CONNEXUS® ENERGY

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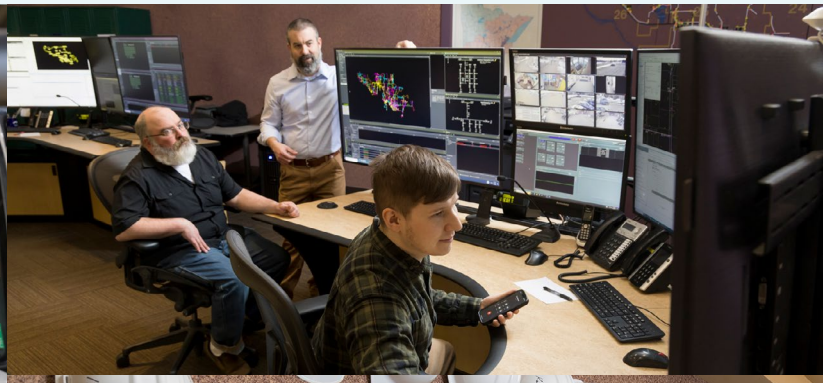
AN ECONOMIC ANALYSIS OF CONNEXUS ENERGY'S TEN-YEAR RESOURCE PLAN

Providing Reliable, Resilient, Sustainable, and Cost-Effective Electricity

Prepared by STRATEGEN

Published May 2024



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Authors

Strategen Consulting Inc.

- Jennifer Gorman
- Joe Goodenbery

1 - Executive Summary

Electric cooperatives are economic mainstays in their communities, where their employees live and work alongside the members they serve. Cooperatives not only create and distribute safe, affordable, and reliable electricity to their consumer-members, but they also add economic value that extends well beyond the electric sector. Through investments in new capital and operating and maintenance expenses, electric cooperatives enable new economic activity across the value chain, create jobs, and support local, state, and national economies.

As Minnesota's largest member-owned electric utility, Connexus Energy's (Connexus) economic impact on its member communities has only continued to grow. The full value of these economic benefits can be quantified by tracking how the cooperative's investments flow from one industry to another. To do so, Strategen Consulting (Strategen) employed the IMPLAN model to conduct analysis using economic multipliers, which estimate how expenditures in one sector stimulate new activity across multiple sectors, measured through direct, indirect, and induced effects.

This report examines the economic impacts that may be realized from the implementation of the Connexus Resource Plan. The cooperative's 2024-2033 Resource Plan (Resource Plan) sets forth a path for Connexus to continue to provide reliable, resilient, and sustainable electricity to its membership in a cost-effective manner, and in the process, bring substantial economic benefits to the region and Minnesota's economy. This report examines the economic impacts that may be realized from the implementation of Connexus' Resource Plan.

Strategen forecasts that over the period ranging from 2024-2033, Connexus' Resource Plan will create $1.3 billion in total economic output and will contribute $574 million to U.S. gross domestic product (GDP). These activities will support an average of 230 annual jobs[1] with a total of 5,100 job-years[2] for Americans nationwide and $400 million in labor income. The cooperative's Resource Plan is also expected to generate $122 million in tax revenues.

Notably, over one-third of the impacts from Connexus' Resource Plan are expected to be realized locally.

The findings from this study highlight the substantial impact that Connexus' investments can have on the local, state, and national economies. Further, federal funding, such as the Empowering Rural America program from the Rural Utilities Service, may provide opportunities to further build upon and accelerate the realization of these economic impacts.

[1] There will be a maximum annual job creation in 2025 due to the construction of wind capacity. In 2025, approximately 2,300 jobs are expected to occur.
[2] A job-year represents one job over the span of one year.

2 - Background

About Connexus Energy

Founded in 1937 as one of the nation's first 100 cooperatives, Connexus Energy (Connexus) is now the largest electric cooperative in the Midwest, serving approximately 1,000 square miles in its service territory with over 9,500 miles of distribution lines and more than 145,000 residential, commercial, and industrial members.[3] This infrastructure delivers more than 2 million megawatt-hours of electricity to Connexus members each year and more than 525 megawatts (MW) during periods of peak demand. Connexus' current power supply portfolio includes locally sited solar and battery storage assets, as well as wind, hydro, natural gas, oil, and other resources. Connexus also operates a portfolio of load management resources and programs that help serve 40-50 MW of load during peak summer demand periods and 20-25 MW during the winter.[4] Built by and led by the communities it serves, Connexus is a consumer-owned, democratically governed, not-for-profit utility that provides safe, affordable, and reliable electricity to its members.

On August 30, 2022, Connexus executed a new set of contracts with its wholesale provider of transmission and power supply services, Great River Energy (GRE). These contracts facilitated Connexus' transition from a GRE member to a GRE customer and provide Connexus increased independence as an integrated utility. This change has created emergent opportunities and responsibilities for Connexus, including the full autonomy to procure new power supply resources and the ownership of long-term resource planning activities.[5] As a result, Connexus is empowered to choose both the best location for and the best combination of technologies, services, tools, and programs to manage the grid for its members. Connexus now has several ways to acquire future power resources, including but not limited to power purchase agreements (PPA), auction purchases, and physical projects inside or outside its service area, all while maintaining its focus on reliability and affordability.[6]

2024-2033 Resource Plan

Following Connexus' status change from a GRE member to a GRE customer, Connexus undertook a year-long effort to develop the cooperative's first long term resource plan. This plan studied the ten-year horizon from 2024-2033 and included load and resource forecasting to determine an optimally cost-effective and reliable plan.

The preferred plan (Resource Plan) includes the addition of 100 MW of solar, 50 MW of nuclear, and 30 MW of four-hour battery energy storage, and potential wind resources to Connexus' existing resource portfolio. The solar resources in the preferred plan represent a mix of local distributed resources and bulk system resources that are interconnected to the high-voltage transmission system. The nuclear PPA is intended to be an offtake agreement with an existing, licensed nuclear facility operating in the Midcontinent Independent System Operator (MISO) region. The storage assets are expected to be locally sited, distributed batteries. The preferred plan puts Connexus on a trajectory consistent to meet Minnesota's 100% carbon-free standard by 2040.[7] Further information on the process of developing the plan and its outcomes can be found in the 2024-2033 Connexus Energy Resource Plan.[8]

[3] "2024-2033 Resource Plan," Connexus Energy, December 2023. https://www.connexusenergy.com/download_file/view/515a860d-5d70-4e6e-83d5-5b9366dc46f9/448.
[4] "2024-2033 Resource Plan," Connexus Energy.
[5] "2024-2033 Resource Plan," Connexus Energy.
[6] "Future Power Supply," Connexus Energy, December 2022, https://www.connexusenergy.com/application/files/4317/0490/7675/Power_Supply_Factsheet.pdf.
[7] "2024-2033 Resource Plan," Connexus Energy.
[8] "2024-2033 Resource Plan," Connexus Energy.

3 - Methodology and Inputs

By investing in the deployment and operation of new energy generating resources through its Resource Plan, Connexus is engaging in economic activity that will create jobs, state and local tax revenues, and will contribute to Minnesota's gross state product (GSP). Connexus' investments not only impact the industries in which they directly occur, but also create additional economic activity across multiple economic sectors throughout the region's communities.

Economic Modeling

Multiplier Analysis

The total economic impact resulting from an investment and the additional economic activity that this spending generates can be quantified through analysis using economic multipliers. These multipliers track how spending in one industry flows through the economy, stimulating new activity across multiple industries, measured through direct, indirect, and induced effects.

Direct effects are the impacts within the industry where the initial economic activity occurs. For example, Connexus building local solar has a direct impact on engineers and installers, among others. These direct effects create indirect impacts for industries in the wider supply chain. In the example of building local solar, this would include the manufacturing and supply of equipment and materials needed to build solar panels, such as stainless-steel rods and bolts, as well as legal, accounting, and other professional services. Induced effects result from employees in the direct and indirect industries spending income in their communities, for example, on groceries or other local services. Every dollar of expenditures generates direct, indirect, and induced activity, and economic multipliers determine the magnitude of impacts from one industry on other sectors. The total impacts of a business or sector under study are calculated by adding together the direct, indirect, and induced effects.

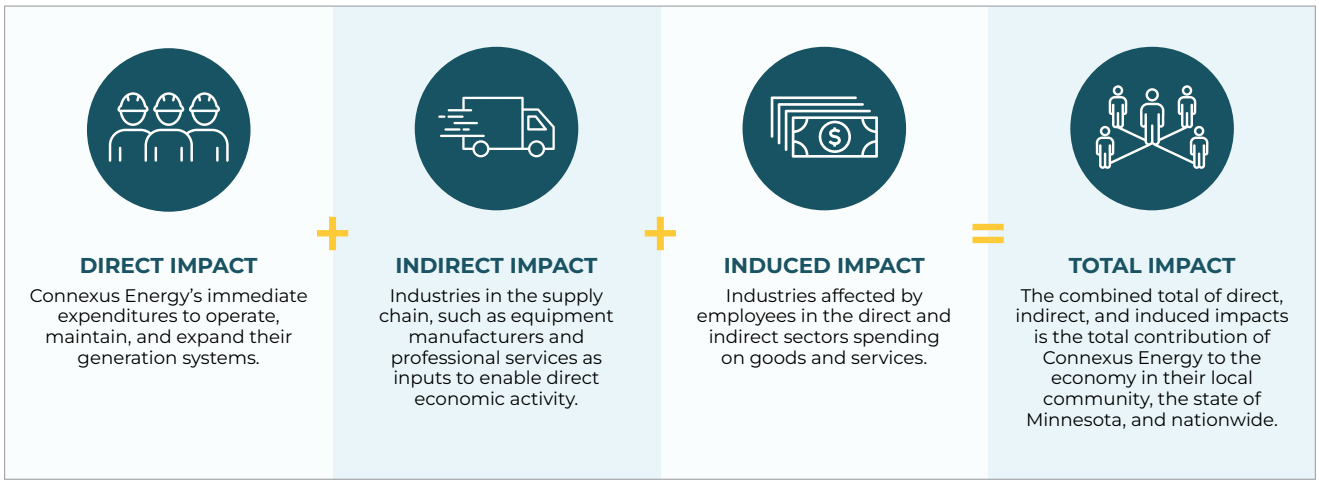

Figure 1. Economic Impacts Created by Connexus Energy's Investments in Renewable Resources

About the IMPLAN Model

To estimate the total economic impact of Connexus' planned investments, Strategen Consulting (Strategen) employed the IMPLAN model to conduct multiplier analysis. IMPLAN is an "input-output" software model of the United States economy utilized by academics, governments, economic developers, corporations, nonprofits, and consultants to analyze the effects of economic activity on different outputs such as state and local tax revenues, employment, sales, gross domestic product (GDP) or GSP, and labor income.[9]

At the core of the IMPLAN model is an input-output dollar flow table, which accounts for the relationships between different sectors of the economy by region. The model uses national industry data and county-level economic data to generate economic multipliers, which in turn estimate the total economic implications of economic activity. IMPLAN Sector codes are based on definitions put forth by the Bureau of Economic Analysis.[10]

Using this information, IMPLAN models the way a dollar spent in one sector of the economy generates waves of economic activity, known as economic multiplier effects, that ripple through other sectors of the economy. The results of IMPLAN modeling are divided into the direct, indirect, and induced effects.[11]

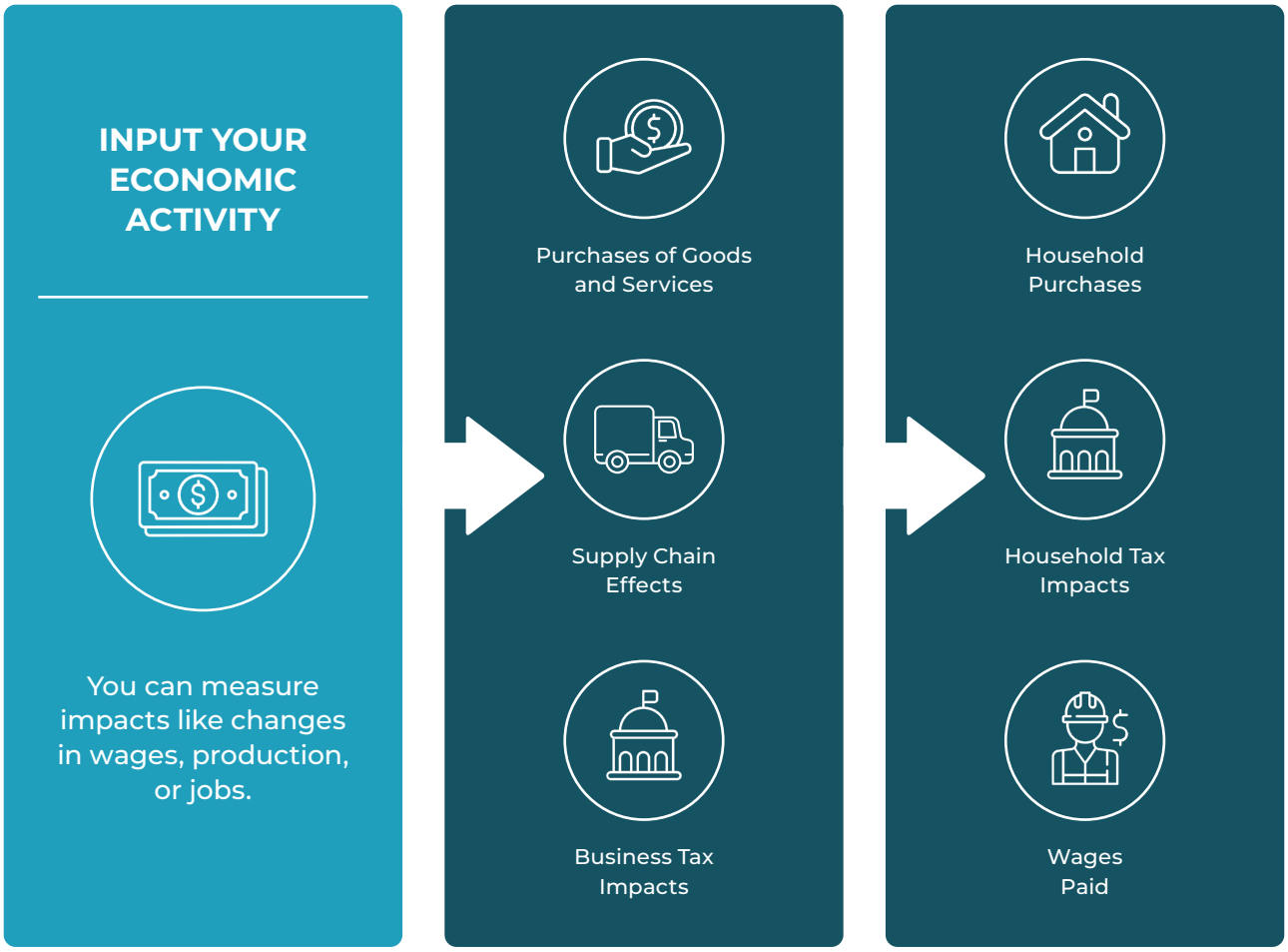

Figure 2. Visualization of IMPLAN Impact Analysis

[9] "How IMPLAN Works," IMPLAN. https://support.implan.com/hc/en-us/articles/360038285254-How-IMPLAN-Works.
[10] "How IMPLAN Works," IMPLAN.
[11] "How IMPLAN Works," IMPLAN.

Data Sources and Model Configuration

Input Data

To perform the analysis, Strategen primarily relied on cost data provided by Connexus within its Resource Plan,[12] supplemented by metrics for wind and nuclear resources provided in the National Renewable Energy Laboratory's (NREL) Annual Technology Baseline.[13] Appendix A provides a detailed description of Strategen's methodology for allocating capital expenditure (CAPEX) and operational expense (OPEX) data to the appropriate economic sectors in IMPLAN for modeling.

Geographic Regions

When modeling economic impacts, a geographic region must be assigned for all economic activity included in the analysis, due to regional variation in spending patterns and resulting variation in the magnitudes of economic multipliers. The IMPLAN model features industry-level economic multipliers available at several levels of geography. This gives users the option to model impacts at the national, state, county, or even zip code levels, depending on the locational precision of their inputs. To assess the impact of Connexus' economic activity in the communities they serve, Strategen created custom regions and custom multipliers within the IMPLAN model, as follows:

- **Connexus Service Territory:** This geography is composed of portions of Anoka, Chisago, Hennepin, Isanti, Mille Lacs, Ramsey, Sherburne, and Washington counties in Minnesota. It is assumed that this is where local solar and storage resources will be deployed.
- **Minnesota:** Revenues from Minnesota's Energy Production Tax Credit were applied to the state level.[14]
- **Wind Region:** This geography is composed of Minnesota, North Dakota, South Dakota, and Iowa. It is assumed that wind power acquired through PPAs will be generated in this region.
- **Nuclear Region:** This geography is composed of the fifteen states that are covered by MISO. It is assumed that nuclear PPAs will be located in this region.

The value of capital investments in clean energy resources and associated operations and maintenance expenses over the study period were then assigned to one of the above geographies.[15] This approach allowed Strategen to calculate and report the economic impacts that Connexus will create within its service territory, driving local economic activity, while also understanding the state-level and national impacts of Connexus investments.

[12] "2024-2033 Resource Plan," Connexus Energy.
[13] "2023 Annual Technology Baseline," NREL, 2023. https://atb.nrel.gov/.
[14] "Fact Sheet: Minnesota Solar Energy Tax Revenue," Center for Rural Affairs, 2022. https://www.cfra.org/sites/default/files/publications/MN%20Solar%20Energy%20Tax%20Revenue%20fact%20sheet-WEB.pdf and "Wind Energy Production Tax," Minnesota Department of Revenue. https://www.revenue.state.mn.us/wind-energy-production-tax.
[15] As the custom regions include overlapping geographies, for example, the Connexus Service Territory is also part of the Wind Region and the Nuclear Region, the multi-regional input-output (MRIO) functionality in the IMPLAN model was not utilized to avoid double counting of impacts.

4 - Economic Impact Analysis Results

The Resource Plan outlines Connexus' strategy to continue to provide reliable, resilient, and sustainable electricity to its membership at a reasonable cost in the coming decade. The planning process to develop the Resource Plan solicited member and stakeholder input and employed trade standard analytics and modeling tools, shaped by the context specific to the cooperative's membership. Connexus members experience reliability that is perennially in the top 5% of all utilities nationwide and have enjoyed five years of zero general rate increase until inflation forced a modest 2.9% increase in 2023. Despite continued supply chain and inflationary challenges, Connexus successfully held rates flat and adopted a 2024 budget with no general rate increase.

As a result of its 10-Year Resource Plan, Connexus is planning to maintain affordability and reliability while accelerating local economic development by investing approximately $720 million in the deployment and operation of a portfolio of energy technologies, including distributed solar and storage, bulk solar, and PPAs for wind and contracting with an existing nuclear facility. This spending will have direct impacts notably within the electric sector and the construction, manufacturing, and engineering services needed to build and operate renewable energy resources. This will further stimulate the economy, creating additional economic activity via indirect and induced impacts.

Strategen forecasts that Connexus' planned investments over this 10-year period can create $1.3 billion in total economic output and contribute $574 million to U.S. GDP. These activities support a total of 5,100 job-years for Americans nationwide or 230 average annual jobs, and $400 million in labor income. This would also lead to $122 million in tax revenues.

As a direct result of its recently gained flexibility, Connexus' Resource Plan is forecasted to also create economic activity within its service territory, primarily due to the deployment of locally sited electric generation facilities and battery storage. Locally, the Resource Plan creates $331 million of economic output and $180 million in value added to the communities served by Connexus. Through this activity, a total of 1,520 local job-years may be created with an annual average of 150 local jobs, leading to $129 million in labor income for local residents. Figure 3 shows both the total impact the Resource Plan can have nationwide, as well as the portion of these impacts that occur locally, within communities served by Connexus.

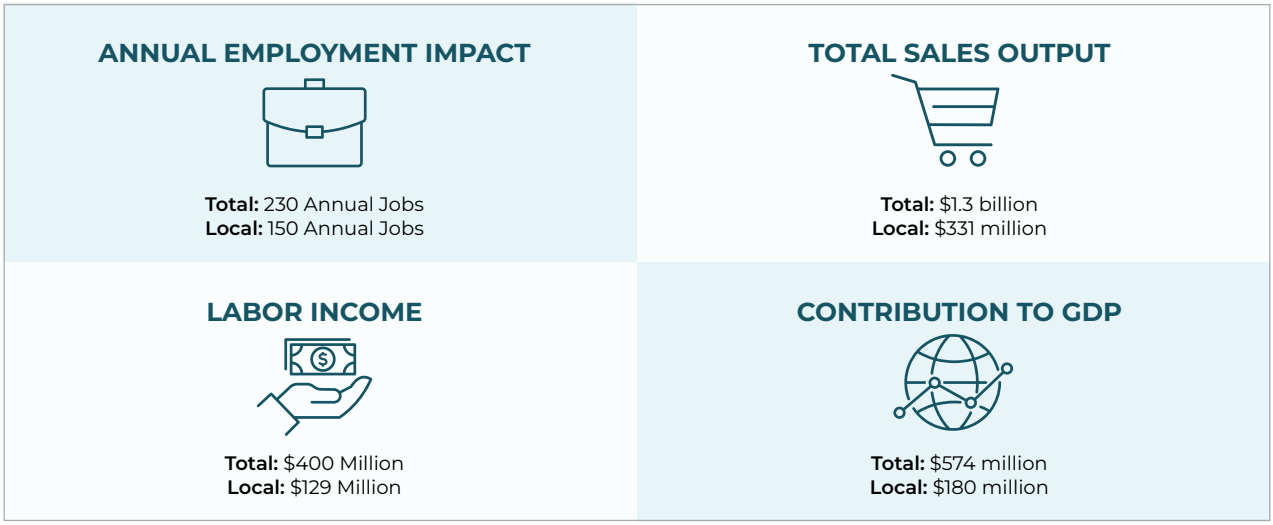

Figure 3. Summary of the National and Local Economic Impact of Connexus Energy's Resource Plan

Beyond economic impacts, Connexus' commitment to invest in cost-effective energy resources will lead to a reduction in local and global greenhouse gas emissions, create sustainable well-paying jobs, and lead to public health and environmental benefits from cleaner air.

5 - Conclusion

As Minnesota's largest electric cooperative, Connexus delivers safe, reliable, and affordable electricity to its members and also provides sizeable economic benefits to the communities it serves and beyond. The findings from this study demonstrate that Connexus' Resource Plan can contribute both to environmental benefits and resource sustainability, while spurring broader economic development. Much of the substantial direct, indirect, and induced impacts resulting from Connexus' investments are anticipated to accrue locally, driving economic development and output, and creating jobs and labor income for local residents. By pursuing its 10-Year Resource Plan, Connexus can continue to support local resilience, economic growth, and the improvement of the quality of life in its home communities, while maintaining its commitment to safe, reliable, and affordable service.

Connexus' 10-Year Resource Plan puts the cooperative on a path to meet Minnesota's 100% carbon-free by 2040 standard and can create significant economic impacts, including:

- 5,100 total job-years, 1,520 of which are local in counties served by Connexus
- 230 annual average jobs, 150 of which are in counties served by Connexus
- $400 million in total labor income, with $129 million accruing for workers in counties served by Connexus
- $1.3 billion in total economic output, including $331 million in counties served by Connexus
- $574 million in contribution to U.S. GDP annually, including $180 million in counties served by Connexus
- $122 million in total tax revenues

Further, while this study only examined economic impact realized between 2024 and 2033, a portion of these impacts will continue, including operation and maintenance of energy resources. These investments offer a tremendous opportunity for Connexus to support the communities it serves, through the delivery of economic, environmental, and public health benefits for all its members. Further, with emergent federal funding opportunities, there is potential to accelerate and enhance these impacts.

6 - Appendix A. Model Setup

Within the IMPLAN model, input data must be assigned to one of IMPLAN's 546 economic sectors to determine the industry-specific multipliers to apply and translate inputs into direct, indirect, and induced impacts. The data employed for this study include capital and operations and maintenance expenditures. For each of these expenditure categories, data for the years 2024 through 2033 were mapped to the appropriate economic sectors in the IMPLAN model. The following sub-sections describe how these data categories were translated for IMPLAN analysis.

Local and Bulk Solar

The economic impacts from local and bulk solar were assumed to be similar. Utilizing CAPEX and OPEX allocations from the NREL's Jobs and Economic Development Impact (JEDI) model for photovoltaics, anticipated investments were translated into IMPLAN industries.[16] Fees for permitting were excluded as this is not an investment in an industry, but rather, a direct payment to a government entity. The cost allocation across the remaining spending categories was normalized to account for this change.

Increases in Home Value

The addition of rooftop solar has been estimated to increase the value of a home by approximately 4%.[17] Strategen accounted for this value increase by estimating the number of homes that solar would be added to then calculating the added value from the installation of solar to the average appraisal value of a home in Minnesota. The average rooftop solar array in Connexus service territory is 7 kilowatts. The average value of a home in Minnesota is reported to be $323,034[18], which would lead to a value added of approximately $13,000 when rooftop solar is added. Connexus anticipates robust growth in the number of its members choosing to invest in rooftop solar, scaling from 11 MW of total rooftop systems today to 130-280 MW by 2033, representing 18,000-40,000 members adding rooftop solar. Cumulatively this represents additional local wealth creation in the form of increased home values of between $234 million and $520 million. This value added was accounted for in IMPLAN as a capital credit. It is important to note that this analysis provides an upper bound of economic impacts from home value increases as it is assumed that all gains from home value increases are spent back into the economy. Detailed estimation of expected spending patterns was outside the scope of this study.

[16] "JEDI Photovoltaics Model," NREL. https://www.nrel.gov/analysis/jedi/pv.html.
[17] Sarah Mikhitarian, "Homes with Solar Panels Sell for 4.1% More," Zillow, April 16, 2019. https://www.zillow.com/research/solar-panels-house-sell-more-23798/.
[18] "Minnesota Home Values," Zillow. https://www.zillow.com/home-values/31/mn/.

Local Storage

IMPLAN allocations for storage followed a methodology developed in a study published by the Illinois Power Agency to evaluate the impacts of a proposed energy storage system.[19] This study illustrates how to allocate storage CAPEX and OPEX costs to IMPLAN sectors.

Nuclear

CAPEX costs for nuclear were allocated based on a breakdown of capital costs provided in the 2020 edition of World Nuclear Association's World Nuclear Supply Chain report.[20] Activity categories were translated into IMPLAN economic sectors. OPEX costs for nuclear were allocated based on studies conducted by the Nuclear Energy Institute (NEI). Specifically, NEI's report detailing the "Economic Benefits of Millstone Power Station" provided a granular breakdown of annual expenditures and corresponding IMPLAN sectors.[21]

Wind

Similarly to the methodology used to model solar, CAPEX and OPEX allocations from NREL's JEDI model for wind were applied to anticipated investments and were translated into IMPLAN industries.[22] Again, fees for permitting were excluded and remaining spending categories were normalized to account for this.

[19] "Illinois Power Agency Policy Study Analysis of Economic Benefits," Levitan & Associates and the Illinois Power Agency, March 1, 2024. https://ipa.illinois.gov/content/dam/soi/en/web/ipa/documents/20250301-appendix-d-implan-report-final-clean-version-2-28-24.pdf.
[20] "Economics of Nuclear Power," World Nuclear Association, August 2022. https://world-nuclear.org/information-library/economic-aspects/economics-of-nuclear-power.aspx.
[21] "Economic Benefits of Millstone Power Station," Nuclear Energy Institute. https://www.nrc.gov/docs/ML0419/ML041910428.pdf.
[22] "JEDI Wind Models," NREL. https://www.nrel.gov/analysis/jedi/wind.html.