a decline in motor gasoline demand; the ethanol industry ran up against the E10 blend wall; and the industry was faced with soaring feedstock prices caused by the severe 2012 drought. During the first half of 2012 Iowa biodiesel producers were on pace to hit 200 million gallons of production. But the lack of the blenders' tax credit and poor profitability held the industry back.

Reflecting these challenges, total ethanol production nationally fell nearly 4 percent to an estimated 13.3 billion gallons.¹ However, Iowa's ethanol industry was able to maintain output. At the end of 2012 Iowa's 41 operating ethanol plants were producing at an annual rate of about 3.7 billion gallons. Iowa leads the nation in ethanol output accounting for nearly 30 percent of U.S. production. Iowa also is the nation's leading biodiesel producer with the second largest biodiesel capacity (after Texas). According to the Iowa Renewable Fuels Association (IRFA), Iowa's 12 biodiesel plants have a

¹ The 13.3 billion gallon estimate is based on annualized year-to-date ethanol production reported by the Energy Information Administration.

rated capacity of 314.5 million gallons and produced 184 million gallons of biodiesel in 2012², accounting for about 17 percent of total U.S. biodiesel output.

The outlook for ethanol in 2013 is no less challenging than it was for 2012. The ethanol industry will be forced to deal with the blend wall and the challenge of increasing demand in an environment of reduced motor fuel consumption. Further, feedstock supplies will remain tight until the 2013 corn crop is in the bin which may or may not provide improved profitability. Further, the oil industry will continue to support and encourage attacks on the RFS and put up hurdles to increased penetration of higher ethanol blends. On the other hand, the reinstatement of the biodiesel blenders' tax credit coupled with a higher RVO for biodiesel in 2013 raises the possibility of robust growth in Iowa biodiesel production.

Ethanol and biodiesel producers are part of a manufacturing sector that adds substantial value to agricultural commodities produced in Iowa and make a significant contribution to the Iowa economy. Based on the size of the renewable fuels industry at year-end 2012, ethanol and biodiesel:³

- Accounts for nearly \$5.5 billion, or 4 percent, of Iowa GDP;
- Generates \$4 billion of income for Iowa households; and
- Supports nearly 60,000 jobs through the entire Iowa economy.

The annualized contribution of the ethanol and biodiesel industries is summarized in Table 1.

² http://www.iowarfa.org/biodiesel_refineries.php

³ This study estimates the annualized impact of producing 3.7 billion gallons of ethanol and 184 million gallons of biodiesel on Iowa's economy. These figures reflect the capacity of ethanol and biodiesel plants operating at year's end.

Table 1
Total Economic Impact of the Renewable Fuels Industry for Iowa: 2012

	Purchases (Mil 2012\$)	GDP (Mil 2012\$)	Household Earnings (Mil 2012\$)	Employment (Jobs)
Ethanol	\$10,897	\$5,057.9	\$3,680.5	54,876
Biodiesel	\$808.2	\$391.0	\$236.8	4,982
Total	\$11,720.2	\$5,448.9	\$3,917.3	59,858

Methodology

The spending associated with current renewable fuels production circulates throughout the entire Iowa economy several fold. Consequently this spending stimulates aggregate demand, supports the creation of new jobs, generates additional household income, and provides tax revenue for State and local governments. We estimate the impact of the renewable fuels industry on the Iowa economy by applying expenditures by the relevant supplying industry to the appropriate final demand multipliers for value added output, earnings, and employment.

This study utilizes an economic model known as IMPLAN (Impact Analysis for Planning) to develop this understanding of the economy, including the sectors that support the ethanol industry, the links between them, and the level of economic activity. IMPLAN is a commonly used economic input-output (I-O) model. I-O models are constructed based on the concept that all industries within an economy are linked together; the output of one industry becomes the input of another industry until all final goods and services are produced. I-O models can be used both to analyze the structure of the economy and to estimate the total economic impact of projects or policies. For this analysis, a model for the Iowa economy was constructed using 2011 IMPLAN software and data (the most recent available) and used to estimate economic impacts of the ethanol and biodiesel industry. Detail regarding the IMPLAN model and how it was used is presented in Appendix A.

Contribution of the Renewable Fuels Industry

The contribution of the renewable fuels industry to the economy of Iowa is detailed in Table 2.

This table reflects the direct, indirect and induced impact from ethanol and biodiesel manufacturing and the agriculture sector.

Table 2
Contribution of the Renewable Fuels Industry to Iowa: 2012

	GDP (Mil 2012 \$)	Employment (Jobs)	Income (Mil 2012 \$)
Ethanol Manufacturing			
Direct	\$188.0	2,050	\$188.0
Indirect	\$654.7	6,729	\$326.8
Induced	\$241.1	3,770	\$134.1
Subtotal	\$1,083.8	12,549	\$648.9
Biodiesel Manufacturing			
Direct	\$14.4	350	\$14.4
Indirect	\$287.8	3,243	\$173.2
Induced	\$88.7	1,389	\$49.2
Subtotal	\$391.0	4,982	\$236.8
Agriculture			
Direct	\$701.9	15,583	\$620.8
Indirect	\$2,132.4	8,870	\$1,782.2
Induced	\$1,139.8	17,874	\$628.6
Subtotal	\$3,974.1	42,327	\$3,031.6
Total Impact			
Direct	\$904.4	18,889	\$823.2
Indirect	\$3,074.9	17,936	\$2,282.2
Induced	\$1,469.6	23,032	\$811.9
Total	\$5,448.9	59,858	\$3,917.3

Ethanol and Agriculture

The ethanol industry provides a significant contribution to the Iowa economy, spending nearly \$11 billion on raw materials, other inputs, and goods and services to produce 3.7 billion gallons of ethanol. The largest share of this spending is for corn and other grains used as the raw material to make ethanol. The Iowa ethanol industry currently uses more than 1.3 billion bushels

of corn, or about 60 percent of Iowa's corn crop.⁴ At 2012 Iowa farm gate prices this amounts to \$8.8 billion of revenue to Iowa corn farmers. In addition to providing a growing and reliable domestic market for Iowa farmers, the ethanol industry also provides the opportunity for farmers to enjoy some of the value added to their commodity by further processing. Locally owned ethanol plants account for more than half of Iowa fuel ethanol plants and nearly half of production capacity.

The remainder of the spending by the ethanol industry is for a wide range of inputs such as industrial chemicals; electricity, natural gas, and water; labor; transportation and services such as maintenance, insurance, and general overhead. Spending for these goods and services represents the purchase of output of other industries, mostly in Iowa. The price assumptions used in estimating the value of expenditures for both ethanol and biodiesel are shown in Appendix Table 1.

- The gross value of the ethanol industry output (ethanol and co-products) amounts to \$11.2 billion. Based on the IMPLAN model, the ethanol industry accounts for \$5.4 billion of Iowa GDP.
- Jobs are created from the economic activity supported by ethanol production. While ethanol production is not a labor-intensive industry, accounting for about 2,000 full time equivalent direct jobs in Iowa⁵, the economic activity resulting from the full activities of the ethanol industry supports a much larger number of jobs in the economy. The direct jobs supported by the ethanol industry are concentrated primarily in manufacturing and agriculture. When the indirect and induced effects of ethanol manufacturing are considered, the industry accounts for more than 12,500 full time equivalent jobs.
- Since renewable fuels production uses feedstocks produced by Iowa farmers, the ethanol and biodiesel industry has the largest impact on agriculture, supporting as many as 17,780 direct farm and farm-related jobs. Most of the agriculture jobs supported by

⁴ The 3.7 billion gallons of annual ethanol production required 1.3 billion bushels of corn. This amounts to 57 percent of the 2.36 billion bushels of corn harvested in Iowa in the 2011/12 marketing year. Without the demand for corn provided by the ethanol industry Iowa farmers would likely plant fewer acres to corn, purchase fewer inputs, and produce a smaller crop, thereby reducing the economic contribution provided by the corn industry.

⁵ The Census Bureau does not report employment in ethanol production. The number of direct jobs associated with ethanol production is based on an estimated industry average of 50 jobs per plant.

the ethanol industry are farm workers and laborers associated with grain production. However, a wide range of jobs in support activities related to crop production ranging from farm managers and bookkeepers to farm equipment operators are supported by ethanol production. As the impact of the direct spending by the ethanol and biodiesel industry expands throughout the economy, the employment impact expands significantly and is spread over a large number of sectors. The indirect and induced jobs supported by the agriculture output used by renewable fuels amount to an additional 24,327 jobs throughout the entire Iowa economy.

- Increased economic activity and new jobs result in higher levels of income for Iowa households. The ethanol industry accounted for \$3.7 billion of income for Iowans in 2012.

Biodiesel

The Iowa biodiesel industry is not as mature as the ethanol industry but also makes sizeable contributions to the Iowa economy. According to the Iowa Renewable Fuels Association (IRFA), Iowa's 12 biodiesel plants have a rated capacity of 314.5 million gallons and produced 184 million gallons of biodiesel in 2012⁶ accounting for about 17 percent of total U.S. biodiesel output.

The Iowa biodiesel industry spent more than \$800 million on raw materials, other inputs, and goods and services to produce 184 million gallons of biodiesel. The largest share of this spending is for fats and oils used as the raw material to make biodiesel. The Iowa biodiesel industry used nearly one billion pounds of soybean oil in 2012 to produce biodiesel, nearly 72 percent of total feedstock use. In addition Iowa biodiesel producers used approximately 250 million pounds of animal fats, 111 million pounds of canola oil, 23 million pounds of industrial grade corn oil, and 9 million pounds of used cooking oil as biodiesel feedstock in 2012. A vast majority of the raw material for biodiesel production in Iowa is procured locally. The remainder of the spending by the biodiesel industry is for a wide range of inputs such as industrial chemicals; electricity, natural gas, and water; labor; and services such as maintenance, insurance, and general overhead. As with ethanol, spending for these goods and services represents the purchase of output of other industries.

⁶ http://www.iowarfa.org/biodiesel_refineries.php

The spending associated with biodiesel production also circulates throughout the entire Iowa economy stimulating aggregate demand, supporting the creation of new jobs, generating additional household income, and creating new tax revenue. The following summarizes the economic contribution of the Iowa biodiesel industry at the end of 2012.

- The gross value of the biodiesel and glycerin produced in Iowa totaled \$823 million and the biodiesel industry accounts for more than \$391 million of Iowa GDP.
- New jobs are created as a consequence of increased economic activity caused by biodiesel production. The increase in economic activity generated by biodiesel production supports 4,982 full time equivalent jobs in all sectors of the Iowa economy.
- Increased economic activity and new jobs result in higher levels of income for Iowa households. The biodiesel industry accounts for \$236.8 million of household income for Iowans.

Challenges for 2013

The renewable fuels industry faces significant challenges in 2013. Perhaps the most significant is the impact of the size of the 2013 corn and soybean harvest. The severe drought of 2012 put significant pressure on subsurface water supplies and reduces the margin of error for the 2013 crop. A return to more normal yields accompanied with large spring plantings would result in a large harvest and would put downward pressure on commodity prices – and feedstock costs.

The health of the economy and future of petroleum prices also provide challenges for the industry. Continued slow growth in consumer spending and high oil prices would further constrain gasoline and diesel fuel consumption. Since ethanol and biodiesel are blended with petroleum products, declines in gasoline and diesel consumption translate into weak demand for renewable fuels. This is a particular issue for ethanol since the E10 blend wall has been met and the primary way to increase consumption is through the sale of higher blends. The EPA approved the use of E15 blends for most automobiles on the road. The industry has to move aggressively to exploit this opportunity.

Finally, public policy and regulatory issues also present challenges. On January 2, 2013, President Obama signed into law H.R. 8, the American Taxpayer Relief Act (ATRA), known

more commonly as the Fiscal Cliff deal. The focus of the legislation was aimed at averting a complete expiration of the 2001 and 2003 Bush tax cuts. This law included the extension and modification of energy tax provisions impacting numerous industries. The ATRA includes a Cellulosic Biofuel Producer Credit that extends the current \$1.01 per gallon tax credit for the production of cellulosic biofuels through 2013. In addition, the ATRA reinstated tax credits for biodiesel and renewable diesel for 2012 and 2013. EPA also increased the quantity of bio-based biodiesel under the RFS to 1.28 billion gallons for 2013.

The RFS continues to be under attack. In late 2012 EPA denied requests for waivers from the RFS mandate filed by several Governors and supported by the petroleum industry and national livestock trade groups. These attacks are likely to continue and will require active defense by the renewable fuels industry.

APPENDIX A

IMPLAN Methodology

To understand how the economy is affected by an industry such as renewable fuel production it is necessary to understand how different sectors or industries in the economy are linked to each other. For example, in the renewable fuels production sector, the ethanol industry buys corn from the agriculture sector, which in turn then buys crop production products and fertilizers from the agricultural chemicals industry, which in turn purchases from a range of other industries. These are referred to as backward linkages. Use by other sectors of natural gas as an input, such as in manufacturing operations, is called a forward linkage. The natural gas production and transmission industries are linked through both forward and backward linkages to other economic sectors in each state's economy.

The household sector is linked to all sectors as it provides the labor and management needed by each. In turn, changes that affect the incomes of the household sector typically have more significant impacts compared to a change in the sales of other sectors. This is because households typically spend most of their income in both retail and service industries.

IMPLAN models provide three economic measures that describe the economy: value added, income, and employment.

- Value added is the total value of the goods and services produced by businesses in the county and are generally referred to as GDP. It is equivalent to the sum of labor income, taxes paid by the industry, and other property income or profit.
- Labor income is the sum of employee compensation (including all payroll and benefits) and proprietor income (income for self-employed work). In the case of this analysis, demand for corn and other feedstocks to produce ethanol supports farm income through higher crop receipts than would be the case without ethanol production. The impact of this higher farm income is evaluated on a gross basis in this analysis. That is, the model does not factor in the distributional effects on consumers from higher grain prices (i.e. reduced spending on non-food goods and services).

- Employment represents the annual average number of employees, whether full or part-time, of the businesses producing output. Income and employment represent the net economic benefits that accrue to the region as a result of increased economic output.

There are three types of effects measured with a multiplier: the direct, the indirect, and the induced effects. The direct effect is the known or predicted change in the local economy that is to be studied. The indirect effect is the business-to-business transactions required to produce the direct effect (i.e. increased output from businesses providing intermediate inputs). Finally, the induced effect is derived from spending on goods and services by people working to satisfy the direct and indirect effects (i.e. increased household spending resulting from higher personal income).

Differences from Previous Studies

As noted earlier, this study is based on simulations of IMPLAN, an Input-Output economy incorporating 2011 data. The results presented in this study incorporate changes in IMPLAN multipliers for Iowa which differ from previous years. In addition, we revised the estimate of the value of corn produced in Iowa allocated to ethanol production. While 60 percent of Iowa's 2011/12 corn crop was used by the ethanol industry, because of the size and importance of Iowa's livestock industry it does not follow that corn production would fall by 60 percent in the absence of the ethanol industry. In other words, the ethanol industry cannot claim the full contribution of corn production for the Iowa economy. These adjustments were incorporated in this year's analysis and are reflected in reduced estimates of employment and GDP stemming both from agriculture and ethanol production.

	Corn Price Farm IA (\$/bu)	Corn Price No 2. Yel Central III (\$/bu)	Distillers Grains 10% Iowa (\$/ton)	Distillers Grains 65% Iowa (\$/ton)	Ethanol FOB Plant Iowa (\$/gal)
Jan	\$5.99	\$6.26	\$185.44	\$75.13	\$2.11
Feb	\$6.21	\$6.42	\$196.60	\$72.00	\$2.09
Mar	\$6.23	\$6.47	\$204.88	\$72.78	\$2.20
Apr	\$6.23	\$6.34	\$210.81	\$71.06	\$2.12
May	\$6.31	\$6.27	\$215.40	\$69.90	\$2.02
Jun	\$6.37	\$6.29	\$222.88	\$70.56	\$2.08
Jul	\$7.17	\$7.86	\$272.56	\$79.56	\$2.45
Aug	\$7.89	\$8.15	\$304.42	\$86.92	\$2.52
Sep	\$6.84	\$7.69	\$275.63	\$90.13	\$2.30
Oct	\$6.82	\$7.48	\$269.30	\$86.50	\$2.32
Nov	\$7.02	\$7.39	\$260.63	\$87.13	\$2.31
Dec	\$7.00	\$7.23	\$255.38	\$86.63	\$2.23
Average	\$6.67	\$6.99	\$239.49	\$79.02	\$2.23

	Crude Soy Oil Iowa (cents/lb)	Crude Corn Oil Midwest (cents/lb)	Choice W. Grease Central US (cents/lb)	Yellow Grease Midwest (cents/lb)	B100 FOB Plant Iowa (\$/gal)
Jan	50.39	54.00	38.13	33.55	\$4.66
Feb	52.40	57.13	46.31	35.08	\$4.72
Mar	53.05	59.44	47.09	39.38	\$4.75
Apr	55.00	60.75	45.72	39.19	\$4.82
May	50.28	57.20	46.50	39.50	\$4.57
Jun	48.47	52.75	41.31	36.88	\$4.38
Jul	52.04	54.63	41.97	35.19	\$4.41
Aug	52.28	57.30	45.35	35.31	\$4.48
Sep	54.04	58.13	42.66	36.00	\$4.51
Oct	49.87	54.50	35.18	32.25	\$4.13
Nov	46.85	51.00	33.16	29.25	\$3.99
Dec	46.73	50.38	36.63	30.50	\$4.00
Average	50.95	55.60	41.67	35.17	\$4.45

Sources: USDA/AMS/NASS