University of Minnesota Extension

COMMUNITY DEVELOPMENT

Economic contribution of Minnesota's ethanol industry, 2025

A report of the Economic Impact Analysis program

Authored by Brigid Tuck

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March 2026

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Executive summary: Economic contribution of Minnesota's ethanol industry, 2025

Ethanol production has deep roots in Minnesota. It has provided a critical economic development opportunity for farmers and communities, along with an avenue to add value to a widely grown local crop: corn. Public-private partnerships have helped grow and sustain the industry. To understand the economic value of ethanol production, the Minnesota Bio-Fuels Association partnered with University of Minnesota Extension to conduct an economic contribution study. Major findings from the analysis include the following items.

Economic contribution in 2025: In 2025, Minnesota's ethanol industry generated an estimated $4.9 billion in economic activity in the state. Of this, $975 million was labor income, or income in the pockets of the state's residents. The industry supported employment for 16,573 people. The ethanol industry contributed nearly $2 billion to Minnesota's gross domestic product (GDP).

Of the $4.9 billion in economic activity generated, $2.6 billion stemmed directly from ethanol plants. Other businesses throughout the state realized the remaining $2.3 billion in activity. The industries experiencing the highest benefits included wholesale trade, crop production, and real estate.

Ethanol production also spurred tax collections. In 2025, Minnesota's ethanol industry generated an estimated $152.9 million in state and local taxes.

Ethanol production: Minnesota's ethanol plants produced 1,361.7 million gallons of ethanol in 2025, a 2.8 percent decrease from 2024. The drop was primarily caused by one plant ceasing to produce ethanol beginning in March of 2025. For context, the average weekly Midwest ethanol production for 2025 increased 2.4 percent from 2024 and was 6.9 percent above the five-year average.

Overall, Minnesota's ethanol plants had average net returns of $0.31 per gallon. While Minnesota's ethanol production decreased in 2025, the total value of feedstock (corn) purchased declined by a higher rate. This is because the price of corn dropped by about 2 percent in 2025 as compared to 2024. Meanwhile, revenues per gallon of ethanol produced increased by 3.2 percent between 2024 and 2025. Prices for ethanol and corn oil were generally higher, while DDGS prices were lower.

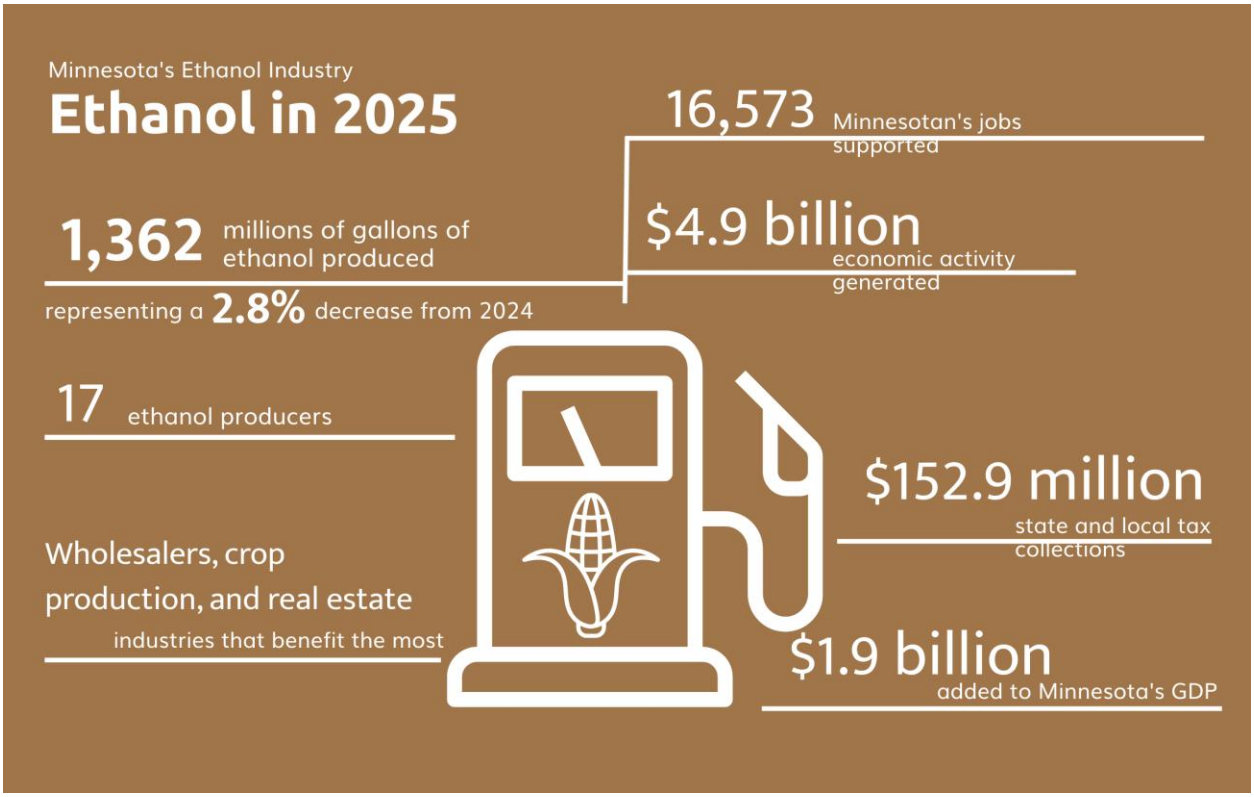
Prices factor into an economic contribution analysis. Production of ethanol could increase, along with the purchases of inputs (corn, utilities, labor, and so forth) and the economic impact could decrease if prices decreased enough to offset the increases.

Ethanol's co-products: In 2025, Minnesota's ethanol plants produced an estimated 4 million tons of DDGS. Due to its fiber and protein content, DDGS is often fed to livestock for nutrition and to enhance production. Minnesota's 2025 DDGS supply could support approximately 1.8 million head of cattle, 3.5 million pigs, and 60.2 million turkeys and chickens. For context, Minnesota farms have 2.1 million head of cattle, 8.9 million pigs, and 39 million head of turkeys.

Distillers' corn oil is the other major co-product made by ethanol plants. In 2025, Minnesota's ethanol plants produced an estimated 485.6 million pounds of corn oil. The corn oil is primarily used for biodiesel production but is also blended into poultry and swine feed. If all of Minnesota's 2025 distillers' corn oil had been used in biodiesel production, it would have generated 63 million gallons of biodiesel. This represents 77 percent of Minnesota 82 million gallons of biodiesel production capacity.

Ethanol industry in the United States: Following the disruptions of the COVID-19 pandemic, the United States ethanol industry has seen continued production growth. U.S. ethanol production hit 16.4 billion gallons in 2025, representing the fifth year in a row that production increased.

Nationally, ethanol exports set records in 2025. Ethanol producers in the United States exported more than 2.18 billion gallons in 2025, a 13 percent increase compared to 2024. Meanwhile, export markets for DDGS remained strong, but total exports decreased by 4 percent in 2025. Looking forward to 2026, the United States Energy Information Administration expects ethanol production to increase.

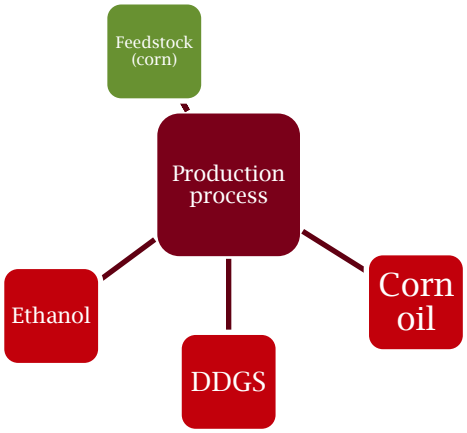


Introduction

Ethanol production has deep roots in Minnesota. The technology to produce ethanol as an alternative to petroleum-based fuel evolved, so that by the 1970s oil crisis, ethanol had emerged as a viable strategy to reduce dependence on foreign oil. While price pressures eased in the 1980s, ethanol production remained important in Minnesota, as it provided a potentially critical economic development opportunity for farmers and communities.[1] It was a path to add value to a widely grown local crop: corn. Since then, public-private partnerships have helped grow and sustain the industry.[2]

The ethanol production process involves fermenting and distilling simple sugars from biological sources. The primary source (often referred to as a feedstock) in ethanol production is corn. Ethanol is typically blended into motor vehicle fuel. In addition to ethanol, many plants also produce Dried Distillers' Grains (DDGS), which farmers feed as a protein to their livestock. Ethanol plants in Minnesota also produce corn oil.[3] These co-products, DDGS and corn oil, help diversify revenue streams and provide revenue stability for ethanol producers (Chart 1).

Chart 1: Ethanol plant production model



One way to understand ethanol production at a state level is through production capacity. Each ethanol plant has a "nameplate ethanol production capacity" or the total amount of ethanol the plant can produce at full operation. In 2025, Minnesota was the sixth-largest ethanol state in the nation, based on nameplate production capacity. Minnesota's ranking among other states dropped one spot compared to 2024, with Indiana moving into fifth place. The shift was primarily due to increased production in Indiana. Iowa, Nebraska, and Illinois continued to lead the nation in ethanol nameplate production levels (Chart 2).

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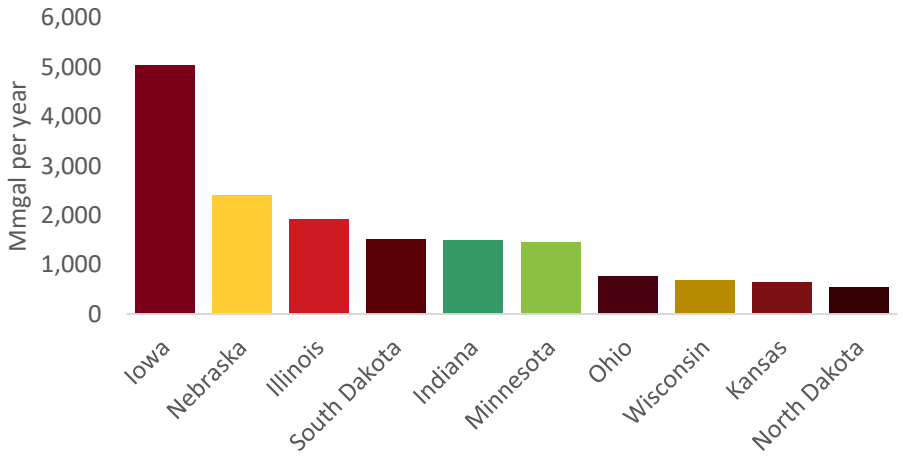
[1] Tiffany, D.G., & Taff, S.J. (2009). Will new technologies preserve Minnesota's ethanol industry? *Rural Minnesota Journal*. Center for Rural Policy and Development. https://www.ruralmn.org/wp-content/uploads/2011/03/Will-New-Technologies-Preserve-Minnesotas-Ethanol-Industry.pdf
[2] Gustafson, C. (n.d.). *History of ethanol production and policy*. North Dakota State University. https://www.ag.ndsu.edu/energy/biofuels/energy-briefs/history-of-ethanol-production-and-policy
[3] Minnesota Department of Agriculture. (n.d.). *Ethanol basics and FAQs*. Minnesota Department of Agriculture. https://www.mda.state.mn.us/environment-sustainability/ethanol-basics-and-faqs

Chart 2: Top 10 states: fuel ethanol production capacity, January 2025, Source: US Energy Information Administration



As of January 2025, when national ethanol capacity statistics were published, there were 18 ethanol plants in the state. In March 2025, the total number of ethanol plants fell to 17 with the discontinuation of production at one Minnesota facility.

At the national level, total nameplate production capacity reached nearly 18.5 billion gallons in 2025, a slight increase from 2024. Minnesota's nameplate production capacity, at 1.46 billion gallons, accounted for 8 percent of national capacity.[4] It also represented an approximately 1 percent increase from January of 2024. Individual nameplate plant capacity varies in Minnesota, from a plant with a capacity of 30 million gallons per year to a plant with a capacity of 164 million gallons per year.

The ethanol industry in 2025

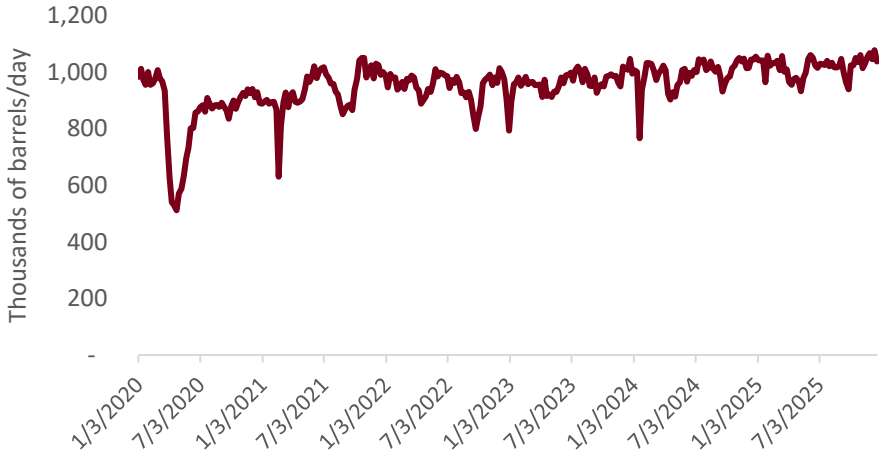
Following the disruptions of the COVID-19 pandemic, the United States ethanol industry has seen continued production growth. U.S. ethanol production hit 16.4 billion gallons in 2025, representing the fifth year in a row that production increased.[5]

In the Midwest, the five-year average ethanol production rate was 954,000 barrels per day (Chart 3). Average weekly Midwest ethanol production for 2025 was 1,020,000 barrels per day, up 2.4 percent from 2024, and 6.9 percent above the five-year average. Production declined at several points throughout the year, including mid-January, early April, and mid-September. These periods are generally consistent with plant downtimes for maintenance and preparation for seasonal changes in the fuel markets.

[4] U.S. Energy Information Administration. (2025, September). *U.S. fuel ethanol plant production capacity*. https://www.eia.gov/petroleum/ethanolcapacity/

[5] Iowa Renewable Fuels Association. (2026, January 13). IRFA Iowa ethanol production stagnant over 3 years at 4.5 billion gallons. *Ethanol Producer Magazine*. https://ethanolproducer.com/articles/irfal-iowa-ethanol-production-stagnant-over-3-years-at-46-billion-gallons

Chart 3: Weekly Midwest plant production of fuel ethanol, 2020-2025, Source: US Energy Information Administration



Nationally, ethanol exports set records in 2025. Ethanol producers in the United States exported more than 2.18 billion gallons in 2025, a 13 percent increase compared to 2024.[6] Increases were fueled by demand from many countries, but Canada, the European Union, India, the United Kingdom, and Colombia remain major markets.[7] The exports supported industry sales growth, strengthened profitability, and provided a floor under margins.[8]

Meanwhile, export markets for DDGS remained strong, but total exports decreased by 4 percent in 2025. Mexico remained the top export market, followed by South Korea, Vietnam, and Indonesia.[6]

Looking forward to 2026, the United States Energy Information Administration expects ethanol production to increase with the average production per day rising from 1.06 million barrels in the first half of the year to 1.11 million barrels per day by the fourth quarter.[9]

Uncertainty continues to be an issue for the nation's ethanol producers. Producers are still waiting for further clarification on items such as the 45Z clean fuel production credit (which became law in 2025), initiatives in the One Big Beautiful Bill Act, and the Environmental Protection Agency's approach to issues surrounding Small Refinery Exemptions.[10]

Ethanol producers continue to advocate for legislation allowing the sale of E-15 year-round. While such legislation did not pass in 2025, California approved E-15 as a legal fuel, opening up another

[6] Krueger, E. (2026, February 19). USDA: US ethanol exports top 2.18 billion gallons in 2025. *Ethanol Producer Magazine*. https://ethanolproducer.com/articles/usda-us-ethanol-exports-top-218-billion-gallons-in-2025
[7] Renewable Fuels Association. (2026, February 20). *New RFA report: Ethanol exports shattered record in 2025*. https://ethanolrfa.org/media-and-news/category/news-releases/article/2026/02/new-rfa-report-ethanol-exports-shattered-record-in-2025
[8] Zimmerman, C. (Host). (2025, December 30). Ethanol report on 2025. [Audio podcast episode]. In *The ethanol report*. Agwired. https://energy.agwired.com/2025/12/30/ethanol-report-on-2025/
[9] Krueger, E. (2026, January 13). EIA expects fuel ethanol production to expand to 1.08 million barrels per day in 2027. *Ethanol Producer Magazine*. https://ethanolproducer.com/articles/eia-expects-fuel-ethanol-production-to-expand-to-108-million-barrels-per-day-in-2027
[10] Small Refinery Exemptions allow small refineries to seek relief from blending biofuels if they can demonstrate disproportionate economic hardship.

market. Retailers, however, continue to be hesitant to expand their product lines to include E-15 without additional federal certainty.[8]

At the state level, sales of E-15 ethanol hit record levels in 2025. Minnesota retailers sold 144 million gallons, a 1 percent increase from 2024. More than 550 stations currently sell E-15 in the state.[11] Additionally, innovations and investments remain key for Minnesota's ethanol plants. Minnesota's plants continue to explore new approaches to production, new products, and methods to increase efficiencies.[12]

Ethanol production in Minnesota

While national production was up, Minnesota's ethanol plants produced 1,361.7 million gallons of ethanol in 2025, a 2.8 percent decrease from 2024 (Table 1). The drop was primarily caused by one plant ceasing to produce ethanol in March 2025.

Ethanol plants are major consumers of Minnesota's annual corn crop. In 2025, an estimated 486.3 million bushels of corn went into ethanol production in the state, representing approximately 29 percent of the 1.7 billion bushels harvested.

While Minnesota's ethanol production decreased in 2025, the total value of feedstock (corn) purchased declined by a higher rate. This is because the price of corn dropped by about 2 percent in 2025 as compared to 2024. The price of natural gas was also slightly lower in 2025. Meanwhile, revenues per gallon of ethanol produced increased by 3.2 percent between 2024 and 2025. Prices for ethanol and corn oil were slightly higher in 2025, while DDGS prices were lower.[13]

As a result of these factors, the operating cost per gallon of ethanol produced was an estimated $1.92 in 2025. Revenues per gallon were $2.23. Thus, Minnesota ethanol plants had average net returns of an estimated $0.31 per gallon, which was consistent with levels in 2022 and 2023.

Table 1: Minnesota's ethanol industry statistics
Sources: Minnesota Bio-Fuels Association, USDA ERS, University of Minnesota Extension estimates, and Iowa State ethanol model

Category	2020	2021	2022	2023	2024	2025	Percent change 2024-2025
Production (mill gallons)	955.5	1,271.5	1,341.9	1,353.4	1,401.3	1,361.7	-2.8%
Feedstock purchases (millions)	$1,090.6	$2,454.2	$3,126.6	$2,788.0	$2,116.0	$2,016.4	-4.7%
Operating costs per gallon	$1.55	$2.40	$2.95	$2.66	$2.00	$1.92	-4.0%
Revenue per gallon	$1.65	$2.93	$3.30	$2.98	$2.16*	$2.23	3.2%
Net returns per gallon	$0.11	$0.53	$0.35	$0.31	$0.16*	$0.31	91%

*The 2024 numbers have been updated since the publication of the 2024 report.

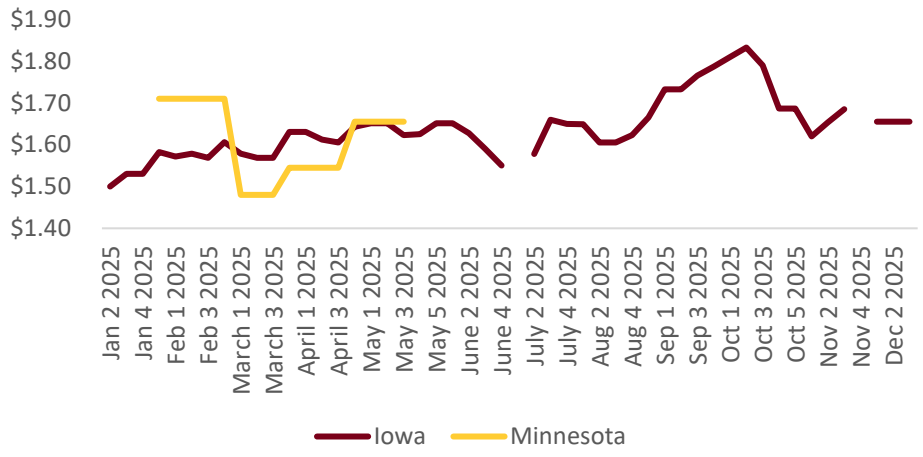
While the United States Department of Agriculture (USDA) produces a weekly ethanol pricing report, which provides a method for tracking ethanol prices, they were difficult to track in 2025. Although it

[11] Dorenkamp, M. (2026, February 17). Minnesota E15 sales hit record high for fifth consecutive year. *Brownfield.* https://www.brownfieldagnews.com/news/minnesota-e15-sales-hit-record-high-for-fifth-consecutive-year/
[12] Kletcher, B. (2025, October). From the desk of…Highwater Ethanol, LLC CEO. In *Ethanol news.* https://www.highwaterethanol.com/index.cfm?show=10&mid=15 and Friese, C. (2025, Fall). General managers message. In *Chippewa Valley Ethanol Company* newsletter. https://cvec.com/cvec-news/
[13] For more information on how Extension estimated revenues, expenditures, and returns, please see Appendix 1.

is not clear why, USDA did not publish Minnesota ethanol prices for most of the weeks in 2025. They were only published from February through May (Chart 4).

To provide some context, Iowa's ethanol prices stayed in a range from a low of $1.50 in the second week of January to a high of $1.83 in the second week of October. Prices flattened off around $1.60 per gallon toward the end of the year. Breaks in the chart for Iowa occurred due to the lack of data for that period. For example, USDA did not publish the weekly ethanol report for the week of the 4th of July or the Thanksgiving holiday.

Chart 4: Minnesota and Iowa ethanol prices, 2025 (date format is month, week, year), Source: US Department of Agriculture



USDA's weekly ethanol reports, however, did publish Minnesota's DDGS and corn oil prices. The average Minnesota price per ton of DDGS began at $152.67 in January and ended at $156.25 in December. The price per ton generally declined on a month-over-month basis from January through August, hitting lows in August ($131.25) and October ($132). Prices then rallied slightly to finish out the year. Corn oil prices, on the other hand, mostly increased throughout the year, climbing from an average Minnesota price of $0.435 per pound in January to $0.535 by year's end.

Prices factor into an economic impact analysis. Production of ethanol could increase, along with the purchases of inputs (corn, utilities, labor, and so forth), and the economic impact could decrease if prices decreased enough to offset the increases.

Economic contribution

In addition to providing an alternative to petroleum-based fuels, Minnesota's farmers embrace ethanol production because it adds value to the corn crop. This added value, in turn, generates economic activity in rural and urban communities across the state. An economic contribution analysis can quantify the value of that economic activity. In general, economic contribution includes direct, indirect, and induced effects.

The direct effect of an industry is the spending by the industry to operate. In this analysis, it is the spending by ethanol producers on items such as corn, enzymes and yeasts, and utilities. As ethanol producers purchase these items, they cause their suppliers to increase production. Those suppliers then purchase more of their inputs along the supply chain. The sum of the impacts on the supply chain is known as indirect effects. Ethanol producers also pay their workers, who spend their

incomes, which further creates additional economic production. The impacts spurred by the spending of ethanol employees are known as the induced effects.

Input-output models are used to measure economic contribution. The models trace the flow of goods and services within an economy. Once that flow is established, the model can determine how a change in one sector of the economy (say, manufacturing) affects other sectors of the economy (construction, for instance). Extension used the input-output model IMPLAN with the Type SAM multipliers for this analysis.

Direct effect

As stated, the direct effect is the spending by an industry to operate. In 2025, Minnesota ethanol producers spent an estimated $2.6 billion on operations (Table 2). Feedstock was the largest input into the production process, with corn purchases comprising 77 percent of all input costs. After factoring in purchases for items, including enzymes and yeasts, labor, and transportation, ethanol producers spent $1.92 per gallon on average to function.

Table 2: Direct effects of Minnesota's ethanol industry: 2025
Sources: Minnesota Bio-Fuels Association, Iowa State Ethanol Production Profitability report, USDA ERS, Extension estimates

Operating Costs	2025 (Millions)
Production (mill gallons)	1,361.7
Feedstock (corn)	$2,016.4
Enzymes, yeasts, and chemicals	$94.4
Denaturant	$63.5
Utilities	$219.0
Direct labor	$94.6
Maintenance and repairs	$34.0
Transportation	$10.2
General & administrative expenses	$80.9
Total operating costs	$2,612.9
$/Gallon	**$1.92**

Revenues	2025 (Millions)
Ethanol	$2,219.6
Dried Distillers' Grain (DDGS)	$557.6
Corn oil	$262.2
Total revenue	$3,039.4
$/Gallon	**$2.23**
Net return over operating costs	$426.5
$/Gallon	**$0.31**

Minnesota ethanol producers earned an estimated $3.0 billion in revenues in 2025. At 73 percent, ethanol sales were the largest contributor to overall revenue. DDGS sales generated an estimated $557.6 million in revenue while corn oil generated $262.2 million. On average, Minnesota ethanol producers received $2.23 per gallon in revenues.

Total economic contribution

In 2025, Minnesota's ethanol industry generated an estimated $4.9 billion in economic activity in the state (Table 3). Of this, $975 million was labor income, or income in the pockets of the state's residents. The industry supported employment for 16,573 people.

Table 3: Total economic contribution of Minnesota's ethanol industry: 2025, dollar values are all in millions Source: Extension estimates

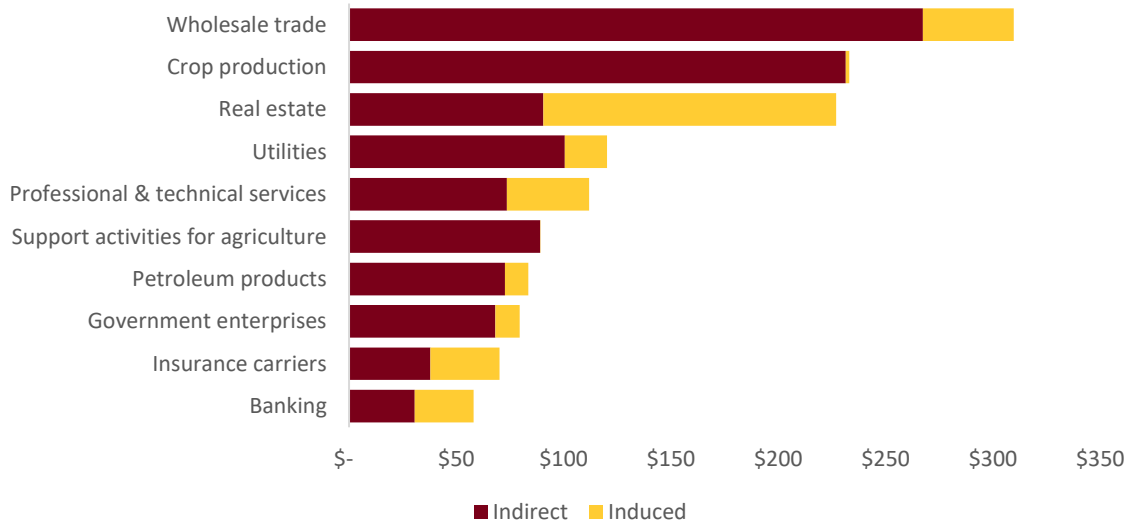
Category	Employment (FTE)	Output	Gross Domestic Product	Labor Income
Direct	7,505*	$2,612.9	$701.0	$275.7
Indirect	5,417	$1,455.1	$719.8	$426.6
Induced	3,651	$815.4	$503.0	$273.1
Total	16,573	$4,883.4	$1,923.8	$975.4

*This table reflects both ethanol plants and corn production. Ethanol plants employed 1,019 people in 2025

The ethanol industry contributed nearly $2 billion to Minnesota's gross domestic product (GDP). While GDP measures only sales to final users (consumers, for example), output measures all sales. For more on the economic terms used in this report, please see Appendix 2.

Of the $4.9 billion in economic activity generated, $2.6 billion stemmed directly from ethanol plants. Other businesses throughout the state realized the remaining $2.3 billion in activity. Chart 5 shows the top industries that benefited the most in Minnesota, either from indirect or induced effects. The industries experiencing the highest benefits included wholesale trade, crop production, and real estate.

Chart 5: Top industries impacted, Minnesota's ethanol industry, millions, 2025 (indirect and induced effects)



Indirect, or business-to-business, impacts were highest in the wholesale trade and crop production industries. These are industries that supply farmers. Businesses in the wholesale trade industry specialize in selling products in bulk to other businesses. For farmers, this includes the local farmer's cooperative, which sells items such as fertilizer, and also services such as fertilizer application. Impacts in the crop production industry include the sale of goods between farmers

(such as one farmer purchasing seed from another) and the purchase of services by a farmer from another farmer (such as custom planting or harvesting).

Induced, or consumer-to-business, impacts are higher in industries such as real estate and banking. This reflects where households are spending their incomes.

State and local tax collections

Ethanol production also spurred tax collections in the state. In 2025, Minnesota's ethanol industry generated an estimated $152.9 million in state and local tax collections. This includes property, sales, and income taxes, along with other taxes and fees. It also includes taxes generated through the direct, indirect, and induced effects.

Table 4: State and local tax contribution of Minnesota's ethanol industry: 2025, dollar values are all in millions Source: Extension estimates

Category	Taxes
Property	$46.8
Sales	$58.4
Income	$38.6
Other	$9.1
Total	$152.9

There are two primary sources of economic activity associated with ethanol production. One is the production of corn. Given the volume of corn used in ethanol production, the impacts stemming from corn growing are significant. The other is the production of ethanol without corn purchases. There are many reasons for ethanol production, one of which is to add value to the corn crop. Thus, looking at the impact above and beyond corn growing itself can be valuable.

Impact of ethanol production (excluding corn)

Ethanol production, excluding the feedstock purchases, generated $1.1 billion in economic activity in 2025 (Table 5). Ethanol plants employed an estimated 1,019 workers, paying $94.6 million in labor income. As a result, the ethanol production (without corn) supported 3,088 workers.

Table 5: Economic contribution of Minnesota's ethanol production (excluding corn): 2025, dollar values are all in millions Source: Extension estimates

Category	Employment (FTE)	Output	Gross Domestic Product	Labor Income
Direct	1,019	$596.5	$315.0	$94.6
Indirect	662	$227.2	$117.1	$64.5
Induced	1,407	$314.4	$194.0	$105.5
Total	3,088	$1,138.1	$626.1	$264.6

Impact of corn production

Ethanol plants purchased an estimated $2.0 billion of corn in 2025. These corn purchases helped support 13,485 jobs in the state, including 6,486 jobs on the farm (Table 6). In total, corn sales to ethanol plants generated $3.7 billion in economic activity.

Table 6: Economic contribution of Minnesota's corn produced for ethanol: 2025, dollar values are all in millions Source: Extension estimates

Category	Employment (FTE)	Output	Gross Domestic Product	Labor Income
Direct	6,486	$2,016.4	$386.0	$181.1
Indirect	4,755	$1,228.0	$602.7	$362.1
Induced	2,244	$500.9	$309.0	$167.6
Total	13,485	$3,745.3	$1,297.7	$710.8

The role of ethanol's co-products

Ethanol's two primary co-products, DDGS and corn oil, help ethanol plants maintain consistent revenues. They also have practical uses that provide additional value in the economy.

DDGS as animal protein

In 2025, Minnesota's ethanol plants produced an estimated 4 million tons of DDGS. Due to its fiber and protein content, DDGS is often fed to livestock for nutrition and to enhance production. For example, research demonstrates that DDGS have 95 percent of the energy value of corn when fed to beef cattle. [14]

While beef cattle can benefit, farmers also feed DDGS to a variety of animals. Usage statistics from 2024 showed that the majority of DDGS (70 percent) were fed to cattle (including beef and dairy), 22 percent were fed to swine, and 6 percent to poultry.[15]

The volume of DDGS produced by Minnesota's ethanol plants is significant. To understand how significant, one can estimate how many of Minnesota's animals could receive nutrition from DDGS. Livestock producers can generally replace between 10 and 20 percent of their animal's daily ration with DDGS.[16] For cattle producers, this means one ton of DDGS can feed two-thirds a cow for a year (Chart 6). Similarly, one ton of DDGS could also provide a valuable food source for four pigs or 250 turkeys.

Based on these ratios, Minnesota's 2025 DDGS supply could support approximately 1.8 million head of cattle, 3.5 million pigs, and 60.2 million turkeys and chickens. For context, Minnesota farms have 2.1 million head of cattle, 8.9 million pigs, and 39 million head of turkeys.[17]

[14] DiCostanzo, A. (2021). *Feeding distillers grains to beef cattle*. University of Minnesota Extension. https://extension.umn.edu/beef-feedlot/feeding-distillers-grains-beef-cattle
[15] Renewable Fuels Association (n.d.). *Ethanol co-products*. https://ethanolrfa.org/ethanol-101/ethanol-co-products
[16] Hoffman, L, & Baker, A. (2011). *Estimating the substitution of distillers' grains for corn and soybean meal in the U.S. feed complex*. Economic Research Service, U.S. Department of Agriculture. https://www.ers.usda.gov/publications/pub-details?pubid=36472
[17] Minnesota Department of Agriculture and United States Department of Agriculture

Chart 6: Animal's potential annual use of one ton of Dried Distillers' Grains (DDGS), Source: USDA, ERS

Distillers' corn oil

Distillers' corn oil is the other major co-product made by ethanol plants. In 2025, Minnesota's ethanol plants produced an estimated 485.6 million pounds of corn oil. The corn oil is mostly used for biodiesel production but is also blended into poultry and swine feed.[18]

If all of Minnesota's 2025 distillers' corn oil had been used in biodiesel production, it would have generated 63 million gallons of biodiesel.[19] This represents 77 percent of Minnesota 82 million gallons of biodiesel production capacity.[20]

[18]Moreau, R., & Hums, M. (2020). Corn oil and distillers corn oil. In F. Shahidi (Ed.), *Bailey's industrial oil and fat products.* https://onlinelibrary.wiley.com/doi/abs/10.1002/047167849X.bio007.pub2#:~:text=Distillers%20corn%20oil%20(DCO)%20is,a%20valuable%20poultry%20feed%20ingredient

[19]United States Department of Agriculture (n.d.*). Ethanol conversion factors.* United States Department of Agriculture Farm Service Agency. https://www.fsa.usda.gov/Internet/FSA_File/2002factorsnformulas.pdf

[20] Minnesota Department of Agriculture. (2025, January 15). *Annual report on biodiesel.* https://www.lrl.mn.gov/docs/2025/mandated/250183.pdf

Appendix 1: Methodology

This appendix outlines the basic methods and data sources used to arrive at the ethanol expenditures and revenues found in Tables 1 and 2.

Production

The Minnesota Bio-Fuels Association conducted a survey of ethanol producers to determine total production in 2025. They then provided these figures to Extension. Production data for 2020 to 2024 comes from previous analyses of the ethanol industry completed on behalf of the Minnesota Bio-Fuels Association and was collected in a similar manner.

Revenues

Extension calculated revenues from ethanol production primarily by using Iowa State's ethanol plant prices report, which contains Minnesota data.[21] In authoring this report, University of Minnesota Extension used the average monthly price of ethanol per gallon as calculated by Iowa State (due to the lack of Minnesota specific data), weighted for production by month. This approach yielded an average price of $1.63 per gallon for the year. Indications are the Iowa price may be higher than the Minnesota price, but the Iowa price data is the best available option for 2025.

Iowa State's report also provides a price for DDGS and corn oil in Minnesota. Extension used that data to estimate DDGS and corn oil revenues in Minnesota, also weighted for monthly production. The average DDGS price using this model was $138.98 per ton and corn oil was $0.54 per pound.

Iowa State gets its price data for Minnesota from USDA's daily ethanol report produced by the Agricultural Marketing Service.

Expenditures

Extension calculated ethanol plant expenditures primarily using Iowa State's ethanol plant profitability model and its estimates of costs per gallon of ethanol produced. Extension used Minnesota corn prices, again weighted for production by month, resulting in an average corn price of $1.48 per gallon of ethanol.

Data from Minnesota's Department of Employment and Economic Development (DEED) indicated wages in the chemical manufacturing sector (where ethanol production is categorized) increased by 3.6 percent between 2024 and 2025, thus the wage figure reflects this change.

Corn production

This is an economic contribution study, so it examines the relationships and supply chain related to the production of ethanol. Thus, Extension included the impact of corn production. An economic impact study would take a different methodological approach.

[21] Iowa State University (n.d.). Ag decision maker. Iowa State University Extension and Outreach. https://www.extension.iastate.edu/agdm/energy.html

Appendix 2: Definitions and terms

Special models, called input-output models, exist to conduct economic contribution analysis. There are several input-output models available. IMPLAN is one such model. Many economists use IMPLAN for economic contribution analysis because it can measure output and employment impacts, is available on a county-by-county basis, and is flexible for the user. IMPLAN has some limitations and qualifications, but it is one of the best tools available to economists for input-output modeling. Understanding the IMPLAN tool, its capabilities, and its limitations helps ensure the best results from the model.

One of the most critical aspects of understanding economic contribution analysis is the distinction between the local and non-local economy. The local economy is identified as part of the model-building process. Either the group requesting the study or the analyst defines the local area. Typically, the study area (the local economy) is a county, or a group of counties, which share economic linkages. In this study, the study area is the entire state of Minnesota.

This distinction is important because the model will only capture the impact of spending within the defined region. If an ethanol producer, for example, buys items outside the state of Minnesota, this will not generate indirect effects.

A few definitions are essential to properly read the results of an IMPLAN analysis. These terms and their definitions are provided below.

Output

Output is the quantity of goods or services produced in a given time period by a firm or industry, whether consumed or used for further production. The concept of national output is essential in the field of macroeconomics.

Output represents the value of industry production. In IMPLAN, these are annual production estimates for the year of the data set and are listed in producer prices. Output is measured in dollars and is equivalent to total sales.

Output measures all sales in the economy, and therefore can, in essence, double count. Corn is a good example of this. A farmer sells corn to a local farmer's cooperative. This is one sale, and the value of the corn is counted in output. The farmer's cooperative then grinds that corn into dairy cattle feed and sells it to the local dairy farmer. That is a second sale, and the final price again includes the value of the corn. The dairy farmer, in turn, sells the milk produced from the cow fed with the feed. The value of the corn is built into that sale price, too.

Output is the figure most commonly reported in economic contribution studies.

Gross Domestic Product (GDP)

GDP is similar to output, however, as it eliminates double counting by only counting the value at final demand (or final use of the product).

Employment

In this report, employment is listed as full-time equivalents. Because employment is measured in jobs and not in dollar values, it tends to be a very stable metric. This is particularly true in times of accelerating inflation—one employee produces the same amount of output, even if the value of that output is rising.

Labor income

Labor income includes all forms of employment income, including employee compensation (wages, salaries, and benefits) and proprietor income. Labor income measures the value added to the product by the labor component.

Direct impact

Direct impact is equivalent to the initial activity in the economy. In this study, it is the expenditures of the ethanol producers.

Indirect impact

The indirect impact is the summation of changes in the local economy that occur due to spending on inputs (goods and services) by the industry or industries directly impacted. For instance, if employment at the ethanol plant increases by 10 jobs, this implies a corresponding increase in output by the plant. As the plant increases output, it must also purchase more inputs, such as electricity, enzymes, and equipment. As the plant increases its purchases of these items, its suppliers must also increase production, and so forth. As these ripples move through the economy, they can be captured and measured. Ripples related to the purchase of goods and services are indirect impacts.

Induced impact

The induced impact is the summation of changes in the local economy that occur due to spending by labor; that is, spending by employees in the industry or industries directly impacted. For instance, if employment in an ethanol plant increases by 10 jobs, the new employees will have more money to purchase housing, buy groceries, and go out to dinner. As they spend their new income, more activity occurs in the local economy. This can be quantified and is called the induced impact.

Input-output, supply and demand, and size of market

Care must be taken when using regional input-output models to ensure they are being used in the appropriate type of analysis. If input-output models are used to examine the impact or the contribution of an industry that is so large that its expansion or contraction results in such major shifts in supply and demand that prices of inputs and labor change, input-output can overstate the impacts or contributions. This may be a concern in this study, as Minnesota's ethanol plants produce 8 percent of national production. If they all were to suddenly stop producing, it may affect the price of ethanol.