



Economic Impact of Closure: Benson Power Biomass Facility

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Executive Summary

The Benson Power biomass facility in Benson, Minnesota, burns a mix of poultry litter and wood to produce electricity. The 50 megawatt plant opened in 2007 to help Xcel Energy fulfill its mandate to purchase 125 MW of biomass electricity as part of 1994 legislation. Current power purchase agreements indicate that the plant will continue in operation through September 2028. However, the 2017 Minnesota Legislature passed a bill¹ allowing Xcel Energy to purchase and close the Benson Power biomass facility early.

This study² analyzes the economic impact of the early closure of the plant, as well as a number of other related economic impacts. For the 45 workers at the plant and for many of the plant's suppliers, the closure of the plant has a significant negative impact. However this study is intended to be an objective assessment of both the positive and negative effects of the closure. This includes negative impacts like the loss of 45 jobs at the Benson Power biomass facility and the loss of sales and increased costs for suppliers, as well as positive impacts like reduced electricity costs for consumers and businesses due to Xcel Energy's ability to purchase electricity from other sources at lower cost. The outputs in Section 2 are net economic impacts that balance both positive and negative impacts.

Although the impacts start with the loss of 45 jobs at the facility in Benson, the facility's suppliers are located across the state. Additionally, ratepayers benefitting from energy cost savings are also located across the state. As a result, this analysis was conducted for the entire state of Minnesota.³

In summary, this analysis shows that the closure of the Benson Power biomass facility would have a slightly positive net economic impact. That slight positive net economic impact would add jobs to the economy; even accounting for the loss of 45 jobs at the plant, the closure results in a net increase in jobs—ranging between a low of 53 jobs in 2018 to a high of 207 jobs in 2023. The positives of lower energy costs for consumers and businesses outweigh the negatives of the loss of 45 jobs at the Benson Power biomass facility and the loss of \$28.1 million in sales and increased costs for suppliers (of trucking, wood biomass and turkey litter) and result in a net positive employment impact. There are also net positive impacts on gross domestic product (size of the state economy) and personal income (wages and other payments to individuals). Overall, these impacts are small, relative to the scale of the state's economy. In 2016, total employment in Minnesota was about 3.7 million and gross domestic product was over \$339 billion, according to the U.S. Bureau of Economic Analysis.

Despite a positive net economic impact, there would still be substantial negative impacts, primarily on suppliers. The largest negative employment impacts would occur for trucking and for industries related to poultry litter and wood biomass suppliers. Industries that would experience growth as a result of the Benson Power biomass facility closure include construction, retail and services. Construction would grow due to spending \$20 million over four years in Benson on infrastructure, as well as construction of poultry litter storage. Other industries would grow due to reallocation of consumer spending due to reduced spending on electricity.

¹ 2017 Session Laws, Chapter 5

² Required by 2017 Session Laws, Chapter 94, Article 6, Section 26

³ The Regional Economic Models Inc (REMI) model used for this study does not allow impacts to be calculated just for the Benson area. All impacts presented in this study are statewide.

Summary of Net Economic Impacts

Year	Employment	Gross Domestic Product (fixed \$ millions)	Personal Income (fixed \$ millions)
2018	53	12.5	43.1
2019	135	22.3	52.6
2020	122	23.1	53.8
2021	167	28.4	59.4
2022	187	31.1	62.5
2023	207	34.6	65.4
2024	191	33.3	63.3
2025	197	34.5	66.2
2026	192	34.4	66.4
2027	155	30.4	60.8
2028	112	22.7	45.1

Note: Impacts in this table reflect the net change in jobs, gross domestic product and personal income, taking into account activity gained relative to activity lost as a result of the closure.

Source: Regional Economic Models Inc., PI+ Version 2.1.0

Section 1: Economic Impact Inputs

Direct Impacts

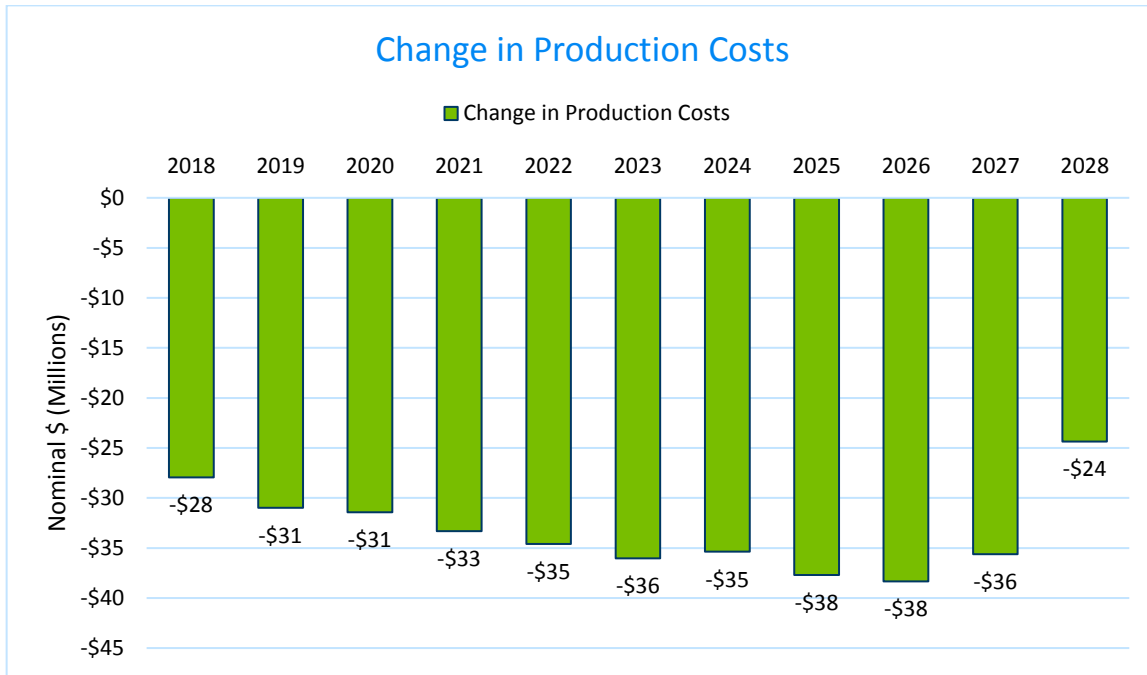
1. **Jobs:** The first direct impact is the loss of jobs at the Benson Power biomass facility. It is assumed that the demand for electricity still exists, but will be met by other sources of electricity.
 - A loss of 45 jobs each year in 2018-2028 (Source: Xcel Energy).
2. **Fertilizer Sales:** There will be a reduction in fertilizer sales due to the closure. The fertilizer company takes ash by-products from the biomass facility and processes them to prepare them for sale.
 - A loss of \$5.2 million (fixed \$) in sales each year in 2018-2028 (Source: fertilizer company—not named to protect confidentiality).⁴
3. **Production Costs:** There will be a reduction in production costs for utilities, due to being able to purchase electricity at a lower price to sell to customers.

Year	Value (nominal \$ millions)
2018	-27.9
2019	-31.0
2020	-31.4
2021	-33.3
2022	-34.6
2023	-36.0
2024	-35.4
2025	-37.7
2026	-38.3
2027	-35.6
2028	-24.4

Note: Xcel Energy estimated savings to all types of ratepayers in Minnesota. Amount is reduced in 2028 because power purchase agreement ends at the end of September 2028.

Source: Xcel Energy

⁴ Another fertilizer company with annual sales of less than \$300,000 provided data after the report had been finalized. Including this company would have had negligible impact on the results of this study, but it is worth noting.



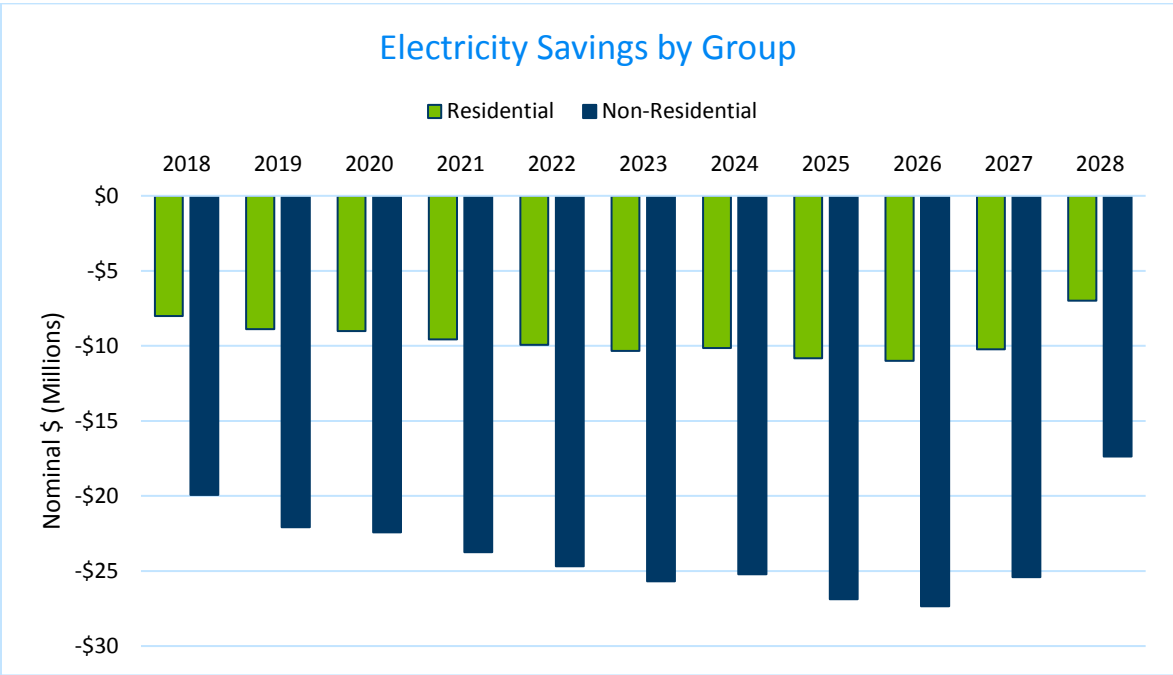
Source: Xcel Energy

4. **Electricity Savings:** Estimated residential electricity savings for consumers are reallocated to all other consumer spending categories. Non-residential electricity savings result in a reduction in production costs, allocated to industries based on the intensity of electricity usage. The sum of these savings equals the total cost savings to Xcel Energy in Number 3, above.

Year	Residential Savings (nominal \$ millions)	Non-residential Savings (nominal \$ millions)
2018	-8.0	-19.9
2019	-8.9	-22.1
2020	-9.0	-22.4
2021	-9.6	-23.8
2022	-9.9	-24.7
2023	-10.3	-25.7
2024	-10.2	-25.2
2025	-10.8	-26.9
2026	-11.0	-27.3
2027	-10.2	-25.4
2028	-7.0	-17.4

Note: Numbers may not sum due to rounding. Amount is reduced in 2028 because power purchase agreement ends at the end of September 2028.

Source: Xcel Energy



Source: Xcel Energy

5. **Renewable Development Fund:** As part of the 2017 bill, the City of Benson will receive \$20 million over four years from the Renewable Development Fund (RDF). The City of Benson expects to use the funding to pay for construction of enhanced wastewater facilities in order to attract new businesses to the city. However, the funds transferred from the RDF would have been used on other projects if they had not been allocated to Benson. As a result, there is a decrease in three spending categories that RDF frequently funds: state government spending (which includes higher education), research and development spending, and construction (assumed to be split evenly) by \$20 million over four years for the opportunity cost of the RDF transfer. *Note: Because no project announcements have been made, no impacts from the new businesses that could be recruited to Benson are included in this study. The businesses would have positive impacts, increasing the net impacts included in Section 2.*

Year	Construction Spending (nominal \$ millions)	Opportunity Cost of Spending (nominal \$ millions)
2019	5	-5
2020	5	-5
2021	5	-5
2022	5	-5

Source: City of Benson; Renewable Development Fund website

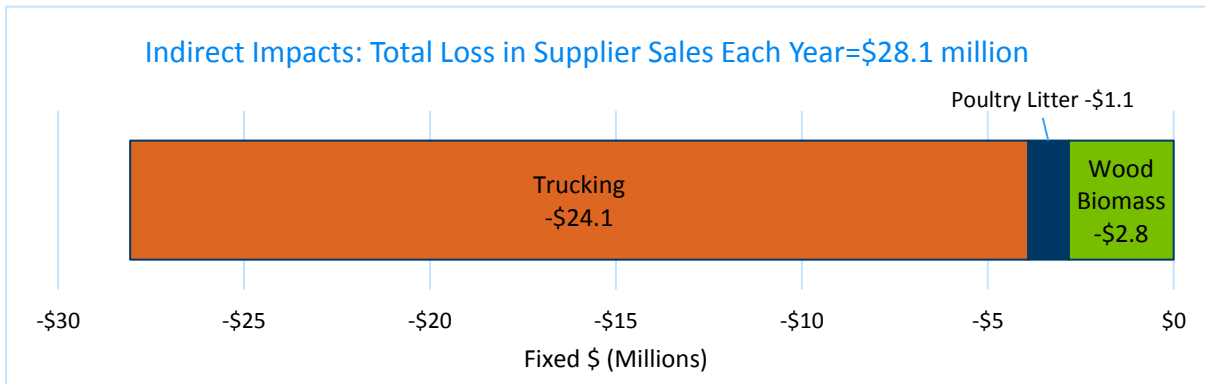
Indirect Impacts (Suppliers)

Sales to suppliers were taken from the Benson Power biomass facility’s monthly sales reports from 2012-2016. DEED staff averaged and annualized monthly data to use as inputs for the sales lost due to the closure of the biomass facility for suppliers in three key areas:

- Wood biomass: loss of \$2.8 million in sales each year in fixed dollars.

- Poultry litter: loss of \$1.1 million in sales each year in fixed dollars (note that this amount was adjusted from a loss of \$1.5 million in sales each year to exclude poultry litter suppliers outside Minnesota).
- Trucking: loss of \$24.1 million in sales each year in fixed dollars.

The total sales loss to all suppliers is \$28.1 million in sales each year in fixed dollars. (Note that 2028 figures are reduced due to the end of the power purchase agreement at the end of September 2028.)



Note: Numbers may not sum due to rounding.

Source: Xcel Energy

1. **Wood Biomass Suppliers:** For wood biomass, we assume that 80 percent of sales went to logging firms and 20 percent of sales went to sawmills. Based on comments received from suppliers, we expect that these companies will continue in business and compete with other businesses for contracts after the loss of these sales.

Year	Logging (fixed \$ millions)	Sawmills (fixed \$ millions)
2018	-2.3	-0.6
2019	-2.3	-0.6
2020	-2.3	-0.6
2021	-2.3	-0.6
2022	-2.3	-0.6
2023	-2.3	-0.6
2024	-2.3	-0.6
2025	-2.3	-0.6
2026	-2.3	-0.6
2027	-2.3	-0.6
2028	-1.7	-0.4

Note: Numbers may not sum due to rounding. Amount is reduced in 2028 because power purchase agreement ends at the end of September 2028.

Source: Xcel Energy; Minnesota Timber Producers Association

However, these businesses expect an increase in production costs to dispose of waste wood/sawdust previously sent to the Benson Power biomass facility. We assume that the disposal costs of this low-quality wood and sawdust will be approximately equal to the amount of sales that had been going to the Benson Power biomass facility. In other words, what was once a benefit to sales becomes a cost. We made this assumption based on comments we received from a company supplying wood biomass to the Benson Power biomass facility.

Year	Logging (fixed \$ millions)	Sawmills (fixed \$ millions)
2018	2.3	0.6
2019	2.3	0.6
2020	2.3	0.6
2021	2.3	0.6
2022	2.3	0.6
2023	2.3	0.6
2024	2.3	0.6
2025	2.3	0.6
2026	2.3	0.6
2027	2.3	0.6
2028	1.7	0.4

Note: Numbers may not sum due to rounding. Amount is reduced in 2028 because power purchase agreement ends at the end of September 2028.

Source: Xcel Energy; Minnesota Timber Producers Association

- Poultry Litter Suppliers:** Poultry litter suppliers will also lose sales as a result of the biomass plant’s closure. Sales from poultry litter suppliers located outside Minnesota were excluded.

Year	Value (fixed \$ millions)
2018	-1.1
2019	-1.1
2020	-1.1
2021	-1.1
2022	-1.1
2023	-1.1
2024	-1.1
2025	-1.1
2026	-1.1
2027	-1.1
2028	-0.8

Note: Numbers may not sum due to rounding. Amount is reduced in 2028 because power purchase agreement ends at the end of September 2028.

Source: Xcel Energy

According to input received from poultry litter suppliers, the loss of demand from the Benson Power biomass facility will make poultry litter sales more difficult seasonally. As a result, production costs would increase for turkey producers due to increased need for storage. We assume that the increase in cost would be equal to the loss in sales as a result of the Benson Power biomass facility closure. We assume this amount will be used in 2018 and 2019 to construct additional storage for poultry litter. Permitted turkey producers may need to modify their manure management plans and/or permit with the Minnesota Pollution Control Agency, at minimal cost, in order to construct additional storage.

Year	Production Cost (fixed \$ millions)	Construction Cost (fixed \$ millions)
2018	5.9	5.9
2019	5.9	5.9

Note: Numbers may not sum due to rounding.

Source: Xcel Energy; Minnesota Turkey Growers Association

3. **Trucking Suppliers:** As a result of the Benson Power biomass facility closure, sales for truckers who transport wood biomass and poultry litter to the facility will decrease. Based on comments received, it is expected that these trucking companies will continue to compete for other business after the loss of these sales.

Year	Value (fixed \$ millions)
2018	-24.1
2019	-24.1
2020	-24.1
2021	-24.1
2022	-24.1
2023	-24.1
2024	-24.1
2025	-24.1
2026	-24.1
2027	-24.1
2028	-18.1

Note: Amount is reduced in 2028 because power purchase agreement ends at the end of September 2028.

Source: Xcel Energy

Section 2: Economic Impact Outputs

Although the impacts start with the job loss at the facility in Benson, the facility’s suppliers are located across the state. Additionally, ratepayers benefitting from energy cost savings are also located across the state. As a result, this analysis was conducted for the entire state of Minnesota. Based on the inputs from Section 1, the outputs below show that the closure of the Benson Power biomass facility would have a slightly positive net economic impact for the state of Minnesota.

Between 2018 and 2028, employment impacts range from a low of 53 in 2018 to a high of 207 in 2023. This employment impact is a net impact, meaning that the positives of lower energy costs for consumers and businesses outweigh the negatives of the loss of sales and other negative impacts for suppliers.

Similarly, there would also be net positive impacts on gross domestic product (size of the state economy) and personal income (wages and other payments to individuals).

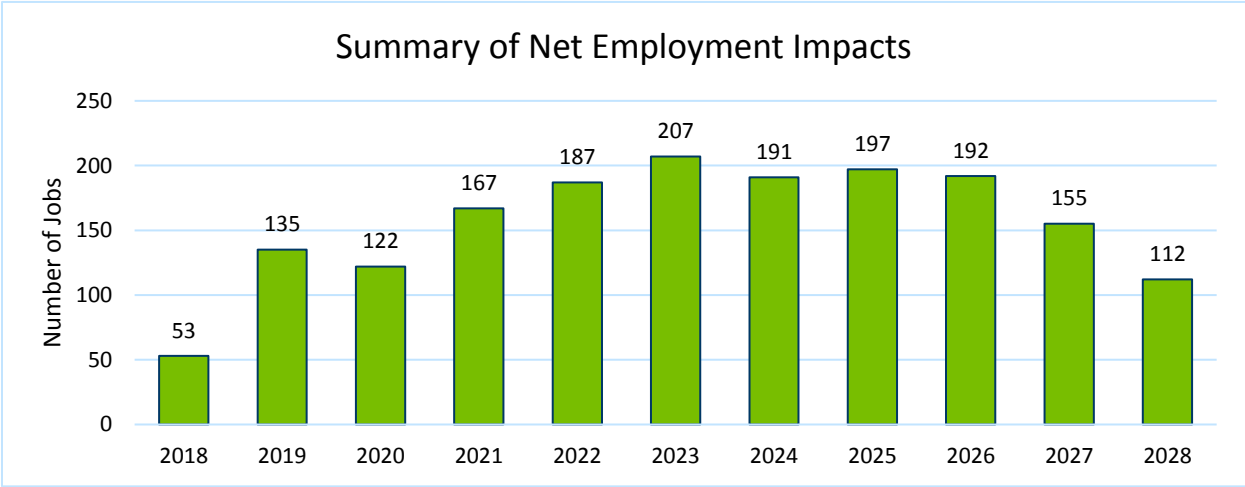
Overall, these impacts are small, relative to the scale of the state’s economy. In 2016, total employment in Minnesota was about 3.7 million and gross domestic product was over \$335 billion, according to the U.S. Bureau of Economic Analysis.

Summary of Net Economic Impacts

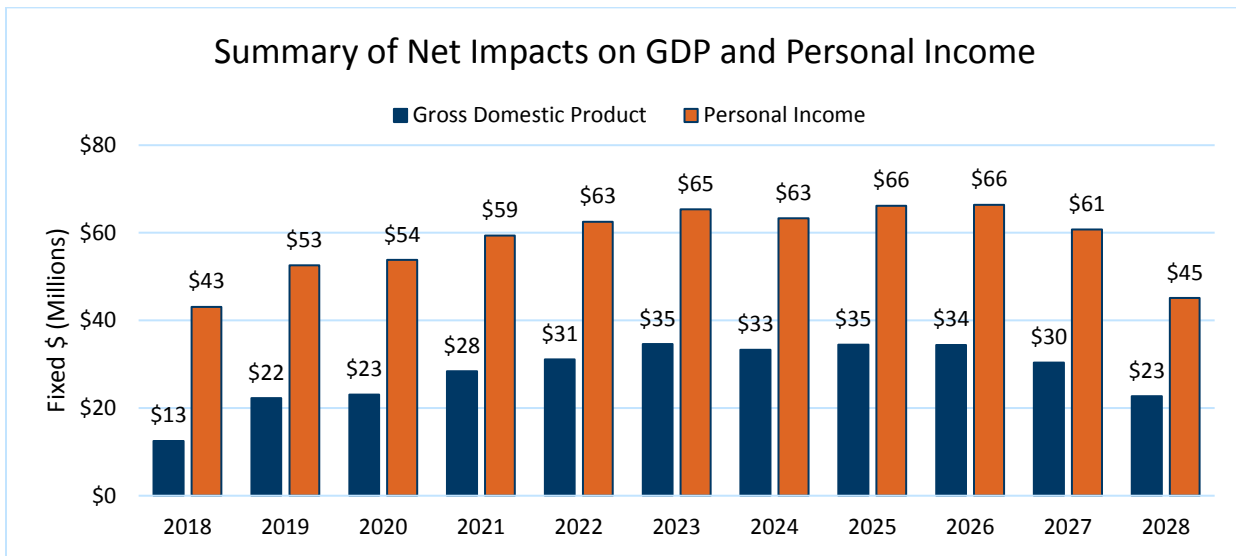
Year	Employment (number of jobs)	Gross Domestic Product (fixed \$ millions)	Personal Income (fixed \$ millions)
2018	53	12.5	43.1
2019	135	22.3	52.6
2020	122	23.1	53.8
2021	167	28.4	59.4
2022	187	31.1	62.5
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Note: Impacts in this table reflect the net change in jobs, gross domestic product and personal income, taking into account activity gained relative to activity lost as a result of the closure.

Source: Regional Economic Models Inc., PI+ Version 2.1.0



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Source: Regional Economic Models Inc., PI+ Version 2.1.0

Despite a positive net economic impact, there would still be substantial negative impacts, primarily on suppliers. As a result, the largest negative employment impacts would occur for trucking and for industries related to poultry litter and wood biomass suppliers.

Industries that would experience growth as a result of the Benson Power biomass facility closure include construction, retail and services. Construction would grow due to spending \$20 million over four years in Benson on infrastructure, as well as construction of poultry litter storage. Other industries would grow due to reallocation of consumer spending due to reduced spending on electricity.

Overall, this study examines the net impact of both positive and negative economic changes. Residential and non-residential ratepayers benefit from reduced spending on electricity. Benson will lose 45 jobs at the biomass facility, but the city will receive funding to make investments to prepare for future job creation projects. Suppliers of trucking, wood biomass and turkey litter will lose \$28.1 million annually in sales. Overall, the benefits of these economic changes are widely distributed, as many ratepayers receive small reductions in electric bills, while the costs are concentrated among employees and suppliers of the biomass facility. On net, this economic impact study finds that the closure of the Benson Power biomass facility would have a slight positive net impact on Minnesota’s economy.

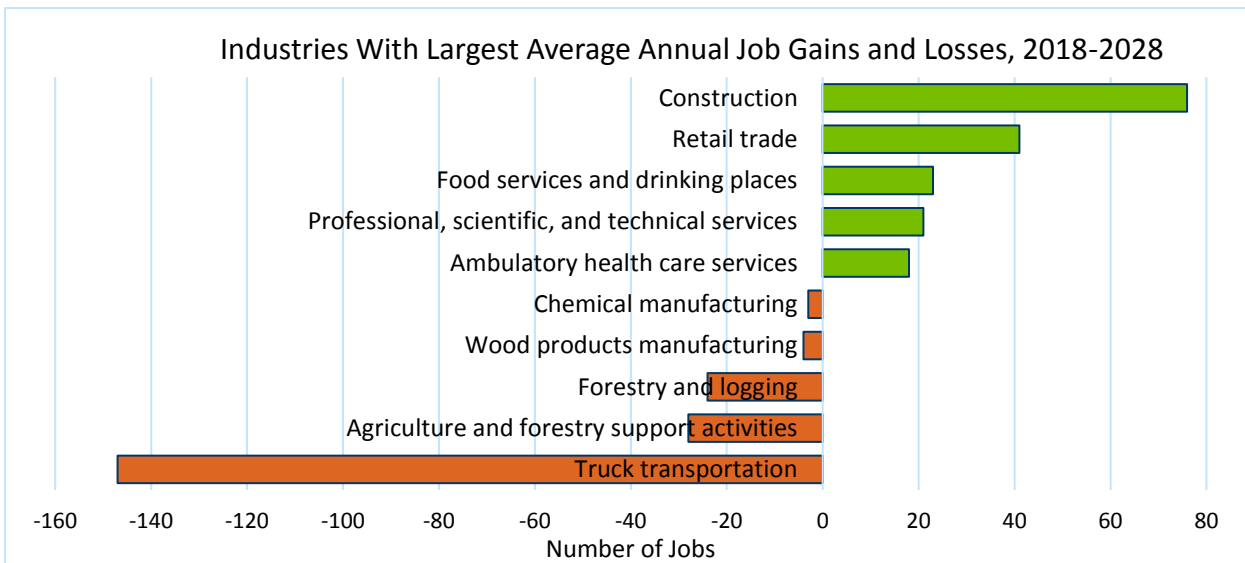
Additional Detail of Employment Impacts

5 Industries With Largest Job Losses	Average Annual Job Loss (2018-2028)
Truck transportation	-147
Agriculture and forestry support activities	-28
Forestry and logging	-24
Wood products manufacturing	-4
Chemical manufacturing	-3

Source: Regional Economic Models Inc., PI+ Version 2.1.0

5 Industries With Largest Job Gains	Average Annual Job Gain (2018-2028)
Construction	76
Retail trade	41
Food services and drinking places	23
Professional, scientific, and technical services	21
Ambulatory health care services	18

Source: Regional Economic Models Inc., PI+ Version 2.1.0



Source: Regional Economic Models Inc., PI+ Version 2.1.0

Section 3: Equipment Investments—Beyond the Scope of This Study

Some suppliers submitted data on their past investments in equipment to serve the Benson Power biomass facility for the study. Such investments occurred at varying points, but all in the past (i.e., before 2018). In economic terms, they are a sunk cost, meaning that they cannot be recovered.

This study, like all economic impact studies, is a macroeconomic impact study, looking at impacts on industries and the state economy overall, rather than individual businesses. An analysis of the equipment investments of suppliers would be, by its nature, a very narrowly microeconomic undertaking and is outside of the scope of this study. In fact, this undertaking would require skills different from those of this study, namely financial and legal skills.

Due to the substantial value of investments made in equipment to serve the Benson Power biomass facility, valued in excess of \$100 million overall and over \$60 million since 2014, these sunk costs are worth noting. Some of the discussion of equipment costs is not related to the economic impacts of the closure. Instead, it relates to the idea of compensating suppliers who will be negatively impacted by the closure. However, in that situation, it would be critical to have financial and legal experts conduct a business-by-business analysis of these supplier investments. Some investments may have been made a decade or more ago, while others have been made in the past year or two. Some equipment may be very transferable to support other customers, which will allow for either reuse or resale. On the other hand, some equipment may be very specialized and have little or no reuse or resale value.

Section 4: About Economic Impact Analysis

Economic impact analysis is a form of macroeconomic analysis that examines the effect of an event on the economy in a specified area, measuring changes in business revenue, jobs, personal income and the size of the regional economy. In what is often called either a ripple effect or multiplier effect, increased economic activity triggers additional spending. The total impact is the sum of the direct, indirect and induced effects. The direct effect is the change that stimulates other activity; in this case, the decrease in jobs at the Benson Power biomass facility, as well as the changes in consumer and business spending due to decreased expenditures on electricity. The indirect effect is from industries reducing purchases of supplies and equipment from other industries due to decreased demand (for wood biomass, poultry litter and trucking suppliers). The induced effects is from changes in household wages and spending caused by the direct and indirect effects. The economic impact estimates in this memo include all three effects.

The Department of Employment and Economic Development (DEED) uses a statewide economic model built by Regional Economic Models Inc. (REMI) to conduct impact analysis of programs, various job creation proposals and legislative initiatives. REMI is a dynamic economic model that incorporates aspects of four methods: input-output, econometric, computable general equilibrium and new economic geography. Once the data is input, the

model simulates the net change in sales and purchases among Minnesota businesses, suppliers, consumers, government, importers and exporters and other entities interacting in the local economy. In this economic impact estimate, DEED input detail about direct and indirect impacts into the analysis, resulting in a more accurate economic impact estimate.

REMI is used by government agencies (including many U.S. state governments), consulting firms, nonprofit institutions, universities and public utilities. Articles about the model equations and research findings have been published in professional journals such as *The American Economic Review*, *The Review of Economic Statistics*, *The Journal of Regional Science*, and *The International Regional Science Review*.

Section 5: Data Sources

For this study, data was gathered from a variety of sources. Xcel Energy provided monthly reports from 2012-2016 on purchases from suppliers. DEED staff averaged and annualized this data. Xcel also provided data on electricity cost savings for residential, non-residential and government customers.

Data was also gathered directly from suppliers. DEED gathered input from a number of suppliers of wood biomass, poultry litter and trucking on the impacts on their businesses. This data corresponded to data provided by Xcel Energy. There were also some suppliers that provided additional insights that helped in the development of assumptions used in this study. No suppliers are named in this study, in order to protect confidential business information to the greatest extent possible.

Besides data received directly by DEED, this study has also benefited from input provided by suppliers and other interested parties to the Legislative Energy Commission, notably at the meeting on Sept. 14, 2017. Additional data and context were gathered from reviewing all submissions on Public Utilities Commission Docket 17-530 for the closure of the Benson Power biomass facility.