North Dakota Legislative Council

Prepared for the Energy Development and Transmission Committee
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IMPACT OF LARGE ENERGY CONSUMERS ON THE ELECTRIC GRID - BACKGROUND MEMORANDUM

Section 1 of House Bill No. 1579 (2025) (appendix) directs the Legislative Management to study the impact of large energy consumers, including data centers, on the electrical grid of this state, regulatory structure, and economic development. The study must include an evaluation of the:

- Electrical grid reliability and infrastructure requirements within the state, including the capacity of the electrical grid, necessary upgrades to accommodate large energy consumers, the cost of necessary upgrades to accommodate large energy consumers, how the cost of necessary upgrades to accommodate large energy consumers are allocated, effects of congestion on the electrical grid caused by increased development, and best practices for integrating high-demand users while maintaining reliability for all ratepayers;
- Regulatory consistency throughout the state, including an assessment of the manner in which state and local laws and regulations impact large energy consumers, whether the certificate of public convenience and necessity process is appropriate for private-sector end users, and whether regulatory inconsistencies exist between investor-owned utilities, rural electric cooperatives, municipal power providers, and independent power producers;
- Economic impacts affecting the energy industry of the state, including an assessment of job creation, tax revenue generation, and long-term investment trends tied to data center development and other large energy consumers;
- Market dynamics of the local and national energy industry, including the role of demand-side management, local versus regional energy market participation, and the ability of large consumers to support grid stability through off-peak consumption or other grid-supportive practices;
- Costs and impacts of all regulated and exempted public utilities, including best reporting practices; and
- Regulatory and exemption criteria relating to load size, system integration, application processes, impacts to consumers and access to the regional grid systems, electrical generation sources, the feasibility of colocated backup generators at various facilities, and generation sources, including legacy electric generation units.

The study must include input from representatives of data center operators and other large energy consumers operating or considering investment in the state; investor-owned utilities, rural electric cooperatives, municipal power providers, and independent power producers; the Public Service Commission (PSC); the Lignite Energy Council; the North Dakota Transmission Authority (NDTA); regional transmission organizations (RTOs); the Petroleum Council; and any other relevant state or federal agencies.

BACKGROUND

Data center construction in the United States increased from 611.8 megawatts (MW) at the end of 2020 to 680.8 MW in the first half of 2021.[1] By mid-2021, more than 527.6 MW of capacity were under

[1] PFM Group Consulting LLC, Prince William County, *Virginia Data Center Fiscal Impact Analysis* (July 7, 2022).

construction in primary markets, representing a 42 percent increase compared to the same period in 2020. The data center construction market is anticipated to double in size from $64.2 billion in 2019 to $121.6 billion by 2027. Between 2014 and 2016, annual electricity use by data centers remained stable at approximately 60 terawatt-hours (TWh). By 2018, use increased to 76 TWh, accounting for 1.9 percent of total United States electricity consumption. In 2023, electricity use reached 176 TWh, representing 4.4percent of national consumption. Projected electricity uses in 2028 range from 325 TWh to 580 TWh. This range represents 6.7 to 12 percent of projected total United States electricity consumption.

In April 2025, President Donald Trump issued Executive Order 14262, entitled "Strengthening the Reliability and Security of the United States Electric Grid"[2] and Executive Order 14261, entitled "Reinvigorating America's Beautiful Clean Coal Industry and Amending Executive Order 14241"[3] to address the rising strain on the electric grid from large energy consumers, including artificial intelligence data centers and expanded domestic manufacturing. Executive Order 14262 directs the Secretary of Energy to develop a uniform methodology to identify current and anticipated reserve margins across the bulk power system regulated by the Federal Energy Regulatory Commission (FERC) to identify regions with reserves below acceptable thresholds. The order also directs the Secretary of Energy to develop a protocol to identify which generation resources within a region are critical to system reliability. In response to the order, the United States Department of Energy issued the July 2025 report entitled *Evaluating the Reliability and Security of the United States Electric Grid*. The report identified the need for rapid reforms to bolster the nation's power grid to safeguard grid reliability and power data centers needed to win the artificial intelligence arms race and preserve national security.

North Dakota has emerged as a competitive location for data center development due to its naturally cold climate, relatively low energy costs, favorable tax policies, and access to stable energy resources. As the state continues to diversify its economy, demand for digital infrastructure, driven by technologies such as artificial intelligence, has significantly increased. The increased use of artificial intelligence has contributed to a rising demand for data centers, which are known for high energy consumption and significant impacts on local electric grids.

REGULATION

In North Dakota, a certificate of public convenience and necessity is a regulatory requirement under North Dakota Century Code Chapter 49-03.1 for any public utility, excluding electric public utilities and certain telecommunications or motor carriers, before the utility begins construction or operation of a utility plant or system. The certificate must be obtained from the PSC, following a formal application process that includes the submission of financial and service-related documentation, a public hearing, and a review of factors such as service need, applicant capability, and the impact on existing utilities. The commission is authorized to approve, deny, or conditionally issue the certificate based on public interest and may waive the hearing requirement if no objections are filed within the stipulated notice period. A utility is prohibited from exercising any franchise rights without this certification unless the utility continues a noninterrupted service under a renewed or replacement franchise. Violations may result in cease and desist orders and enforcement actions by the PSC.

Although the PSC is responsible for regulating utility rates, approving the siting of energy conversion and transmission facilities, and overseeing investor-owned utilities, the commission does not have statutory authority to regulate data centers directly.[4] While the PSC retains regulatory jurisdiction over utilities that supply energy to data centers, its oversight does not extend to operational practices, energy usage, or sustainability measures specific to those facilities. In the absence of direct regulatory authority, data centers are constructed and operated without comprehensive oversight related to their energy demand, environmental impact, or integration with the state's two RTOs. This regulatory gap raises

[2] Exec. Order No. 14,262, Strengthening the Reliability and Security of the United States Electric Grid, 90 Fed. Reg. 15,521 (Apr. 14, 2025).

[3] Exec. Order No. 14,261, Reinvigorating America's Beautiful Clean Coal Industry and Amending Executive Order 14241, 90 Fed. Reg. 15,517 (Apr. 14, 2025).

[4] A. Stewart & J. Mowery, *Navigating Data Center Regulation: The Case for North Dakota*, 45 N.D. J. Pol'y & Dev. 56 (2023).

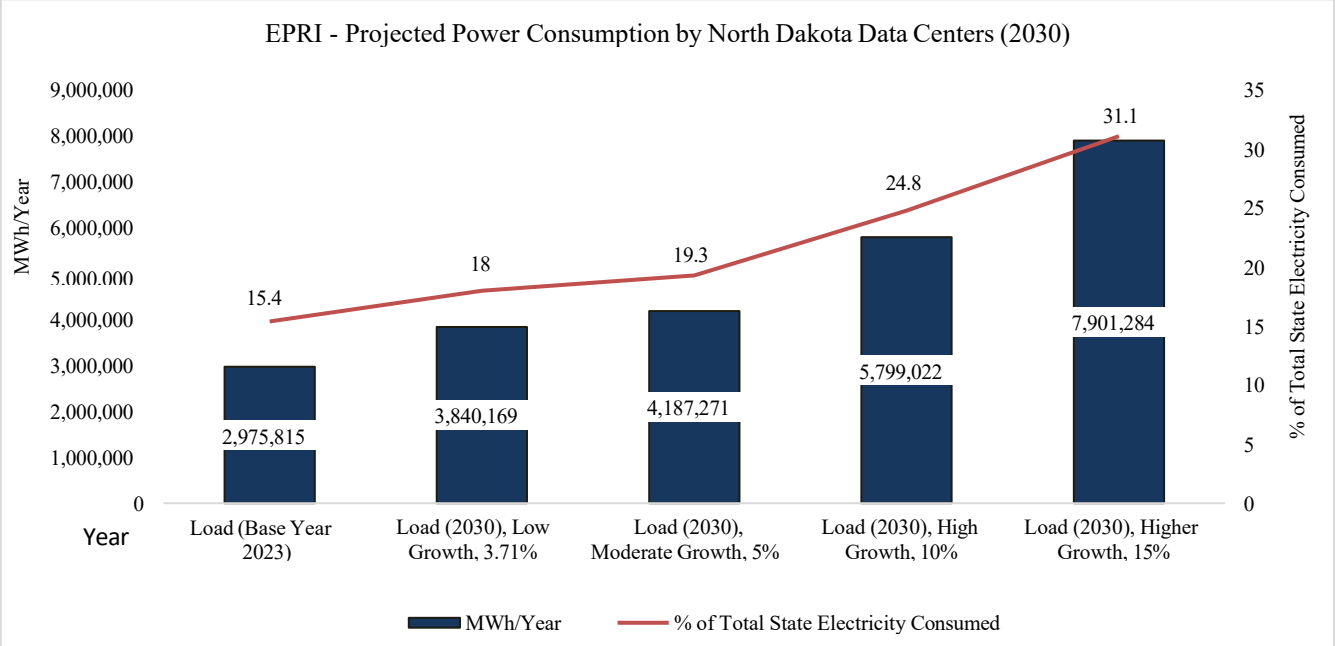
concerns regarding the grid's ability to accommodate the growing energy requirements of data centers in rural regions and the broader implications for North Dakota's environmental and energy policy objectives.[5] The PSC faces jurisdictional limitations when it comes to overseeing data centers' locations and power needs.[6] Facilities served by unregulated energy providers or developed independently of investor-owned utilities fall outside the commission's jurisdiction. As North Dakota continues to attract investment in digital infrastructure, consideration may be warranted regarding whether the current statutory framework sufficiently addresses the long-term implications of data center growth on grid reliability, resource planning, and environmental sustainability.

ELECTRICAL GRID RELIABILITY AND INFRASTRUCTURE REQUIREMENTS

Grid Capacity, Generation, and Consumption

North Dakota's electrical grid has an installed utility-scale generation capacity of approximately 9,508 MW, which includes 4,048 MW from coal-fired plants, 4,250 MW from wind power although this receives a reduced accreditation of about 700 MW due to intermittency, and smaller contributions from natural gas and hydroelectric sources.[7] While coal remains the dominant source for baseload electricity generation, wind contributes 30 percent of annual generation. Electricity generation in the state exceeds internal consumption, positioning North Dakota as a net exporter. For instance, in 2019, the state produced 42,904 gigawatt-hours (GWh) of electricity but only consumed 22,862 GWh.

Most electricity generation occurs in the western and central parts of the state, with high-voltage transmission lines distributing power to Minnesota, South Dakota, Montana, and Canada. The grid is managed by two major independent system operators--the Midcontinent Independent System Operator (MISO) and the Southwest Power Pool (SPP), which handle both transmission operations and market balancing for reliability. The Electric Power Research Institute (EPRI) estimated North Dakota's 2023 data center electricity consumption in both megawatt-hours (MWh) and as a percentage of the state's total electricity demand. Projections for 2030 vary based on four growth scenarios--higher, high, moderate, and low, with data centers expected to account for 9.1 percent, 6.8 percent, 5 percent, and 4.6 percent of total United States electricity consumption, respectively.[8] These estimates assume that all other electricity loads increase by 1 percent annually.



[5] A. Stewart & J. Mowery, *Navigating Data Center Regulation: The Case for North Dakota*, 45 N.D. J. Pol'y & Dev. 56 (2023).
[6] Jeff Beach, PSC Conference to Explore Issues Around Power-Hungry Data Centers, N.D. Monitor (July 30, 2024).
[7] Energy & Envtl. Rsch. Ctr., *North Dakota State Energy Security and Resiliency Plans*, UND (Sept. 2024).
[8] North Dakota Transmission Authority, *Grid Resiliency Plan and Report* (Jan. 2025).

Necessary Grid Reliability Improvements

The NDTA commissioned Power System Engineering, Inc., to perform a transmission capacity study to explore the increasing energy demands from large consumers including data centers, manufacturing expansions, and other electrifications. The first phase involved reviewing recent transmission studies, identifying projects, and summarizing the impact of proposed generation and transmission projects on North Dakota's grid.[9] The second phase focuses on conducting steady-state power flow analysis and potentially dynamic stability assessments. These technical evaluations aim to determine current constraints and inform strategic upgrades necessary to maintain reliability and resilience amid growth. Both MISO and SPP are working on energy policy updates that include revising generator interconnection rules and enhancing transmission planning models to address increased demand and accommodate new high-load users.

Costs of Reliability Improvements

Studies commissioned by the NDTA include modeled cost projections related to the replacement of retiring dispatchable coal, gas, and nuclear plants with renewable energy sources and storage facilities. These projections reflect the capital and operational costs involved in maintaining grid reliability under the United States Environmental Protection Agency's proposed emissions rules. In the MISO region, the estimated additional cost is $381.9 billion through 2055. In the SPP region, the additional cost is projected at $65.6 billion, compared to the current operating costs of existing generation fleets. These figures highlight the significant financial impact of transitioning from North Dakota's lignite-based baseload generation to alternative sources like wind, solar, and battery storage. These costs are associated with ensuring sufficient replacement capacity to prevent rolling blackouts and meet reserve margin requirements, especially in scenarios where existing coal-fired capacity is forcibly retired.

The NDTA was established to support and facilitate the development of new transmission infrastructure across the state. Its involvement in transmission upgrades is contingent on the presence of an acceptable cost allocation methodology being developed and approved by FERC before any projects can move forward.[10] This condition ensures that no infrastructure expansion takes place without a clear and equitable framework for determining who pays for what portion of the transmission cost. The authority plays a proactive role in transmission development by working closely with regional transmission owners, federal and state regulatory bodies, and the RTOs such as MISO and SPP. This collaboration ensures that transmission cost allocation policies are aligned with both state interests and federal regulatory standards.

North Dakota's electric transmission needs are served primarily by the state's two RTOs, MISO and SPP. These organizations operate under the jurisdiction of FERC, and the transmission systems the organizations manage are governed by FERC-approved federal tariffs. Regional transmission upgrades, which are required to accommodate large energy consumers such as industrial facilities, have costs allocated according to tariff-based formulas. These formulas aim to distribute the financial burden among all beneficiaries, rather than placing the full cost on a single customer or generator. The allocation structures are monitored and reviewed through the joint efforts of FERC, RTOs, and the NDTA to ensure fairness and effectiveness in meeting growing demand.[11]

Transmission cost allocation in North Dakota distinguishes between two broad categories--generator interconnection upgrades and regional transmission upgrades. For generator interconnection upgrades, the responsibility lies with the generator, which pays for the cost of tie lines that connect the generator's facility to the main transmission grid. These interconnection costs are direct and local in nature and are not spread across other users. Regional transmission upgrades, which involve high-voltage infrastructure and cover broader service areas, are treated differently. These upgrades are required to connect new generation and ensure the system can accommodate large-scale energy consumers such as manufacturing plants or data centers. The costs for these types of upgrades are allocated across multiple

[9] N.D. Trans. Auth., *Resilience of the Electric Grid in North Dakota: Annual Report* (July 2024).
[10] Empower North Dakota Comm'n, *Empower North Dakota: Comprehensive State Energy Policy 2010-2015* (2010).
[11] N.D. Trans. Auth., *Annual Report: July 1, 2022-June 30, 2023* (2023).

users based on the principle that those who benefit should contribute accordingly. This cost-sharing approach is governed by FERC-approved tariff methodologies, with oversight from the NDTA to confirm fair and balanced frameworks are in place before development begins.

Effects of Congestion and Best Practices to Support Reliability

The *North Dakota Transmission Authority 2023 Annual Report* highlights the risk of congestion and capacity shortfalls due to the retirement of dispatchable baseload plants and increased load from high-demand developments such as data centers and electrified industry. The report indicates even with wind, solar, battery storage, and gas replacements, capacity shortfalls could worsen, leading to reliability issues and rolling blackouts.

System operators and regulatory authorities have implemented several best practices to support grid reliability and accommodate increased demand from high-load users, such as data centers and industrial facilities. These efforts include revising generator accreditation methods to reflect historical performance during periods of high system need and improving resource adequacy assessments. Capacity market design updates, such as MISO's shift from a vertical to a sloped demand curve, aim to strengthen investment signals for new generation capacity. The new Reliability-Based Demand Curve (RBDC) enhances reliability by providing a more effective capacity pricing mechanism to better support resource investment and retirement decisions in the MISO market. The RBDC seeks to address the volatility of the legacy vertical demand curve that often led to near-zero clearing prices during small surpluses and high prices during minor capacity shortages. The SPP has introduced seasonal planning reserve requirements and updated outage coordination policies to enhance system flexibility and reliability.[12] Transmission planning models also are being refined to better account for extreme weather conditions and evolving demand patterns, with the goal of improving overall transmission capacity and operational resilience.

ECONOMIC IMPACT OF DATA CENTERS NATIONALLY

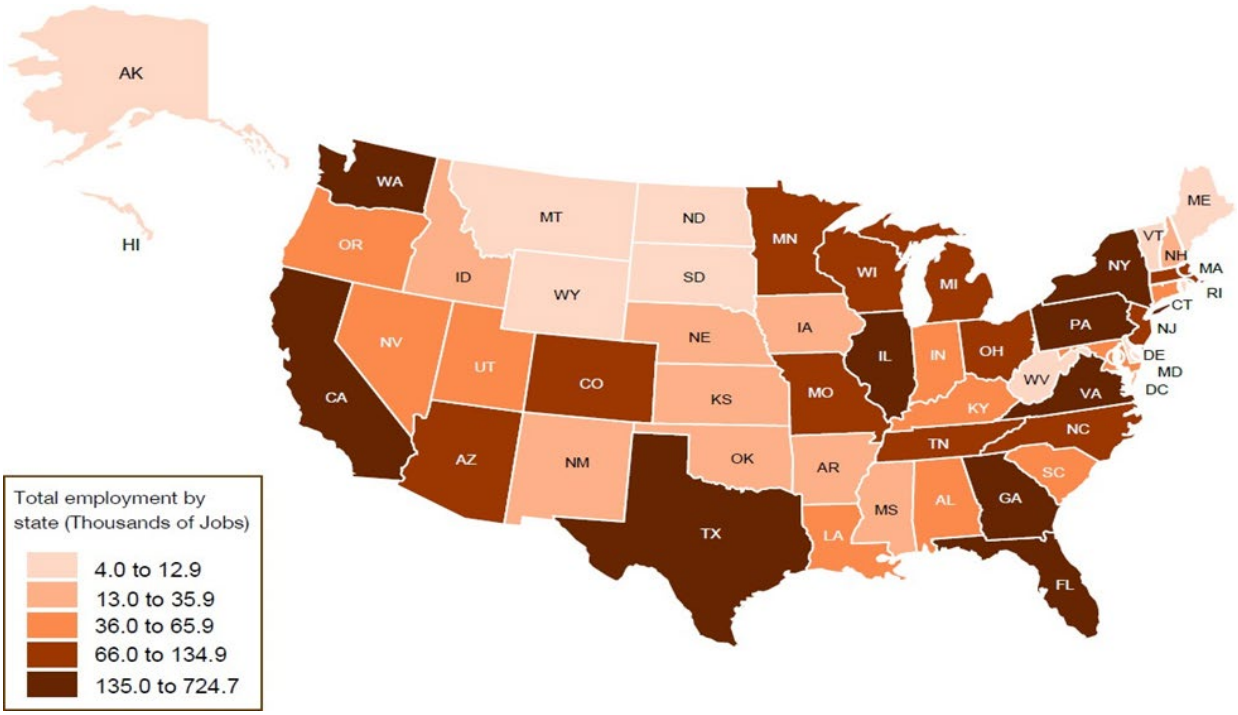
Data centers contribute to both local and national economies through job creation, capital investment, and increased tax revenues. Data centers require substantial capital expenditures and may encourage additional economic activity by attracting related industries and infrastructure investments.[13]

Employment

From 2017 to 2023, the United States data center industry demonstrated consistent growth in employment impacts. Direct job creation rose from 400,100 in 2017 to 603,900 in 2023, reflecting a 51 percent increase. Indirect and induced employment increased from 2.53 million in 2017 to over 4.07 million in 2023, a growth of approximately 61 percent. Total employment impact, combining direct, indirect, and induced effects, increased from 2.93 million in 2017 to 4.68 million in 2023, showing an overall growth of 60 percent during the 7-year period.

California and Texas[14] account for the largest shares of data center employment, comprising 17 percent and 10 percent of the national total, respectively. California, Texas, Florida, New York, and Georgia collectively account for over 40 percent of all data center employment in the United States. California led with 724,700 total jobs in 2023, followed by Texas with 485,100 jobs, Florida with 335,800 jobs, and New York with 256,400 jobs. The following map illustrates the distribution of data center employment by state in 2023:

[12] Southwest Power Pool, Market Monitoring Unit, *State of the Market 2024* (May 28, 2025).
[13] PwC, Economic, Environmental, and Social Impacts of Data Centers in the United States 1 (Prepared for the Data Center Coalition, Feb. 2025).
[14] Andrew Foote & Caelan Wilkie-Rogers, Employment in Data Centers Increased by More Than 60% From 2016 to 2023 But Growth Was Uneven Across the United States, U.S. Census Bureau (Jan. 6, 2025).



Income

From 2017 to 2023, labor income associated with the United States data center industry showed sustained growth. Direct labor income in the form of wages and salaries paid to employees working directly in data center operations increased from $43 billion in 2017 to $105 billion in 2023, representing a 144 percent increase over the 7-year period. Indirect and induced labor income rose from $166 billion in 2017 to $299 billion in 2023, an increase of approximately 80 percent. The total labor income impact, combining earnings from direct, indirect, and induced sources, grew from $209 billion in 2017 to $404 billion in 2023, reflecting a 93 percent increase.

Tax Revenue

Between 2017 and 2023, the United States data center industry's contributions to federal, state, and local tax revenues increased across all major categories. Social insurance contributions, such as employer and employee payroll taxes, grew from $20.3 billion in 2017 to $44.9 billion in 2023, an increase of approximately 121 percent. Over the same period, corporate income tax contributions rose from $5.6 billion to $18 billion, a 221 percent increase, while personal income tax contributions increased from $20.2 billion to $49.6 billion, up nearly 146 percent.

Property tax contributions rose from $8.1 billion in 2017 to $18.3 billion in 2023, and sales and use taxes increased from $9.1 billion to $22.5 billion over the same period. Other payments, including miscellaneous fees and levies, more than tripled, increasing from $2.9 billion to $9.5 billion. The total tax impact from the industry increased from $66.2 billion in 2017 to $162.8 billion in 2023, reflecting a 146 percent overall growth.

ECONOMIC IMPACT OF DATA CENTERS IN NORTH DAKOTA[15]

Employment

In 2022 and 2023, the data center industry in North Dakota contributed to statewide employment both directly and indirectly. In 2022, data centers directly employed 680 individuals. In 2023, that number fell to 520 individuals, representing a 24 percent reduction. Indirect and induced employment, excluding cross-border effects and reflecting jobs supported by local supply chains and consumer spending, amounted to 2,050 jobs in 2022, and declined to 1,810 jobs in 2023.

[15] PwC, Economic Contributions of Data Centers in the United States 2017-2023, Prepared for The Data Center Coalition (Feb. 2025). https://www.datacentercoalition.org/reports-and-publications.

Income

In 2022, $55 million in wages and salaries was earned by those directly employed in the data center industry. That amount declined by 11 percent, to $49 million, in 2023. The indirect and induced labor income without cross-border spillover effects, which includes earnings supported through local supply chains and consumer activity, amounted to $126 million in 2022. That amount declined to $112 million in 2023.

In 2022, data centers directly contributed $121 million in gross domestic product in the state. In 2023, that amount declined to $118 million. Indirect and induced gross domestic product impacts amounted to $198 million in 2022 and $175 million in 2023.

Tax Revenue

In 2022, the total federal, state, and local tax contributions generated by the data center industry in North Dakota amounted to $30 million. This amount decreased to $29 million in 2023.

POSSIBLE STUDY APPROACH

In studying the impact of large energy consumers on the electric grid, the committee may find it helpful to receive testimony from:

- Electric utilities, which may include Basin Electric Power Cooperative, Minnkota Power Cooperative, Montana-Dakota Utilities Company, and Otter Tail Power Company;
- Regional transmission authorities, including the SPP and MISO;
- State and federal regulatory agencies, including the PSC;
- Developers and operators of large energy-consuming facilities, such as data centers, hospitals, and advanced manufacturing companies;
- Local planning and zoning officials from counties and municipalities that host or are evaluating new energy-intensive developments;
- Public interest groups and ratepayer advocates to assess the consumer and community impacts of large-load interconnections and infrastructure costs;
- Research and academic institutions, including the University of North Dakota's Energy and Environmental Research Center;
- The Lignite Energy Council;
- The NDTA; and
- The Petroleum Council.

ATTACH:1