A Snapshot of the Energy Landscape in Illinois

Considerations for the State's Energy Transition

Prepared for Illinois Manufacturers' Association

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INTRODUCTION

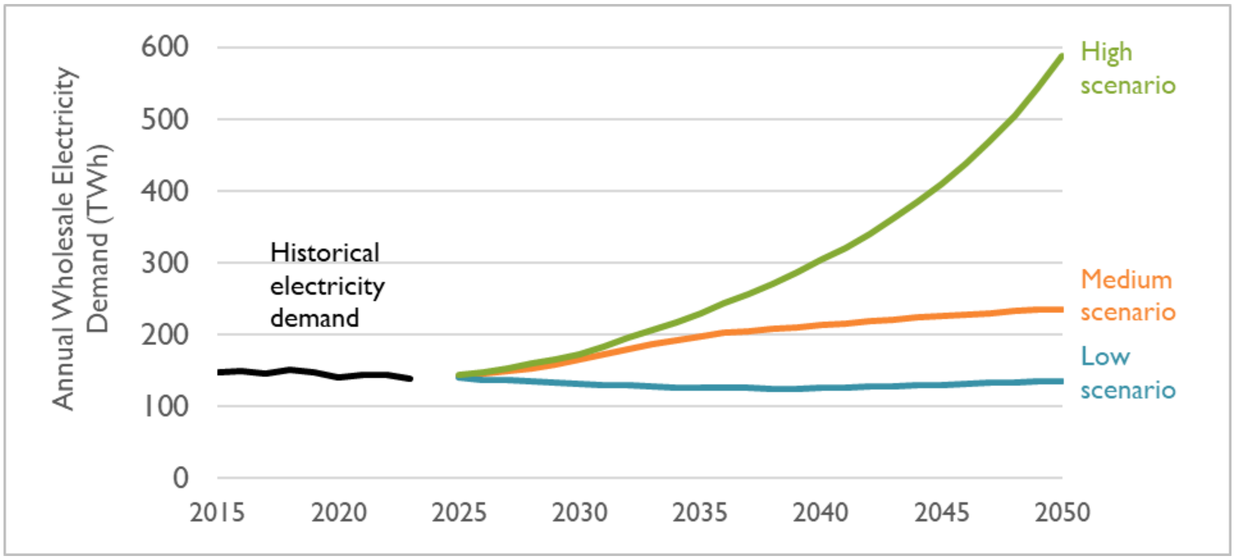
Successfully planning ahead for a manufacturing business in Illinois means having a solid understanding of the state's complex and ever-changing energy landscape. Legislators have established ambitious decarbonization and renewable energy goals that aim to combat climate change, leading planners to explore how to bring more clean energy onto the system and reduce overall demand. Meanwhile, electrification measures and anticipated large loads from data centers, quantum computing, manufacturing growth, and other industries are causing electricity forecasts to increase. The Illinois Manufacturers' Association commissioned Synapse Energy Economics (Synapse) to develop this public report to help stakeholders understand how these and other factors might impact them in the long run.

The report looks at the tasks facing policymakers (ensuring both resource adequacy and lower emissions for Illinois) and how both tasks rest on disparate dynamics at play in the energy system. The roadmap Illinois selects for the future of the energy industry will impact businesses and consumers across Illinois. Energy planning will require thoughtful consideration of the following points:

- As load is expected to increase, resource adequacy will need to align with decarbonization efforts while balancing costs and grid reliability.
- Illinois has set ambitious goals for decarbonization and renewable energy. Achieving these goals will require Illinois to evaluate its current energy portfolio, optimize its resource options, including the addition of far more renewables on the grid and electrification of various loads and end uses.
- Continued policy developments will need to account for the state's immense manufacturing and industrial sector that currently heavily relies on gas and nuclear power.
- Policymakers are exploring more proactive strategies for interregional transmission planning that can ensure Illinois's ability to import additional capacity and support future resource development to accomplish various policy goals.

Various factors will impact actual loads over the next couple of decades. As a result, Synapse developed a range of what future forecasted load may look like. Specifically, we created low-, medium-, and high-load growth electricity forecasts through 2050, comprising various components that will contribute to electric loads. In looking at the aggregate load, in the lowest electricity growth scenario, electric load falls by 2 percent by 2050. In the medium scenario, load grows by 97 terawatt-hours (TWh) by 2050. In the low scenario, as a result of increased levels of energy efficiency (which offsets minor load growth from data centers, transportation electrification, and conventional load), 2050 load falls by 2 percent, relative to the recent past. In the high scenario, load grows by over 450 TWh by 2050, an increase of over 320 percent relative to the recent past.

Figure 1. Projected electricity demand in low, medium, and high scenarios



This report provides a snapshot of several of the evolving components of the energy sector that will impact Illinois stakeholders.

- Section 1 provides an overview of the energy policy context in Illinois, including the landmark legislation, the Climate and Equitable Jobs Act, new targets and standards for energy resources, and new requirements for gas utility planning.

- Section 2 reviews average electricity and gas rates, looking at recent trends and different components of rates.

- Section 3 details the resources available to Illinois and how the resource mix is expected to change, as well as challenges and solutions to getting new clean energy resources online.

- Section 4 discusses the challenges facing the transmission system and the need for holistic, long-term transmission planning.

- Section 5 discusses the role that data centers and other large loads will play in driving up electricity demand in the near- and long-term future.

- Section 6 reviews available federal incentives that have been leveraged to advance decarbonization measures in Illinois.

- Section 7 details our electric load forecast for Illinois out to 2050, demonstrating the overall aggregated load, and individual components for conventional load, data center load, energy efficiency, transportation electrification, and building electrification. It also provides a forecast of natural gas consumption through 2050.

1. ILLINOIS STATE POLICY AND BACKGROUND

In recent years, Illinois developed a set of policies to begin decarbonizing its energy system while continuing to play a strong role in manufacturing nationwide. Initiatives such as the Future Energy Jobs Act (FEJA), the Climate and Equitable Jobs Act (CEJA), the Illinois Renewable Energy Access Plan, and the Illinois Commerce Commission's (ICC) proceeding on the future of natural gas provide a roadmap for the state to transition to cleaner sources of energy. One of the regional transmission operators that covers Illinois, Midcontinent Independent System Operator (MISO), recently said, "Currently, about 75% of the region's total load is served by utilities that have ambitious decarbonization and/or renewable energy goals. Carbon emissions in MISO have already declined more than 32% since 2014, and far greater reductions are expected going forward."[1] The state's policies and plans provide important context for examining the state of the energy landscape in Illinois.

Illinois is among the most ambitious states moving toward a clean energy economy.

- Illinois ranks 16th in ACEEE's 2022 State Energy Efficiency Scorecard, a statewide comparison of clean energy policies and energy efficiency across different sectors.[2] Illinois scores higher than other states for having clean energy and energy efficiency policies and extensive funding for programs that support low-income communities. ACEEE highlighted that areas for improvement include reducing emissions in the transportation and industrial sectors.
- Among Midwestern states, Illinois is second for installed solar capacity (after Ohio) and third for installed wind capacity (after Iowa and Kansas).[3]
- Illinois is also home to the nation's largest nuclear fleet with 11 of the nation's 93 nuclear reactors. Its large nuclear fleet enables Illinois to generate a substantial share of its energy needs emission-free.
- Notably, Illinois is one of a dozen states planning for building decarbonization and the future of its natural gas utilities through a Future of Gas proceeding.

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[1] MISO Transmission Expansion Plan. 2024. Page 4. Available at: https://www.misoenergy.org/planning/transmission-planning/mtep/#t=10&p=0&s=&sd=.

[2] American Council for an Energy-Efficient Economy (ACEEE). 2022. State Energy Efficiency Scorecard: Illinois. Available at: https://www.aceee.org/sites/default/files/pdfs/State_Scorecard/2022/one-pagers/Illinois.pdf.

[3] Here, "Midwest" refers to Iowa, Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, North Dakota, Nebraska, Ohio, South Dakota, and Wisconsin. Illinois Clean Energy Dashboard, Midwest Solar & Wind Capacity, accessed January 30, 2025. Available at: https://cleanenergy.illinois.gov/tracking-illinois-progress/midwest-solar-wind-capacity.html.

Illinois' ambitious energy policies, programs, renewable portfolio standards, and the progress it has already made toward retiring large GHG-emitting generators (as discussed below) sets the state on the path to reach its 2050 clean energy goals.

Illinois has a diverse economy and is home to many industry players advanced manufacturing, agriculture and food processing, transportation, energy, and biotechnology. Specifically, chemicals, food and beverages, machinery, fabricated metal products, and computers and electronics are the largest contributors to the state's manufacturing base. [4] The sector also contributes to the state's energy consumption, consuming more energy than any other end-use sector in Illinois. The industrial sector consumes 30 percent of overall energy in the state compared to 25 percent in the residential sector, 25 percent for transportation, and 20 percent for the commercial sector. The industrial sector specifically consumes 25 percent of natural gas consumption and 25 percent of petroleum in the state. Policymakers in the state will need to account for these manufacturing needs as they navigate the implementation of climate and clean energy policies.

1.1. Future Energy Jobs Act and Climate and Equitable Jobs Act

Passed in 2017, FEJA established near-term renewable energy targets, expanded the state's energy efficiency programs, and supports clean energy job development. FEJA requires the state's two largest utilities to source 25 percent of their power from renewable sources by 2025 and requires the build-out of at least 4,300 megawatts (MW) of new solar and wind by 2030.[5] The act requires Commonwealth Edison (ComEd) and Ameren Illinois (Ameren), the largest electric utilities in the state, to expand their energy efficiency programs to reduce electric waste and customer bills by 2030. Other provisions include funding to support clean energy job training, bill support for low-income customers, and the creation of a community solar program.

In 2021, Illinois passed CEJA, a landmark climate law that establishes comprehensive plans and targets for the future of energy in the state.[6] The law sets renewable portfolio standards that require 50 percent of the state's electricity to come from renewable sources by 2040 (discussed below). By 2045, all electric generating units and other large units that emit greenhouse gases (GHG) must reduce their GHG emissions to zero, and by 2050 the state must meet its power needs with 100 percent clean energy. Many of the law's provisions also support jobs, affordability, and improved air quality in environmental justice communities. Every five years the Illinois Environmental Protection Agency (IL EPA), Illinois Power Agency (IPA), and the Illinois Commerce Commission (ICC) will jointly file a report

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[4] U.S. Energy Information Administration (EIA). "Illinois State Energy Profile." Accessed February 6, 2025. Available at: https://www.eia.gov/state/print.php?sid=IL.

[5] Citizens Utility Board. 2017. "What is the Future Energy Jobs Act?" Available at: https://citizensutilityboard.org/wp-content/uploads/2017/05/FEJA.pdf

[6] Climate and Equitable Jobs Act (CEJA), IL Public Act 102-0662.

discussing the state's progress toward achieving clean energy goals and impacts on reliability from the state's decarbonization mandates.

CEJA also includes major provisions for the transportation sector, energy efficiency, the clean energy workforce, disadvantaged communities, and more. The law establishes a planning process to support vehicle electrification including rebates for electric vehicles (EV) and EV charging infrastructure. It expands energy efficiency programs and creates new requirements for energy efficiency in low-income households. It also supports clean energy job development, improved wages and benefits for workers, and training for workers displaced by the transition away from fossil fuels. The law directs additional resources to disadvantaged communities and creates special provisions to support energy efficiency, economic development, and EV adoption among these communities.

1.2. Renewable Portfolio Standards and Clean Energy Procurement

The renewable portfolio standards established in CEJA require the state to meet the following targets for electricity generation:

- 25 percent of electric demand through renewable sources by 2025
- 40 percent of electric demand through renewable sources by 2030
- 50 percent of electric demand through renewable sources by 2040

Of the total renewable generation, 45 percent must come from wind and hydropower and 55 percent from solar (a mix of utility-scale solar, community solar, and other) but those targets may now be adjusted by the IPA under Public Act 103-1066 (HB 587). The IPA reports on the state's renewable energy credit (REC) procurement progress every two years in its Long-Term Renewable Resources Procurement Plan. According to the IPA's 2024 Long-Term Renewable Resources Procurement Plan, Illinois fell significantly short of its target to reach 22 percent of electric generation with renewable energy during the 2023–2024 delivery year: the state only procured 7.8 million RECs instead of the targeted 26 million RECs.[7]

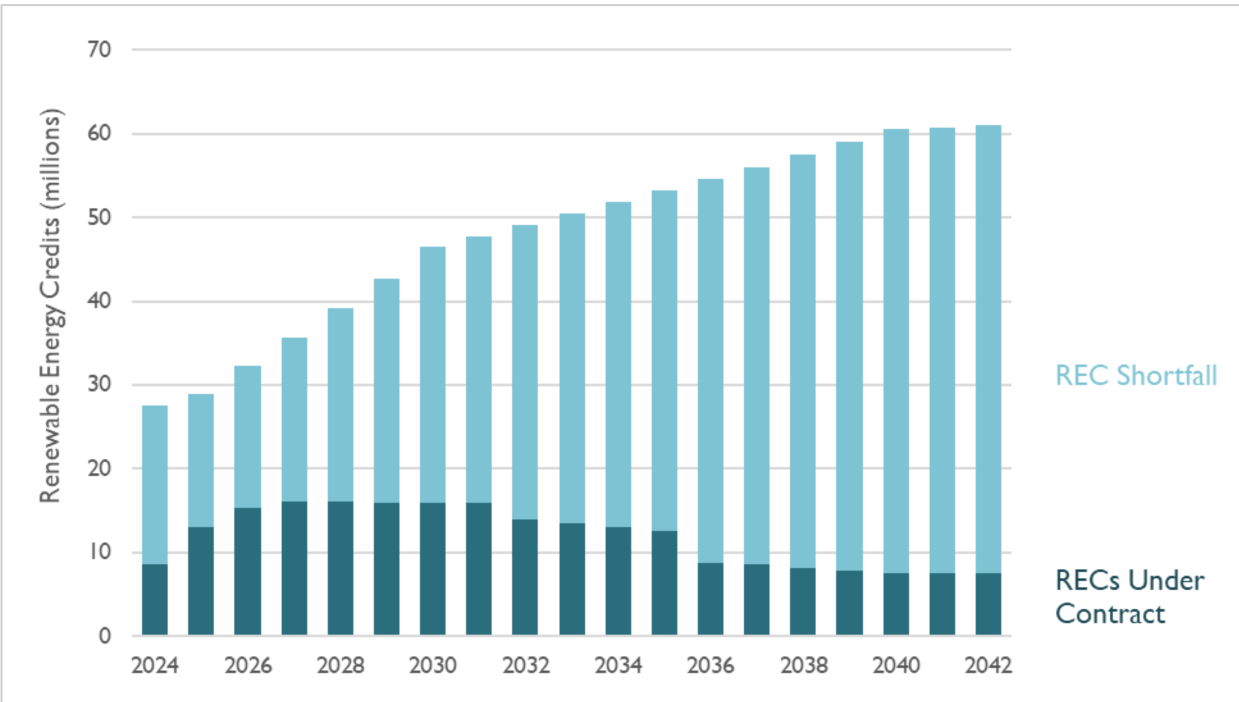
Illinois is one of 30 states (including Washington, DC) with RPS targets. While state RPS targets vary, they generally aim for 10–30 percent of current retail sales to come from renewables. Illinois's shortfall is

[7] Illinois Power Agency. 2024. Long-Term Renewable Resources Procurement Plan. April 19, 2024. Available at: https://illinoisshines.com/wp-content/uploads/2024/04/final-2024-long-term-renewable-resources-procurement-plan-19-apr-2024.pdf; Section 1-10 of the Illinois Power Agency Act RECs are the unit of measurement used to track renewable energy generation – one REC equals one megawatt-hour (MWh) of energy from a renewable source. In Illinois, renewable sources of energy include wind, solar photovoltaic, solar thermal, biodiesel, organic waste biomass, tree waste, hydropower, and landfill gas; renewable sources do not include the incineration of tires, waste, construction debris, and landscape waste other than trees, and more.

notable compared to other states, though that is somewhat attributed to transition issues after the RPS targets were raised in 2021.[8]

Figure 2 shows the state's current level of renewable energy procurement and its shortfall from reaching the RPS targets set forth in CEJA (i.e., the amount of remaining RECs that the state still needs to procure in each year). Illinois currently has enough RECs under contract to meet 25 percent of the cumulative REC requirement through 2050.

Figure 2. Statewide annual RPS goal, current REC portfolio and REC shortfall



Source: Illinois Power Agency, 2024 Long-Term Renewable Resources Procurement Plan, April 19, 2024, available at: https://illinoisshines.com/wp-content/uploads/2024/04/final-2024-long-term-renewable-resources-procurement-plan-19-apr-2024.pdf.

1.3. Nuclear Power

Although Illinois generates more electricity from nuclear power than any other state in the country, for three decades Illinois has had a moratorium on new nuclear construction. The State partially lifted this moratorium in 2023 with the passage of Public Act 103-0569. The act allows small nuclear reactors producing less than 300 MW of energy while continuing the moratorium on larger, traditional nuclear

[8] Barbose, Galen. 2023. U.S. State Renewables Portfolio & Clean Electricity Standards: 2023 Status Update. Lawrence Berkeley National Laboratory.

power plants. States including Colorado, Connecticut, Georgia, Kentucky, Montana, New Jersey, New York, Ohio, and Wisconsin have implemented programs or enacted legislation assisting nuclear generation. Only 12 states currently have restrictions on the construction of new nuclear power facilities.[9]

With the moratorium partially lifted, new nuclear development has been under discussion – primarily for small modular reactors. These resources have the potential to address new load growth and resource adequacy while also supporting progress towards emission reduction goals. While construction of new nuclear power plants also has the potential to create both construction and longer-term operational jobs, some stakeholders express concern about the affordability of these reactors, which have no historical data on actual cost.

Additionally, there is debate about retirement or maintenance of existing nuclear in the state. In assessing the economic impact of relicensing versus retiring two nuclear plants in Illinois, the Brattle Group found that retiring these plants would increase emissions and raise wholesale power prices in the near term, leading to higher electricity prices for customers.[10] In auditing nuclear in Illinois, Synapse also found that state support for existing nuclear plants could be part of the strategy for Illinois to transition to less-carbon emitting resources.[11]

1.4. Electric Vehicles

The transportation sector is the largest source of GHG emissions in Illinois, and the state has established ambitious targets for the sector. Under CEJA, Illinois targets having one million passenger EVs on the road by 2030 and authorizes funding and rebates for the purchase of EVs and charging infrastructure.[12] The state is also considering the adoption of EV standards already in place in California and other states.[13] These additional proposed standards, including Advanced Clean Cars II, Advanced Clean Trucks, and Heavy-Duty Omnibus, would phase out the sale of new gasoline- and diesel-powered cars, pick-up trucks, work vans, and SUVs before banning their sale in 2035, reduce the sale of gasoline- and diesel-

[9] National State Conference of Legislatures. 2023. "States Restrictions on New Nuclear Power Facility Construction." Available at: https://www.ncsl.org/environment-and-natural-resources/states-restrictions-on-new-nuclear-power-facility-construction.

[10] The Brattle Group. 2025. "Brattle Analyzes the Economic Impact of Retiring Two Illinois Nuclear Plants." Available at: https://www.brattle.com/insights-events/publications/brattle-reports-analyze-the-economic-impact-of-retiring-two-illinois-nuclear-plants/.

[11] Synapse Energy Economics. 2021. *Exelon Illinois Nuclear Fleet Audit: Findings and Recommendations*. Prepared for the Illinois Environmental Protection Agency.

[12] Climate and Equitable Jobs Act (CEJA), IL Public Act 102-0662.

[13] National Federation of Independent Business. 2025. "Illinois to Hold Additional Hearings on Proposal to Adopt California's Vehicle Emissions Standards." Available at: https://www.nfib.com/news-article/illinois-to-hold-additional-hearings-on-proposal-to-adopt-california-vehicle-emissions-standards/.

powered medium- and heavy-duty trucks, and create new emissions and testing requirements for heavy-duty trucks.

1.5. Building Sector Decarbonization and the Future of Gas

Illinois is also examining how to reduce its consumption of natural gas. As of 2023, three-quarters of households in the state rely on natural gas for heating purposes, in contrast to the national average of 46 percent.[14] Around 20 percent of households rely primarily on electric heating, which includes both electric resistance heating and more efficient heat pumps. The residential sector consumes about one-third of all gas in Illinois, with the industrial sector consuming another quarter of total gas. The commercial sector and electric power sector each consume about one-fifth of the gas used in the state.[15] Natural gas has historically been an affordable source of power, and has historically been used in periods of peak demand (both in the electric and buildings sector). As a result, the cost-effectiveness of replacement solutions, and the ability of these solutions to provide energy during peak periods, are likely to be key considerations in policy discussions.

CEJA addresses building decarbonization and gas consumption through the Illinois Stretch Energy Code which sets optional energy efficiency standards in residential and commercial buildings. Municipalities can choose to adopt this code, which expands upon the state's existing energy conservation codes, as a way to reduce gas consumption in buildings. Under the Stretch Energy Code, energy efficiency requirements become stricter every few years, with a goal of a 60- to 75-percent reduction in energy consumption below baseline levels by 2031.[16]

The ICC is addressing gas system decarbonization through recent rate case rulings and new planning dockets that may require that the state's energy future shift towards less gas consumption and investment. In 2023, the ICC cut 30 percent of proposed investments from the four largest natural gas utilities, approving only $570 million of the $810 million proposed in rate cases and halting gas system modernization efforts pending more comprehensive gas planning for the future.[17] The ICC also directed gas utilities to begin filing Long-Term Gas Infrastructure Plans every two years beginning in July 2025,

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[14] EIA. "Illinois State Profile and Energy Estimates." Accessed February 6, 2025. Available at: https://www.eia.gov/state/?sid=IL.

[15] EIA. "Natural Gas Consumption by End Use." Accessed January 27, 2025. Available at: https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SIL_a.htm.

[16] Capital Development Board, Illinois Stretch Energy Code, accessed January 27, 2025. Available at: https://cdb.illinois.gov/business/codes/illinois-energy-codes/illinois-stretch-energy-code.html

[17] Citizens Utility Board. "Q&A on ICC Gas Rulings and How They Impact Customers." December 19, 2023. Available at: https://www.citizensutilityboard.org/blog/2023/12/19/qa-on-icc-gas-rulings-and-how-they-impact-customers/; Citizens Utility Board, "ICC reins in gas utilities, cuts rate hikes by hundreds of millions of dollars," November 16, 2023. Available at: https://www.citizensutilityboard.org/blog/2023/11/16/icc-reins-in-utilities-cuts-rate-hikes-by-hundreds-of-millions-of-dollars/.

requiring the companies to provide five-year action plans, comprehensive evaluations of alternatives to building out the gas system, and scenario analyses.[18]

The ICC additionally opened Docket No. 24-0158 in 2024, called the "Future of Gas" proceeding, which explores the future of the gas system as the state transitions toward a cleaner energy future.[19] This docket will explore broader strategies for decarbonizing the gas system and how gas utilities can adapt to the energy transition. Current strategies from gas utilities around the country include running efficiency programs, piloting geothermal networks, and examining the potential of lower-carbon fuels to comply with decarbonization policies. Many environmental advocates are pushing for decarbonization of the gas system by prioritizing electrification through non-wires alternatives to new infrastructure investment and electric heat pump deployment. The Future of Gas hearings will contemplate price impacts on customers (residential, commercial, and industrial), reliability and resiliency of energy sources, use of natural gas in manufacturing and other sectors, and how the state should move forward.

Electrification efforts and planning for the Future of Gas will need to account for the state's strong reliance on natural gas as a resource, particularly in the building and power sectors, to ensure resource adequacy. Illinois and its electric system are located in two regional transmission operator (RTO) territories, PJM and MISO, and both MISO and PJM have voiced concerns about the pace of the transition away from gas and potential loss of reliability. MISO noted that "the transition that is underway to get to a decarbonized end state is posing material, adverse challenges to electric reliability."[20] In light of resource retirements, the market monitor for PJM opined that "given current technology and the short time period, the retiring capacity can only be replaced by gas fired or dual fuel generation."[21] Environmental advocates have argued that a portfolio of renewables combined with storage and demand-side management could fill the gaps left by retiring gas plants.[22] However, Illinois and its utilities will need to proactively plan as the state moves toward its energy targets to avoid potential reliability issues and procure required resources.

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[18] Illinois Commerce Commission, Final Order Case 23-0066, Nicor Illinois Gas Company d/b/a Nicor Gas Company Proposed General Increase in Rates and Revisions to Other Terms and Conditions of Service, November 16, 2023, available at: https://www.icc.illinois.gov/docket/P2023-0066/documents/344366/files/601330.pdf.

[19] Illinois Commerce Commission, Initiation of Proceeding to Examine the Future of Natural Gas and Issues Associates with Decarbonization of the Gas Distribution System, Docket No. 24-0158, Available at: https://www.icc.illinois.gov/docket/P2024-0158/documents/347887/files/607586.pdf.

[20] MISO, MISO's Response to the Reliability Imperative, February 2024, available at: https://cdn.misoenergy.org/Executive%20Summary%202024%20Reliability%20Imperative%20report%20Feb.%2021%20Final631825.pdf?v=20240221114214.

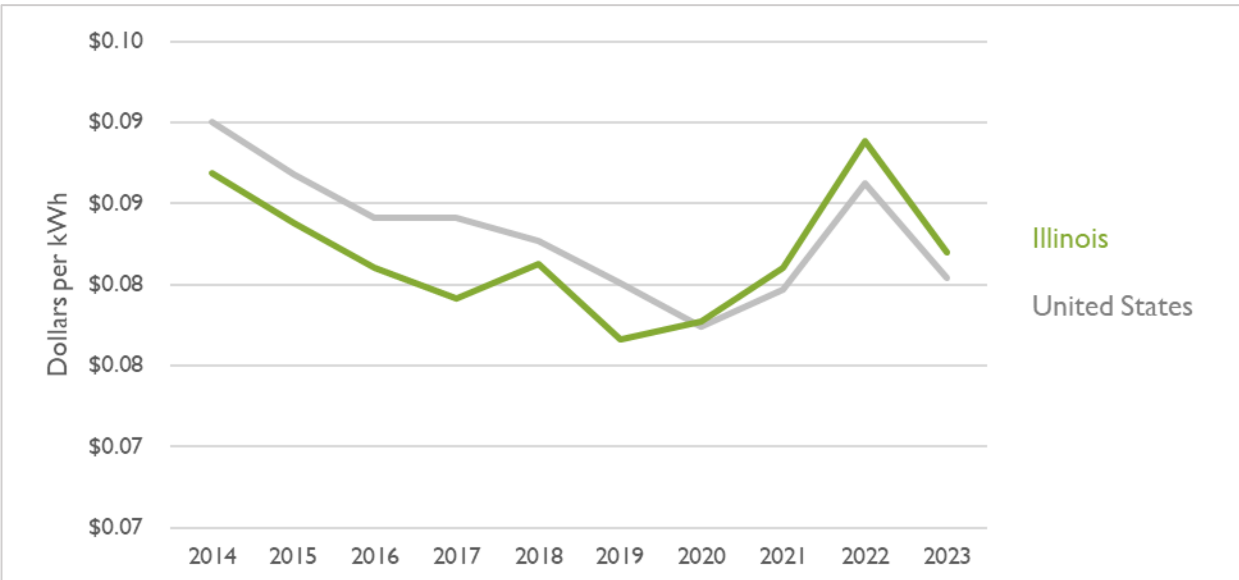
[21] Monitoring Analytics, LLC, 2023 State of the Market Report for PJM, March 14, 2024, available at: https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2023/2023-som-pjm-vol1.pdf.

[22] Rosen, Theo. "Save it for later: Illinois needs more energy storage." *Environment America* (March 6, 2025).

2. ENERGY COSTS IN ILLINOIS

The average retail rate of electricity in Illinois across all sectors was lower than the U.S. average over the last decade.[23] Industrial electricity rates in Illinois were similar to the U.S. average (see Figure 3), as were residential rates, while commercial electricity rates in Illinois were below the national average.[24] Industrial natural gas retail rates in Illinois have been higher than the national average over the last 10 years (Figure 4).[25] Commercial gas rates in Illinois were on par with the national average, and residential rates have been below the national average since 2014.[26]

Figure 3. Industrial electric rates (2023 dollars)



Source: EIA, Electricity Data Browser, accessed January 30, 2025, available at: https://www.eia.gov/electricity/data/browser/.

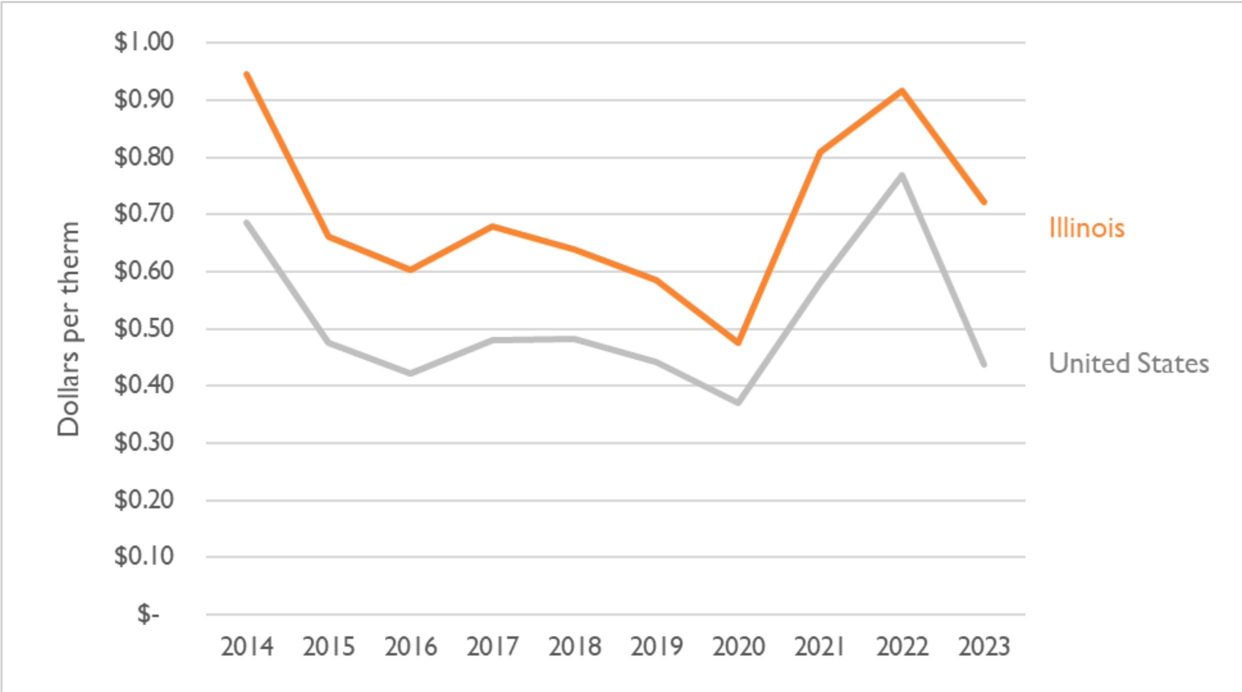
[23] EIA, "Electricity Data Browser." Accessed January 30, 2025, available at: https://www.eia.gov/electricity/data/browser/.

[24] Ibid.

[25] EIA, "Natural Gas Summary." Accessed March 3, 2025, available at: https://www.eia.gov/dnav/ng/ng_sum_lsum_a_EPG0_PIN_DMcf_a.htm.

[26] Ibid.

Figure 4. Industrial natural gas rates, 2023 dollars



Source: EIA, Natural Gas Summary, accessed March 3, 2025, available at: https://www.eia.gov/dnav/ng/ng_sum_lsum_a_EPG0_PIN_DMcf_a.htm.

There are many factors that influence electric and gas rates. In the sections below, we discuss gas and electric rates in Illinois including recent trends and a breakdown of various rate components and structures.

2.1. Historical Electricity Rates and Rate Structure

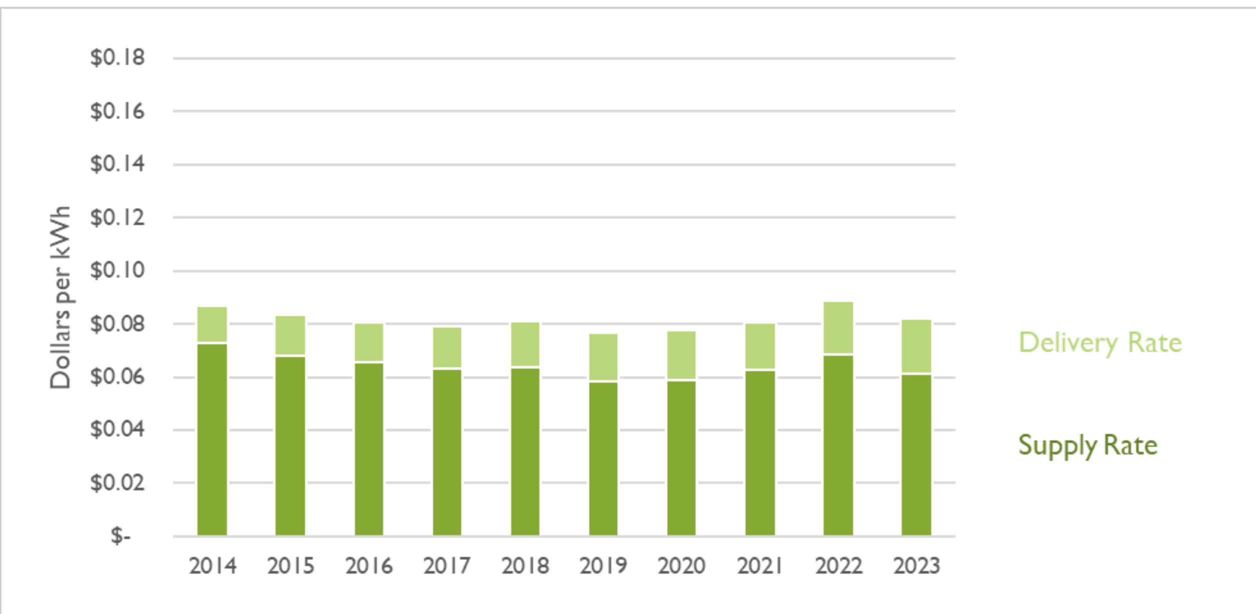
Average statewide retail electricity rates have remained stable in Illinois over the last 10 years for industrial, commercial, and residential customer classes, as seen in Figure 5, Figure 6, and Figure 7. Due to the Ukraine war and global energy price market effects, the supply portion of customers' bills, which covers the cost of generating energy and transmitting it from generators to utilities, spiked in 2022 before returning to pre-2022 levels in 2023.[27] The delivery portion of customer bills, related to the cost of providing service through the distribution network, has remained stable for residential customers and increased by just 1 cent per kilowatt-hour (kWh) for commercial and industrial customers since 2014. In

[27] Supply charges include energy, generating capacity, and transmission charges, as well as other administrative charges for the grid operator (MISO or PJM).

the last 10 years, supply rates were twice as large as delivery rates on a per kWh basis on average for all customer classes.

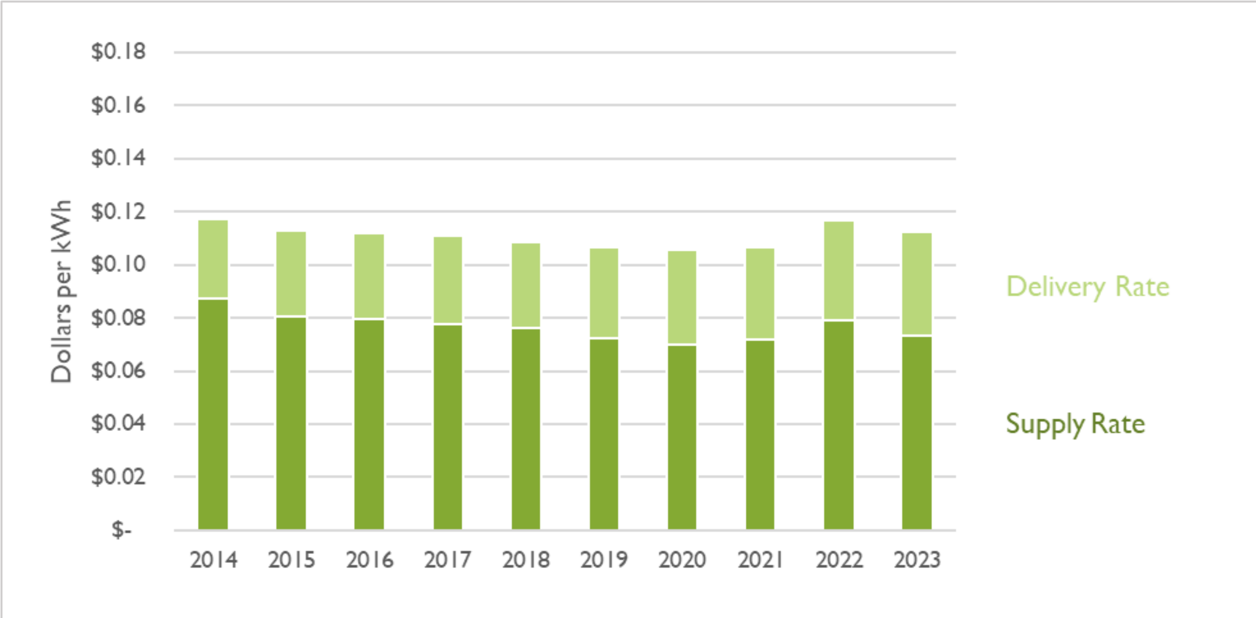
The rates shown in Figure 5, Figure 6, and Figure 7 show effective rates (a proxy rate calculated by dividing total utility revenues ($) by total electric sales (kWh), using EIA data for Illinois. Customers automatically take service from their local utility for the delivery of electricity on the distribution grid ("delivery"). For the supply portion of their electricity, small commercial customers can either choose to purchase supply through their local utility or from one of many third-party suppliers, while larger load customers typically receive supply directly through their utility. If they purchase electricity supply through their local utility, they receive basic generation service or hourly supply service and are considered to have "bundled" delivery and supply services. If a customer uses a third-party supplier, they are considered to be on "unbundled service." EIA reports utility revenues and sales by utility, separately for bundled and unbundled customers. We untangled the supply and delivery portion for bundled customers and combined them with the unbundled supply and delivery rates, to fully capture the statewide average effective rates of each cost component. For each utility, the delivery rates are the same for bundled and unbundled service, as they are provided by the same entity for all customers (i.e., not a third party). To calculate the supply portion of the bundled service, we subtracted the known distribution rates from the total bundled rates. We then added the supply portion from the bundled customers to the unbundled supply revenues and sales, to get a total statewide weighted average supply rate. Distinguishing between the supply rate and delivery rate allows for greater analysis of the cost components and drivers of electric rates, which we discuss in the following two sections.

Figure 5. Industrial average effective supply and delivery rates in Illinois (2023 dollars per kWh)



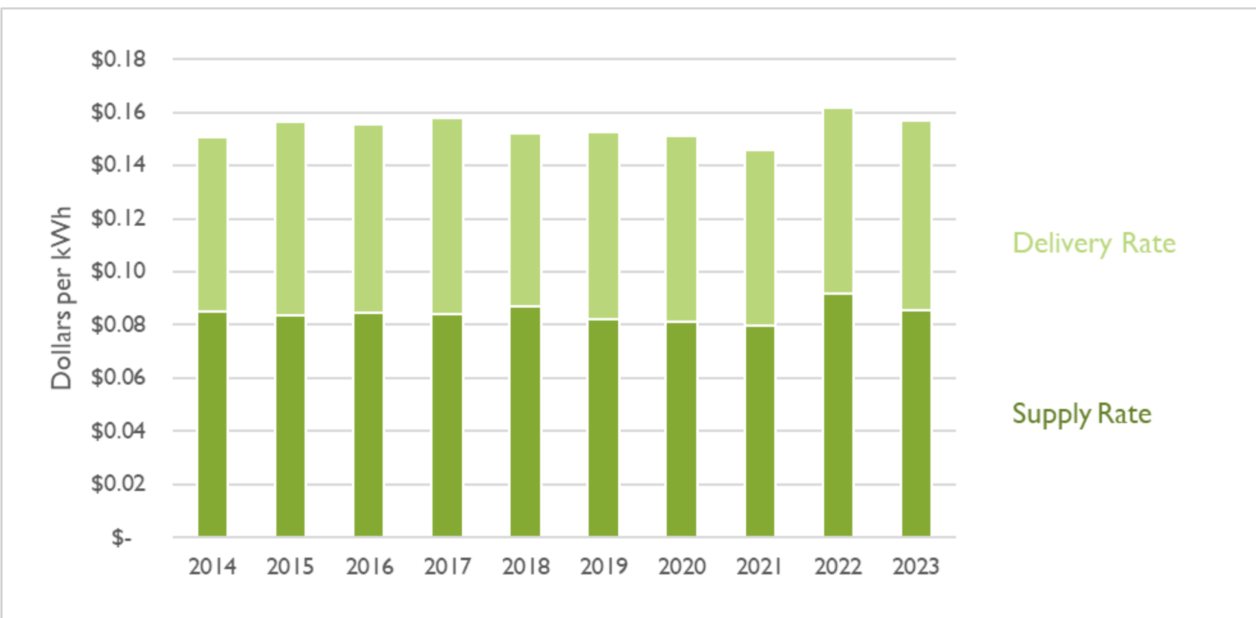
Source: EIA, Form EIA-861, available at: ***https://www.eia.gov/electricity/data/eia861/***.

Figure 6. Commercial average effective supply and delivery rates in Illinois (2023 dollars per kWh)



Source: EIA, Form EIA-861, available at: https://www.eia.gov/electricity/data/eia861/.

Figure 7. Residential average effective supply and delivery rates in Illinois (2023 dollars per kWh)



Source: EIA, Form EIA-861, available at: https://www.eia.gov/electricity/data/eia861/.

Electricity Delivery and Policy-Related Charges

The delivery portion of electric bills covers the costs of delivering electricity to customers through the distribution grid network (e.g., lower-voltage electricity lines within each of the utility service territories). This includes the costs associated with maintaining shared pieces of equipment on the distribution grid (for instance, substations, transformers, electricity poles, and wires) as well as some utility administrative costs. The delivery portion of the bill also usually includes customer costs such as electric meters and certain administrative costs.

Electric utility bills also include policy-related charges. These cover utility costs related to policy and regulatory compliance, program costs (e.g., energy efficiency programs and low-income energy assistance programs), and passthrough charges such as state taxes. These policy-related charges may be embedded in delivery charges or they may be reflected in separate riders, but they are collected from all customers through the distribution company (we include these in the delivery portion in the figures and tables throughout this section).

Table 1 shows a breakdown of delivery charges for a selection of non-residential rates in ComEd, Ameren, and MidAmerican. Each rate has monthly charges which are like subscription fees that cover the fixed costs of metering, operations, administration, and other customer-related costs. The remainder of the bill for non-residential customers in Illinois is made up of demand charges.[28] A demand charge on a bill is a fee based on the highest level of electricity demand (measured in kilowatts, kW) during a billing period. Unlike volumetric charges, which depend on the total amount of electricity consumed (measured in kWh), demand charges reflect the peak rate at which electricity is drawn from the grid. Demand charges cover costs associated with supporting large loads such as capacity and voltage transformation costs. Utilities typically apply these charges to large load customers, who more often have higher and more variable demand and therefore put a greater strain on the grid (relative to smaller and/or residential customers). Demand charges can help recover the costs associated with ensuring the grid can meet the peak demands from these types of customers.

Monthly customer charges and demand charges vary based on the customer size (average monthly kW or kWh), and the voltage of the electricity service provided. Commercial and Industrial customers can elect to take service at a higher voltage (usually “primary voltage” or higher) than the standard voltage (“secondary voltage”) provided to residential customers or smaller commercial customers. Table 1, below, reflects these options.

[28] We only summarize the utility bill charges for ComEd, Ameren, and MidAmerican, and do not include bills from municipal utilities or cooperatives.

Table 1. Non-residential delivery charges by utility in Illinois

Utility Rate Classes		Monthly Customer Charges ($/month)	Demand Charges ($/kW)	
ComEd		Customer Charge & Standard Metering Service Charge	Distribution Facilities Charge (Primary or Secondary Voltage)	Primary Voltage Transformer Charge
Large Load (>400-1000 kW)		$169.80 & $13.59	$11.54 or $14.59	$0.50
Very Large Load (>1000-10,000 kW)		$1,005.03 & $14.09	$11.05 or $13.49	$.050
Extra Large Load (>10,000 kW)		$2,293.55 & $39.91	$12.28 or $13.10	$0.55
Ameren		Customer Charge & Meter Charge	Distribution Delivery Charge	Transformation Charge
General Service	Primary Meter Voltage (>600v-15kV)	$160.00 & $12.51	$8.38	$0.59
	High Voltage Meter Voltage (>15-100kV)	$570.00 & $12.51	$1.93	$0.59
	100+ Meter Voltage (>100kV)	$720.00 & $12.51	$0.28	$0.59
Large General Service	Primary Meter Voltage (>600v-15kV)	$160.00 & $14.96	$9.88	$0.59
	High Voltage Meter Voltage (>15-100kV)	$570.00 & $14.96	$2.86	$0.59
	100+ Meter Voltage (>100kV)	$720.00 & $14.96	$0.28	$0.23
MidAmerican		Basic Service Charge & Meter Charge	Delivery Charge	Reactive Demand Charge ($/kVar)
General Demand Service		$29.42 & $4.80	$6.00	NA
Large Electric Time-of-Use Service		$551.40 & $116.96	$5.40	$0.50
Very Large Electric Time-of-Use Service		$551.40 & $327.13	$0.78	$0.50

Sources: ComEd, "Summary of Typical Nonresidential Line Item Charges," 2025, available at: https://www.comed.com/cdn/assets/v3/assets/blt3ebb3fed6084be2a/blt2a55fd60b0fa4cf2/679124a91d0aeed2124fed68/ADA_Summary_of_Typical_Nonresidential_Line_Item_Changes.pdf?branch=prod_alias*; Ameren, "Ameren Illinois Company d/b/a Ameren Illinois Rate MAP-P – Modernization Action Plan – Pricing Delivery Charges Informational Sheet," 2025, available at:* https://www.ameren.com/-/media/rates/files/illinois/2024/aiel8rtpbrr12262024.ashx*; MidAmerican, Schedule of Rates for Electric Service in Illinois, 2025, available at:* https://www.midamericanenergy.com/media/pdf/il-electric-tariffs.pdf.

Electricity Supply Costs

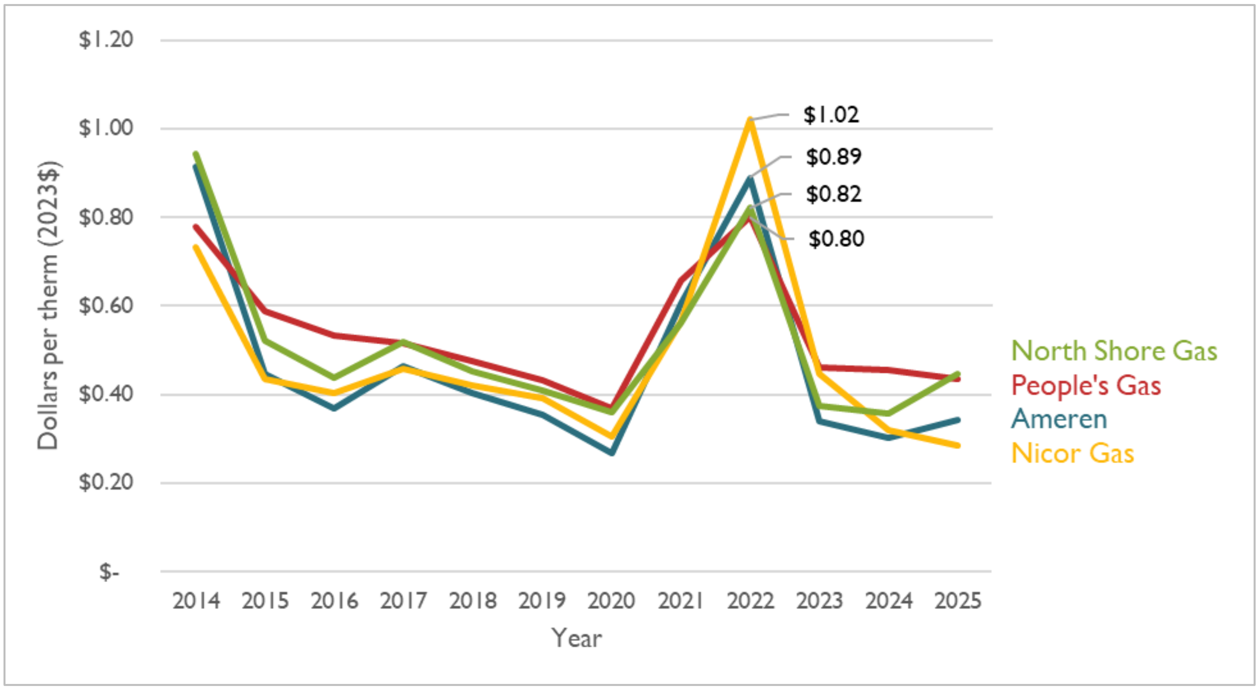
Electricity supply is provided to a customer by either its utility (through basic generation service) or through a third-party supplier. Utilities purchase energy through competitive procurements administered through the IPA and through the wholesale electricity markets (either the PJM market in the northeast part of the state or the MISO market in the rest of the state). Section 3.2 discusses electricity markets in more detail. PJM and MISO also charge distribution utilities for the costs to maintain the transmission system across the region. The distribution utilities then pass these charges onto customers in their service territory in the supply portion of the bill.

For the basic generation service available to small commercial customers, the supply portion of customer bills does not change daily. This is due to long-term supply contracts (i.e., hedging of supply costs) and because utility rates are adjusted and trued up on a longer-term schedule. These supply service rates only change twice per year and are set through regulatory proceedings. Alternatively, large load customers, typically over 100–150 kW loads, receive hourly supply service and therefore see their supply rates change frequently.

2.2. Historical Natural Gas Rates

Natural gas supply rates have been less stable than electricity rates in Illinois and the broader United States in past years. Since 2008, gas supply rates across all customer classes have decreased, except for a spike in rates in 2022 caused primarily by the war in Ukraine. Except for minor variations, all gas utilities in the state experienced the same trend, as shown in Figure 8.

Figure 8. Average natural gas supply charges, in 2023 dollars



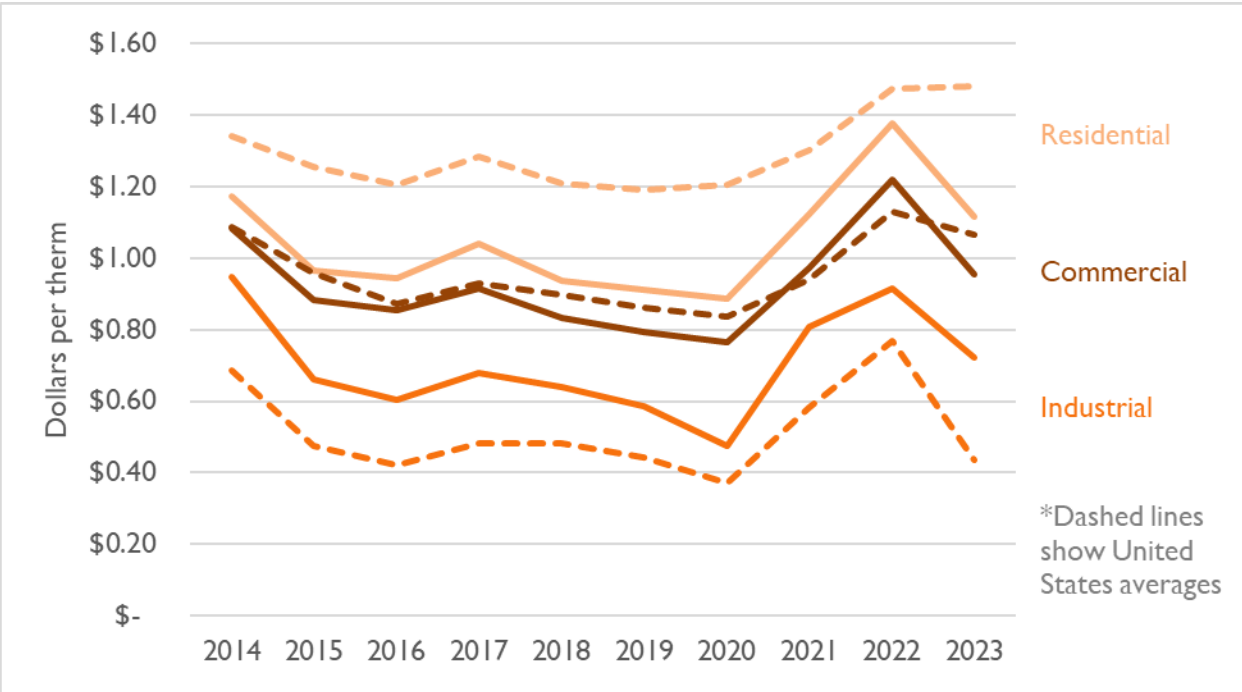
Source: Illinois Commerce Commission "Current and Historical Utility Gas Supply Charges," accessed February 24, 2025, available at: https://www.icc.illinois.gov/natural-gas-choice/purchased-gas-adjustment-rates#:~:text=The%20price%20that%20gas%20utilities,any%20reconciliation%20from%20prior%20months.

EIA reports data on natural gas revenues and sales in the same way as it does for electric consumption.[29] Figure 9 shows the effective natural gas rate for all sectors, calculated as total revenues (including both supply and delivery) divided by total sales. Total gas rates decline from the 2000s and spike in 2022.

[29] EIA, "Natural Gas Prices." Accessed January 31, 2025, available at: https://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_PRS_DMcf_a.htm.

Of all the customer classes, industrial customers pay the lowest amount per unit of energy. Over the last decade, industrial gas rates in Illinois were higher than U.S. average industrial gas rates, while commercial rates in Illinois were on par with the rest of the country, and residential rates were below the national average.[30]

Figure 9. Effective natural gas rates in Illinois, by rate class, in 2023 dollars



Source: U.S. Energy Information Administration, natural gas prices, accessed 2/3/2025, from: *https://www.eia.gov/dnav/ng/ng_pri_sum_dcu_nus_a.htm*

30 EIA, "Natural Gas Prices." Accessed January 31, 2025, available at: https://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_PRS_DMcf_a.htm.

3. ILLINOIS'S ENERGY RESOURCES

Illinois policymakers and system planners are working to ensure the state has the right resource mix to meet its RPS targets while ensuring resource adequacy for anticipated increases in loads. Renewable energy will need to substantially increase to meet RPS targets. The ICC's Renewable Energy Access Plan (REAP), a requirement of CEJA, estimated that renewable production would need to increase from 3.3 TWh per year in 2024 to 64– 450 TWh per year to achieve RPS targets.[31] (The high end of this range is based on a future in which all nuclear energy in Illinois, which currently plays a large role in satisfying the state's zero-emitting energy needs, retires. Given the large role of nuclear in the current energy mix, this is an unlikely outcome.) Much of the electric generation from Illinois's resources in 2024 was exported to other states, especially in the PJM region. The ICC has indicated that the state should advocate for wholesale market rules and interregional transmission capacity that will facilitate cost-effective clean electricity imports to Illinois.[32] The ICC has also identified energy efficiency measures, demand response, and other non-wires alternatives as key to Illinois's energy future.[33] To reduce emissions from fossil fuels, fossil fuel industry players and other industrial actors have proposed carbon capture and sequestration (CCS) projects to reduce emissions.[34] In July 2024, Governor Pritzker signed a new law that will create safeguards and reduce the risk of leaks associated with CCS.[35]

Gas plays a large role in Illinois's energy system. Illinois situated at the crossroads of many interstate natural gas pipelines and two natural gas hubs, making gas a widely available resource for the state.[36] As of 2023, there were 118,000 miles of natural gas distribution pipeline across the state (63,000 miles of distribution main and 55,000 miles of services), and 9,000 miles of natural gas transmission pipeline.[37] About 60 percent of distribution mains are steel (cathodically protected), 39 percent are plastic, and the remainder are cast iron. Illinois has 1 trillion cubic feet of natural gas storage capacity which is roughly

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[31] Illinois Commerce Commission. 2024. Illinois Renewable Energy Access Plan at 26. Accessed: https://www.icc.illinois.gov/informal-processes/Renewable-Energy-Access-Plan.

[32] *Id*. at 29.

[33] *Id*. at 45.

[34] Clean Air Task Force. 2023. Carbon Capture and Storage in Illinois.

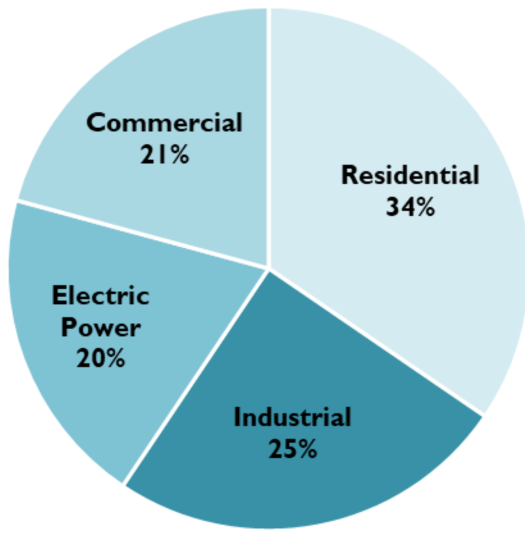
[35] IL Public Act 103-0651.

[36] EIA. "Illinois State Profile and Energy Estimates." Accessed February 6, 2025. Available at: https://www.eia.gov/state/?sid=IL.

[37] U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA), "Pipeline Miles and Facilities 2010+," accessed February 26, 2025, available at: https://portal.phmsa.dot.gov/analytics/saw.dll?Portalpages&PortalPath=%2Fshared%2FPDM%20Public%20Website%2F_portal%2FPublic%20Reports&Page=Infrastructure.

equivalent to the amount of natural gas delivered to customers in a year.[38] Illinois' storage capacity is the second highest of any state in the country.

Figure 10. Natural gas consumption by sector in Illinois in 2023



Source: EIA. "Illinois State Energy Profile." Accessed February 6, 2025. Available at: https://www.eia.gov/state/print.php?sid=IL.

As mentioned above, 75 percent of households in Illinois rely on natural gas heating.[39] The residential and commercial sectors together account for half of the state's total natural gas consumption, while the other half is roughly split between the industrial sector and the power sector (see Figure 10).[40] Only 12 percent of electric generation in Illinois is natural-gas-fired, below the national average of 42 percent in 2024.[41] As in many states, natural gas consumption in Illinois peaks during winter months since buildings require more energy to heat their spaces during colder times of year.

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[38] EIA. "Illinois State Energy Profile." Accessed February 6, 2025. Available at: https://www.eia.gov/state/print.php?sid=IL.

[39] EIA. "Illinois State Energy Profile." Accessed February 6, 2025. Available at: https://www.eia.gov/state/print.php?sid=IL.

[40] EIA, "Natural Gas Consumption by End Use." Accessed January 27, 2025. Available at: https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SIL_a.htm.

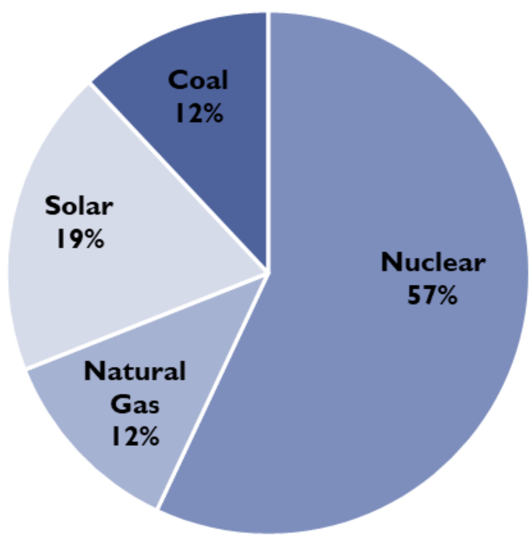
[41] EIA. "Illinois State Energy Profile." Accessed February 6, 2025. Available at: https://www.eia.gov/state/print.php?sid=IL.

3.1. Resources on the Electric Grid

Across the United States, anticipated increases in electricity demand are raising concerns about resource adequacy for the electric grid. Policymakers are scrutinizing the amount of capacity and the types of resources both on the grid and in the interconnection queues around the country to assess the capabilities and potential deficiencies of our system.

Illinois is the country's fifth largest producer of electricity, with over 45,000 MW of electric generating capacity.[42] The majority of in-state electricity generation comes from nuclear power (see Figure 11): Illinois produces more nuclear energy than any other state.[43] The remaining electricity generation comes from wind and solar (19 percent), natural gas (12 percent), and coal (12 percent). In recent years, many coal-fired generation have aged out and economically retired, and as a result coal-fired generating capacity has substantially declined, dropping from 46 percent of net generation in 2009 to 13 percent in 2024.[44] Meanwhile, the share of electricity generation from natural gas and wind has grown; in the last decade, wind generation has doubled and natural-gas-fired generation has quadrupled.[45]

Figure 11. Share of electric generation in 2024



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[42] EIA, "Illinois State Energy Profile." Accessed January 24, 2025. Available at: https://www.eia.gov/state/print.php?sid=IL#30. (net summer capacity)

[43] EIA. "Illinois State Energy Profile." Accessed February 6, 2025. Available at: https://www.eia.gov/state/print.php?sid=IL.

[44] *Id*.

[45] *Id*.

Source: EIA, Illinois State Energy Profile, accessed January 24, 2025.

In PJM, there are currently over 5 GW of generator capacity requesting to retire before 2030, and MISO is planning for as much as 129 GW of capacity retirement by 2042.[46, 47] Roughly 5 GW of coal capacity are scheduled to retire in Illinois before 2030, alongside 1.6 GW of oil and gas. This number is likely to increase as the state works toward achieving its 2050 goal of net-zero emissions from electric generating units.[48] CEJA adopts a staged approach that requires generators located near disadvantaged communities to reduce their emissions first; it requires other generators to halve their emissions by 2035 and eliminate all emissions no later than 2045.[49]

The amount and type of generating capacity that will be built to serve the future grid is partially dependent on interconnection processes and the ability for Illinois to import clean energy resources from other regions. PJM and MISO are responsible for handling all generator interconnection requests within their respective territories. All new resources looking to supply electricity to the grid must go through an interconnection review process within their respective RTO. During the review process, RTOs assess how much room is available on the grid at the point of interconnection and what upgrades might be needed to support the new resource. There is currently 290 GW of potential generating capacity in the PJM interconnection queue and 393 GW of capacity in the MISO interconnection queue that are actively under review or with a completed review. Of this total 683 MW between the two regions, 123 GW, or 18 percent of requests are projects located in Illinois.[50] Of the 123 GW of generating capacity in the queue in Illinois, almost 90 percent is made up of renewable resources including solar, wind, battery storage, and hydro power. [51] Though this is a large amount of capacity waiting in the grid, many of these resources are in early stages of the queue and many of them will never reach operation due to ongoing interconnection challenges.

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46 PJM, Generator Deactivations, accessed January 30, 2025, available at: https://www.pjm.com/planning/service-requests/gen-deactivations.

47 MISO, MISO Futures Report; Series 1A, November 1, 2023, page 55, available at: https://cdn.misoenergy.org/Series1A_Futures_Report630735.pdf.

48 Illinois Power Agency, IPA Policy Study, March 1, 2024, page 90, available at: https://ipa.illinois.gov/content/dam/soi/en/web/ipa/documents/ipa-policy-study-1-march-2024.pdf.

49 Climate and Equitable Jobs Act (CEJA), Public Act 102-0662.

50 MISO. Generator Interconnection Queue. Accessed: February 26, 2025. Available At: https://www.misoenergy.org/planning/resource-utilization/GI_Queue/; PJM. Interconnection Queue. Accessed February 26, 2025. Available at: https://www.pjm.com/planning/service-requests/serial-service-request-status.

51 MISO. Generator Interconnection Queue. Accessed: February 26, 2025. Available At: https://www.misoenergy.org/planning/resource-utilization/GI_Queue/; PJM. Interconnection Queue. Accessed February 26, 2025. Available at: https://www.pjm.com/planning/service-requests/serial-service-request-status.

3.2. Wholesale Markets

Wholesale markets in PJM and MISO consist of three key markets:

- The RTOs run **energy markets** that include day-ahead and real-time markets, to respond to near-instantaneous supply and demand fluctuations. Electricity is bought and sold based on locational marginal pricing, and it varies in price across the state and hour by hour.
- The RTOs also administer **capacity markets**, which pay generators and demand response resources for their commitment to be available during system peak periods for a 12-month period. This process ensures that there is enough generation ready and able to run when needed to satisfy demand, and it helps maintain a reliable grid across the region.
- The **ancillary services markets** in MISO and PJM help maintain grid reliability by providing essential services such as frequency regulation, reserves, and voltage control.

The wholesale markets are designed to send market signals that will cause the most cost-effective resources to be running at any hour of the day and that ensure the most necessary resources will be constructed longer-term. While the wholesale markets aim to keep resource costs as efficient as possible, both MISO and PJM have seen spikes in capacity market prices in recent years. In 2022, MISO saw a surge in capacity prices in its Midwest subregion to $236.66 per megawatt-day from $5 in 2021.[52] In response, MISO has implemented changes to the way it accredits resources it procures in the capacity market, shifted to a seasonal rather than annual auction period, and updated the way it develops its demand curve analysis that led to inadequate price signals.[53] While some sub-regions in MISO have seen lower capacity prices since 2022, parts of the region saw prices as high as $719.81 per megawatt-day for spring and fall seasons after the April 2024 auction. More recently in July 2024, PJM faced similar challenges when capacity market prices cleared at $269.92 per megawatt-day, up from $28.92 per megawatt-day in the previous auction.[54]

PJM is currently working on reforming its capacity market accreditation methodology and other components of its market structure to address this spike, while putting in place a price cap to ensure

[52] MISO. 2022/2023 Planning Resource Auction Results. Available at: https://cdn.misoenergy.org/2022%20PRA%20Results624053.pdf.

[53] Order Accepting Tariff Revisions 187 FERC ¶ 61,202 (June 27, 2014); MISO. 2024. Resource Accreditation White Paper, Version 2.4.

[54] PJM. 2024. "PJM Capacity Auction Procures Sufficient Resources to Meet RTO Reliability Requirement, Tighter Supply/Demand Balance Drives Higher Pricing Across the Region." Available at: https://insidelines.pjm.com/pjm-capacity-auction-procures-sufficient-resources-to-meet-rto-reliability-requirement/.

that prices do not increase further while reforms are ongoing.[55] Although these capacity costs are only part of the wholesale electricity price that itself is just one component of the supply charge on consumer bills, getting these reforms right and lowering capacity costs will be essential to affordability going forward. Within this market structure, the IPA plays a role with procurement of capacity on behalf of utilities.

3.3. Barriers to Interconnection

Developers across the country are facing significant barriers to interconnecting new resources to the bulk power system, and PJM and MISO are no exception. Across the country, long queues and costly grid upgrades make it challenging for new resources to come online, frequently causing developers to withdraw their requests.

Long wait times in the queue are a result of numerous lengthy studies and the growing backlog of projects looking to interconnect. All applications go through a series of feasibility studies to determine the potential impact on the grid from connecting the new resource—these studies help determine what downstream grid upgrades would be needed and the cost of these upgrades if the new resource were to come online. This process can take multiple years depending on the number of resources in the queue and the need for additional studies or restudies in special cases. In 2023, the average project in the United States took five years to make it through the queue from the application date to operation.[56] PJM and MISO both have complicated processes for affected systems studies because of complex electric grid interactions across their borders, making their queue process even longer.[57]

New interconnecting resources are responsible for paying all the necessary grid upgrade costs to accommodate the incremental load in addition to application fees. Grid upgrades can cost many millions of dollars, which can be cost-prohibitive to developers. The average overall interconnection cost in MISO, including application fees and upgrade costs, tripled from $48 per kilowatt in 2018 to $156 per kilowatt in 2021.[58]

In PJM, 45 percent of the projects submitted to the queue since 2020 have been withdrawn. In MISO, 22 percent have been withdrawn. Within the Illinois portion of PJM and MISO, 18 percent of the projects

[55] Howland, Ethan. 2025. “PJM agrees to lower price cap for upcoming capacity auctions.” *Utility Dive*. January 29. Available at: https://www.utilitydive.com/news/pjm-shapiro-pennsylvania-capacity-auction-price-cap/738591/.

[56] Lawrence Berkley National Laboratory. 2024. *Queued Up: 2024 Edition, Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2023*. Available at: https://emp.lbl.gov/sites/default/files/2024-04/Queued%20Up%202024%20Edition_R2.pdf.

[57] Wilson, John D., Seide, Richard, Gramlich, Rob, Hagerty, J. Michael. 2024. *Generator Interconnection Scorecard*. Advanced Energy United.

[58] LBNL. 2022. “Data from MISO Show Rapidly Growing Interconnection Costs.” https://emp.lbl.gov/news/data-miso-show-rapidly-growing.

submitted since 2020 have been withdrawn.[59] The time and money required to go through the interconnection process increases the risk for developers, especially impacting developers with limited budgets or experience.

3.4. Solutions to Interconnection Challenges

Reforms to address the backlog of resources in the interconnection queue are ongoing at the ISO/RTO level within both PJM and MISO, as well as at the national level. These reforms and their success are essential to addressing resource adequacy concerns and attaining Illinois' renewable energy targets.

The Federal Energy Regulatory Agency (FERC) responded to the nationwide interconnection challenges by issuing Order 2023 in July 2023, which requires RTOs to file and implement sweeping interconnection process reforms.[60] The changes include shifting from serial to cluster study processes, reduced study periods, and studying projects on a first-ready, first-served rather than first-come first-served basis. PJM requested that FERC find its 2022 reforms sufficient to comply with Order 2023. MISO was also in the process of reforming its interconnection process when Order 2023 was issued, and its compliance strategy is still being determined.[61]

In 2022, PJM enacted numerous reforms following a two-year pause in its queue. These reforms included a fast lane to address the backlog of projects that accumulated during the two-year pause, expanded commercial readiness deposit requirements and site control procedures, an expedited process to attain interconnection agreements for projects that do not require network upgrades or additional studies, and a cluster study process that addresses requests on a first-ready, first-served basis.[62]

PJM has recently enacted additional measures that go beyond the 2022 reforms. On December 13, 2024, PJM filed a proposal with FERC to establish its Resource Reliability Initiative (RRI), which has since been approved. The RRI is a one-time expansion of eligibility criteria to Transition Cluster #2—the next available cluster of projects to be studied as PJM transitions to its reformed process—that would allow up to 10 GW more resources to be studied in the cluster and move more quickly through the interconnection process.[63] This initiative is an attempt to address resource adequacy concerns in the

[59] MISO. Generator Interconnection Queue. Accessed: February 26, 2025. Available At: https://www.misoenergy.org/planning/resource-utilization/GI_Queue/.

[60] Order 2023. 184 FERC ¶ 61,054. July 28, 2023.

[61] MISO. FERC Order No. 2023: Workshop. February 21, 2024. Available at: https://cdn.misoenergy.org/20240221%20Order%202023%20Workshop%20Presentation631823.pdf.

[62] Tariff Revisions for Interconnection Process Reform, Request for Commission Action by October 3, 2022, and Request for 30-Day Comment Period. FERC ER22-2210. June 14, 2022.

[63] Order Accepting Tariff Revisions. FERC ER25-712-000. February 11, 2025, at 9.

region for the 2029/2030 delivery year. Eligibility to enter the RRI process is based on several factors, including the size and capacity of the project, the value the project provides to reliability, the project's viability, its in-service date, and its location (i.e., whether it is in a capacity- or transmission-constrained zone). Based on these criteria, gas-fired generation projects are most likely to be selected, with the potential for some battery storage projects to also be selected. These projects will come online 18 months sooner through this initiative and could constitute at least 10 GW new capacity with high reliability ratings.

RTOs are also looking to expand pathways to interconnection through surplus interconnection. This is a form of interconnection that allows additional resources to connect at the site of an existing generator and supply electricity to the grid at times when there is capacity available. A 2024 Synapse Energy Economics study calculated at least 3.5 GW of potential capacity in Illinois accessible through surplus interconnection in MISO's portion of the state's grid.[64] Surplus interconnection requires no network upgrades, and project approval typically happens in an expedited timeframe. MISO currently allows new generators to use surplus interconnection service and receive expedited approval where they connect at the same point of interconnection and do not trigger new network upgrades, and it has 4 GW of capacity in its surplus interconnection queue.[65] FERC recently accepted PJM's proposed revisions to its tariff that remove barriers to surplus interconnection and align more closely with MISO's processes.[66]

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[64] Synapse Energy Economics. 2024. *No-Regrets Solutions for Accelerating Grid Interconnection: How Fast-Track Interconnection Processes Cut Costs in SPP and MISO*. Prepared for Sun2o.

[65] Craighill, Cassidy. 2025. "Leveraging surplus interconnection could unleash 800 GW of energy the US needs today." *Utility Dive*. February 21. Available at: https://www.utilitydive.com/news/surplus-interconnection-gridlab-berkeley-report/740262/.

[66] Order Accepting Tariff Revisions. FERC ER25-712-000. February 11, 2025.

4. Transmission System Planning

Both PJM and MISO are in the process of ensuring that there is sufficient transmission capacity to meet growing electricity demand throughout Illinois, across PJM and MISO and also between transmission regions. Areas with insufficient capacity on the transmission system are likely to require expensive network upgrades to accommodate new generating resources looking to interconnect. Transmission constraints can also lead to high capacity market prices and increase congestion and curtailment of resources on the grid (thereby increasing electricity supply costs).[67] High congestion can also prevent energy from being transmitted across the grid and require generation from more expensive resources, which drives up energy prices. Both PJM and MISO highlight load growth from the development of data centers, electrification efforts from state decarbonization policies, existing transmission system constraints, and extreme weather events as key drivers behind their transmission planning efforts and consideration of grid reliability.[68]

4.1. Status of Transmission in Illinois Grids

A recent report by Americans for a Clean Energy Grid created a scorecard to evaluate various components of transmission planning across the country.[69] Overall, MISO and the Midwest received a B and PJM and the mid-Atlantic received a D+ for transmission planning. The report specifically noted that MISO North, where Illinois is located, is doing much better than the Southern part of the region and has some of the best transmission planning in the country.[70] However, both regions still face significant challenges in transmission planning and management. Across the country, congestion on the grid currently demands improved, proactive planning from grid operators. MISO's Internal Market Monitor categorized real-time congestion in the region as "significant" each year, with a record of $3.7 billion congestion costs in 2022 and nearly $2 billion in 2023. In PJM, on the other hand, total congestion costs decreased from $2.5 billion in 2022 to $1.0 billion in 2023 (a reduction of $1.5 billion or 57 percent).[71] Congestion is expected to increase in all regions without effective system planning.[72]

67 U.S. DOE, 2023. National Transmission Study. https://www.energy.gov/sites/default/files/2023-12/National%20Transmission%20Needs%20Study%20-%20Final_2023.12.1.pdf

68 PJM. 2024. *2023 Regional Transmission Expansion Plan*; MISO. 2024. *MISO Transmission Expansion Plan 2024*.

69 Americans for a Clean Energy Grid. *Transmission Planning and Development Regional Report Card*. Available at: https://www.cleanenergygrid.org/wp-content/uploads/2023/06/ACEG_Transmission_Planning_and_Development_Report_Card.pdf.

70 Americans for a Clean Energy Grid. *Transmission Planning and Development Regional Report Card*. 2023 at 76.

71 Monitoring Analytics. 2024. *2023 State of the Market Report for PJM*. 2024. Available at: https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2023/2023-som-pjm-sec11.pdf.

72 Americans for a Clean Energy Grid. *Transmission Planning and Development Regional Report Card*. 2023 at 72.

4.2. Long-Term, Holistic Solutions to Planning Needs

Both RTOs are working to develop more proactive, longer-term transmission planning processes. The aim is to holistically look at transmission challenges in the region and put plans into motion for multi-year transmission projects. If these regions do not conduct proactive planning that accounts for new generation mix, more network upgrades will be driven by generator interconnection applications. As a consequence, the interconnection processes will continue to be slow and expensive and transmission upgrades will be conducted in a more piecemeal and less efficient process.[73] PJM was developing its Long-Term Regional Transmission Planning Process (LTRTP) and an associated implementation strategy throughout 2024. The process includes scenario-based planning based on needs anticipated 15 years in the future. It seeks to develop projects that provide reliability but also other regional benefits such as production cost savings, capital investment savings, and reduced loss of load.[74] However, PJM has been criticized for lacking a proactive planning process so far, and the successes of the LTRTP remain to be seen.[75]

Meanwhile, MISO's Board approved its Long-Range Transmission Planning (LRTP) process, which will be implemented in four tranches. The first and second tranches focus on needs in the Midwest subregion, which includes Illinois; the third focuses on needs in MISO's South subregion; and the fourth focuses on challenges along the North/South interface. The first tranche, approved in 2022, contains a portfolio of 18 transmission projects worth $10.3 billion and over 2,000 miles of transmission lines. The second tranche includes a 3,631-mile 765 kV "backbone" of 24 projects and 323 facilities across the MISO Midwest subregion. The $21.8 billion projects are scheduled to go into service between 2032 to 2034.[76] The substantial investment in Illinois's subregion will greatly expand the grid's capacity and should reduce congestion in the region.[77]

Interregional planning is becoming a larger focus as regional load growth forecasts call for greater interregional transmission capabilities between regions.[78] This is especially important for Illinois, which sits in both of the largest regions in the country. PJM and MISO interregional planning so far is largely

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[73] Illinois Commerce Commission. 2024. Illinois Renewable Energy Access Plan at 43. Available at: https://www.icc.illinois.gov/informal-processes/Renewable-Energy-Access-Plan.

[74] PJM. 2024. *2023 Regional Transmission Expansion Plan* at 29.

[75] Americans for a Clean Energy Grid. *Transmission Planning and Development Regional Report Card*. Available at: https://www.cleanenergygrid.org/wp-content/uploads/2023/06/ACEG_Transmission_Planning_and_Development_Report_Card.pdf.

[76] MISO, "Long Range Transmission Planning." Available at: https://www.misoenergy.org/planning/long-range-transmission-planning/

[77] U.S. DOE, 2023. National Transmission Study at 64. https://www.energy.gov/sites/default/files/2023-12/National%20Transmission%20Needs%20Study%20-%20Final_2023.12.1.pdf.

[78] *Id*. at ix.

focused on operational reliability or short lead-time projects, such as "Targeted Market Efficiency Projects," which aim to address congestion management.[79] They have not yet collaborated to develop larger-scale projects to substantially increase transmission system capabilities, which would likely result in lower costs for consumers by enabling new generation development, improving grid reliability and resilience, and lessening grid congestion.

Grid enhancing technologies (GET) such as Ambient-Adjusted Ratings, Dynamic Line Ratings, and Emergency Ratings on transmission lines can allow the transmission system to operate to higher transmission limits and achieve substantial production costs savings. MISO's Internal Market Monitor has urged planners to accelerate efforts to implement GETs as affordable transmission solutions.[80] GETs could also have a major impact in PJM, where full utilization of GETs could enable the addition of 6.6 GW of new clean energy onto the region's grid.[81]

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[79] *Id*.

[80] MISO Independent Market Monitor. 2024. *2023 State of the Market Report for the MISO Electricity Markets*. Prepared by Potomac Economics.

[81] Mulvaney, Katie, Siegner, Katie, Teplin, Chaz, Toth, Sarah. 2024. *GETting Interconnected in PJM*. Available at: https://rmi.org/insight/analyzing-gets-as-a-tool-for-increasing-interconnection-throughput-from-pjms-queue/.

5. Data Center and Large Loads in Illinois

Data centers, other projects including quantum computing, and large-scale electrification are driving load growth in Illinois and across the country. Data centers are a rapidly growing industry, particularly with the emergence of artificial intelligence (AI). Illinois is expected to have some of the highest load growth from data centers in the United States as manufacturing and other industries are surging. Decarbonization efforts in Illinois will require the electrification of some industrial loads, as well as the use of innovative, efficient technologies.

Illinois has the fifth-highest GDP in the United States and a diverse economy.[82] The manufacturing sector employed 9.4 percent of the state's workforce and accounted for 13 percent of total gross state product in 2022.[83] At the same time, the industrial sector is also responsible for 18 percent of statewide GHG emissions.[84] Looking forward, life sciences, quantum computing, AI, and microelectronics, clean energy production, advanced manufacturing, agriculture technology and food processing, and transportation are all expected to be high-growth sectors for the state, meaning planning for their potentially increasing energy needs will be essential.[85]

As the state promulgates policies to meet its decarbonization goals, many of these industries are exploring ways to make equipment and processes more energy efficient. At the same time, many large loads will need to be electrified. The Renewable Thermal Collaborative identified the largest opportunity to reduce industrial emissions in the state by electrifying steel and wet corn milling sectors.[86] Renewable Thermal Collaborative recommended employing Hydrogen Direct Reduced Iron (H2-DRI) and Electric Arc Furnace (EAF) technology in the steel sector, and electrical rotary and ring dryer technology in the wet corn milling industry to electrify current processes. If these changes are made at scale, the state, the RTOs, and its utilities will have to accommodate the newly electrified large loads.

Illinois is a national hub for quantum computing. It is the location of four of ten of the country's quantum technology research centers, more than any other state. The state's universities also play a role in the growing industry. The University of Chicago houses Duality, the first quantum startup

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[82] Illinois Department of Commerce & Economic Opportunity, "Key Industries." Accessed February 13, 2025 at: https://dceo.illinois.gov/whyillinois/keyindustries.html.

[83] Global Efficiency Intelligence. 2023. *Industrial Electrification Factsheet: Illinois.* Available at: https://gei-efficiency.squarespace.com/s/Illinois-Industrial-Electrification-Factsheet.pdf.

[84] *Id*.

[85] Illinois Department of Commerce & Economic Opportunity. 2024. *Open for Business: Illinois' 2024 Economic Growth Plan* at 8-9.

[86] Global Efficiency Intelligence. 2023. *Industrial Electrification Factsheet: Illinois*. Available at: https://gei-efficiency.squarespace.com/s/Illinois-Industrial-Electrification-Factsheet.pdf.

accelerator and leads the Chicago Quantum Exchange, the largest university-led quantum initiative in the United States.[87]

The Illinois Department of Commerce and Economic Opportunity has been actively working to attract data centers through its Data Center Investment Program, which has already seen results. Created in 2019, the program creates several tax exemptions under state and local tax laws and incentives for data center owners and provides a tax credit of 20 percent of wages paid for construction workers for projects located in underserved areas.[88] The exemptions last up to 20 years with certifications issued every 5 years. To be eligible for the exemptions, new and existing data centers and their tenants must collectively make a capital investment of at least $250 million over 60 months, create at least 20 full-time jobs associated with operations and maintenance of the data center (at least 120 percent of the median county wage), and be carbon neutral or attain green building standard certification.[89] The Department had already entered into MOUs and issued tax exemption certificates with 21 data center owners or operators as of December 31, 2023. These MOUs are worth $465 million in reported tax exemption value.[90]

Data centers, AI, and quantum computing have the potential to cause large load increases, which requires thoughtful coordination and planning. In 2023, data center load in Illinois was 7 million MWh per year and made up 6 percent of electricity consumed in the state. This is expected to increase rapidly in the next few years, with low-growth scenarios estimating 9.6 million MWh per year and high-growth scenarios estimating 220 million MWh per year.[91] The only states with higher data center loads than Illinois in 2023 were Virginia, Texas, and California with 34 million MWh per year, 22 million MWh per year, and 9 million MWh per year, respectively.

Synapse examined three possible data center load growth scenarios–high, medium and low–based on market trends and industry reports (explored further below in our Data Center Load section). In the low-growth scenario, data center load growth increases to 20 TWh by 2050, compared to 103 TWh in the medium scenario, and 322 TWh in the high scenario.

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[87] Illinois Department of Commerce & Economic Opportunity. 2024. *Open for Business: Illinois' 2024 Economic Growth Plan* at 26.

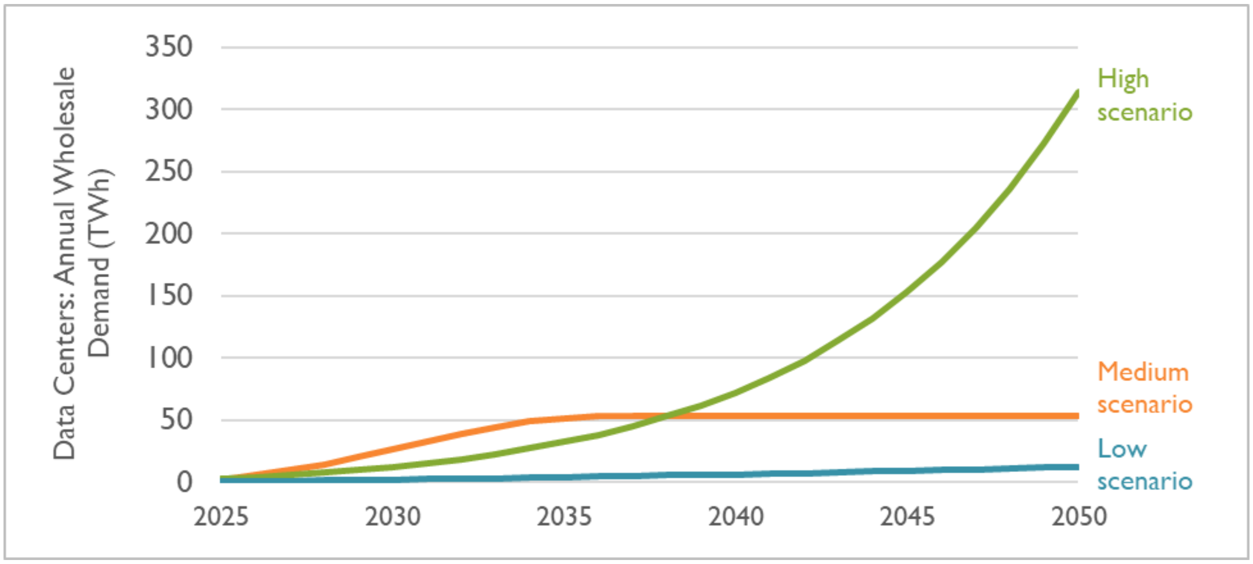
[88] Illinois Department of Commerce & Economic Opportunity, "Data Center Investment Tax Exemptions and Credits." Accessed February 13, 2025: https://dceo.illinois.gov/expandrelocate/incentives/datacenters.html

[89] *Id*.

[90] *Id*.

[91] Electric Power Research Institute (EPRI). 2024. *Powering Intelligence: Analyzing Artificial Intelligence and Data Center Energy Consumption*.

Figure 12. Data center load growth forecast for Illinois



Policymakers and system planners are strategizing and preparing for additional data center load. Goldman Sachs estimates that renewables could meet just 40 percent of data center power demand growth through 2030, with natural gas needed to meet the remainder of the demand. [92] Goldman Sachs also predicts a large increase in nuclear energy in the 2030s to meet continued data center demand. PJM is working to accelerate new generator interconnection and bring more resources online as one part of the solution to address resource adequacy concerns.[93]

Policymakers and planners are working together to explore additional ways to ensure that new large loads can be added to the system, for several different types of electrical configurations. FERC held a technical conference on co-located load and data center issues in November 2024, diving into co-location as one possible solution. In February 2025, FERC instituted a show-cause proceeding, ordering PJM and PJM Transmission Owners to review issues associated with the co-location of large loads and data centers given the large number of proceedings arising in PJM related to this issue.[94]

Part of what makes data center load so difficult to accommodate is its lack of flexibility, as these centers have historically tended to have utilization factors exceeding 86 percent.[95] However, some research suggests that data centers could evolve to have more demand flexibility, or new types of data centers

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[92] Goldman Sachs. 2024. AI/Data Centers' Global Power Surge: The push for the 'Green' data center and investment implications at 12.

[93] *See* Order Accepting Tariff Revisions. FERC ER25-712-000. February 11, 2025, at 9.

[94] Order Instituting Proceeding Under Section 206 of the Federal Power Act and Consolidating with Other Proceedings. FERC EL25-20-000 (consolidated). February 20, 2025.

[95] E3. *Load Growth Is Here to Stay, but Are Data Centers?* July 2024. Available at https://www.ethree.com/wp-content/uploads/2024/07/E3-White-Paper-2024-Load-Growth-Is-Here-to-Stay-but-Are-Data-Centers-2.pdf.

with more varied use could develop. Lithium-ion battery storage could provide backup to the IT infrastructure for some facilities, instead of diesel generators. Some workloads associated with data centers, such as AI training, do not need uninterrupted power. Increased flexibility of the IT infrastructure and energy behind data centers could create more flexible data center loads and reduce the need for new resources and transmission investment on the grid. Additional changes could help data centers run more efficiently, such as using EnergyStar certified servers, which consume 30 percent less energy than a standard server, saving on average more than 650 kWh per year.[96] Furthermore, AI technology is still relatively new and has the potential to become more energy efficient as it continues to develop. In January 2025, Chinese company DeepSeek's AI model was reported to require a fraction of the energy use of other AI models, while achieving the same results.[97]

Ultimately, data center load is difficult to forecast given the lack of historical information as well as the continuously shifting industry developments that will impact the industry's growth and centers' energy needs. Regional and state regulators will be monitoring this closely as changes could substantially shift forecasts.

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[96] Wells Fargo. 2024. "Powering Tomorrow: The Sustainability Imperative for Data Centers."

[97] Ma, Michelle, Chediak, Mark. "DeepSeek's AI Model Just Upended the White-Hot US Power Market." *Bloomberg News* (January 28, 2025).

6. Federal Incentives for Illinois

Illinois can and does leverage federal funds to try to achieve its policies and targets for the energy system, while making solutions more cost-effective for the state's stakeholders. Under the Biden administration, hundreds of billions of dollars were authorized to support regional, state, and local initiatives to support an equitable clean energy transition and build up American energy infrastructure. The Infrastructure Investment and Jobs Act (IIJA) was passed in 2021 and provided extensive funding to develop clean energy infrastructure, energy efficiency solutions, research hubs, and resilience measures.[98] The Inflation Reduction Act (IRA) passed in 2022, created incentives for clean energy and energy efficiency, EV tax credits, environmental justice funding, and a Greenhouse Gas Reduction Fund.[99]

Illinois has been able to benefit from the federal Greenhouse Gas Reduction Fund, in particular. The Climate Pollution Grant program, part of that fund, is in place to help states, localities, and tribes to reduce emissions and pollution.[100] In July 2025 of 2024, the US Environmental Protection Agency (EPA) announced a $430 million grant for the state of Illinois to support measures targeting decarbonization, freight electrification, climate-smart agriculture, and renewable energy.[101]

In April 2024, the U.S. EPA selected Illinois for $156 million Solar for All grant, also part of the Greenhouse Gas Reduction Fund, to expand existing solar programs and increase solar adoption rates. Illinois can use this funding to build on its existing state program Illinois Shines, which targets solar access and affordability, as well as job creation.[102]

The future of many of these incentives and funds under both the IIJA and IRA are uncertain under the new administration. On January 20, 2025, the Trump administration issued an Executive Order "Unleashing Power" that placed a freeze on this funding, pending a review to assess their alignment with new federal policies.[103] It is still unclear exactly which provisions will be affected. The above-

98 IIJA, P.L. 117-58 (2021)

99 IRA, P.L. 117-169 (2022)

100 U.S. EPA, "Climate Pollution Reduction Grants." Accessed February 13, 2025: https://www.epa.gov/inflation-reduction-act/climate-pollution-reduction-grants.

101 U.S. EPA, "EPA Announces More Than $430 Million to Illinois for Community-Driven Solutions to Cut Climate Pollution." July 22, 2024. Available at: https://www.epa.gov/newsreleases/epa-announces-more-430-million-illinois-community-driven-solutions-cut-climate.

102 State of Illinois, "Governor Pritzker Announces $156 Million Federal Grant to Support Solar Power Development." April 23, 2024. Available at: https://gov-pritzker-newsroom.prezly.com/governor-pritzker-announces-156-million-federal-grant-to-support-solar-power-development.

103 U.S. White House, "Executive Order: Unleashing American Energy." January 20. 2025.

mentioned grants for the state of Illinois and other already awarded and contracted funds likely cannot or will not be clawed back. However, the tax credits and unallocated funds are at greater risk of being made unavailable.

7. ILLINOIS ENERGY LOAD FORECASTS

7.1. Electricity Load Forecasts

Evolving consumer energy trends in Illinois–such as the rapid adoption of EVs, increased deployment of heat pumps, and the expansion of commercial-scale data centers discussed in previous sections—suggest that future demand for electricity is expected to grow beyond current levels. Understanding these shifts is critical for ensuring a reliable and resilient energy system. Load forecasting plays a vital role in projecting future electricity needs to support policy decisions and inform infrastructure planning to anticipate the impact of these changes. Our load forecast covers the following components for the study period of 2025 to 2050:

- Conventional load: This is a projection of energy consumption (in TWh) related to traditional electric end uses. ComEd's projections are based on data provided in PJM's 2025 load forecast.[104] Projections for Ameren and MidAmerican are based on a 2023 forecast from MISO.[105] This category is inclusive of historical energy efficiency measures installed through 2023 but does not include any energy efficiency installed in 2024 or later years. It also does not include impacts from any of the other load categories discussed below.

- Data center load: This is a projection of load growth (in TWh) from data centers that the three utilities may face in the future. Given the uncertainty in making a projection for this component, we create high-, medium-, and low-load growth scenarios. The medium-load growth scenario reflects data center load from PJM's 2025 Load Forecast.[106] High- and low-load scenarios are based on other projections for data center growth in a 2024 Electric Power Research Institute study.[107]

[104] PJM 2025 Load forecast. Available at https://www.pjm.com/planning/resource-adequacy-planning/load-forecast-dev-process.

[105] Total retail energy sales from EIA 861 (2023) for Ameren and MidAmerican were used as a baseline, and MISO Load Zone 4 (LRZ4) compounded annual growth rate (CAGR) was applied to project future load for both utilities. MISO LRZ4 includes Ameren Illinois and two other local balancing authorities. Although MidAmerican is not in LRZ4 (but in LRZ3), the CAGR of MISO LRZ4 was applied as a proxy growth rate for MidAmerican. https://cdn.misoenergy.org/20230428%20LRTP%20Workshop%20Item%2003b%20All%20Futures%20Load%20Forecast%20Summary%20(MISO)628685.xlsx.

[106] PJM 2025 Load forecast. Available at https://www.pjm.com/planning/resource-adequacy-planning/load-forecast-dev-process.

[107] Electric Power Research Institute (EPRI). Powering Intelligence; Analyzing Artificial Intelligence and Data Center Energy Consumption. May 2024. Available at https://www.epri.com/research/products/3002028905.

- Industrial electrification: This is a projection of electricity demand (in TWh) from decarbonization efforts that could be made in the industrial sector. Using projections based on Energy Innovation's Energy Policy Simulator, we created low, medium, and high trajectories that describe three different possible futures for electrification in this sector.[108] Our low scenario assumes no incremental industrial electrification. Our medium case assumes that 70 percent of low-temperature end uses are able to be electrified by 2050, with 10–20 percent of high- and medium-temperature end uses able to be electrified by the same date. Our high case assumes that 90 percent of low-temperature end uses are able to be electrified by 2050, with 70–80 percent of high- and medium-temperature end uses able to be electrified by the same date.

- Energy efficiency: This is a projection of energy savings (in TWh) from programmatic energy efficiency measures for 2025 and later years. We used U.S. EPA's Energy Savings and Impacts Scenario Tool (ESIST) to evaluate the projected energy savings across high, medium, and low annual savings levels.[109] Our medium scenario assumes the three utilities achieve their target cumulative persistent annual savings set as per the energy efficiency statute under Section 8-103B, while the low and high scenarios explore "bookend" scenarios where Illinois utilities either match the level of savings achieved by leading utilities in other states, or cease implementing energy efficiency altogether.[110]

- Transportation electrification: This is a projection of electricity demand from transportation electrification. Using Synapse's EV-REDI model, we forecasted three futures of EV adoption.[111] We assumed 100 percent EV sales by 2035 for the high scenario, while the medium scenario assumes 1 million EVs on the road by 2030. The low scenario reflects a business-as-usual case following current EV adoption trends in the state.

- Building electrification: This is a projection of electricity demand (in TWh) from building electrification, specifically heat pump adoption in the residential and commercial space and water heating. Using Synapse's in-house Building Decarbonization Calculator tool (BDC), we modeled high, medium, and low building electrification scenarios.[112] The low case assumes a like-for-like system replacement with very modest heat pump

[108] Energy Policy Simulator (EPS). Energy Innovation. Accessed March 2025. Available at https://energypolicy.solutions/simulator/illinois/en.

[109] U.S. EPA. *Energy Savings and Impacts Scenario Tool (ESIST)*. Available at https://www.epa.gov/statelocalenergy/energy-savings-and-impacts-scenario-tool-esist.

[110] Section 8-103B. Energy efficiency and demand-response measures. Available at https://www.ilga.gov/legislation/ilcs/documents/022000050K8-103B.htm.

[111] For more on Synapse's EV-REDI, see https://www.synapse-energy.com/project/ev-redi-electric-vehicle-regional-emissions-and-demand-impacts-tool.

[112] For more on Synapse's Building Decarbonization Calculator (BDC), see https://www.synapse-energy.com/tools/building-decarbonization-calculator.

deployment in the state. The medium case projects a scenario where 100 percent of all heating system sales are heat pumps by 2050. The high scenario assumes 100 percent of all building stock will be replaced by heat pumps by 2050.

Aggregated Load

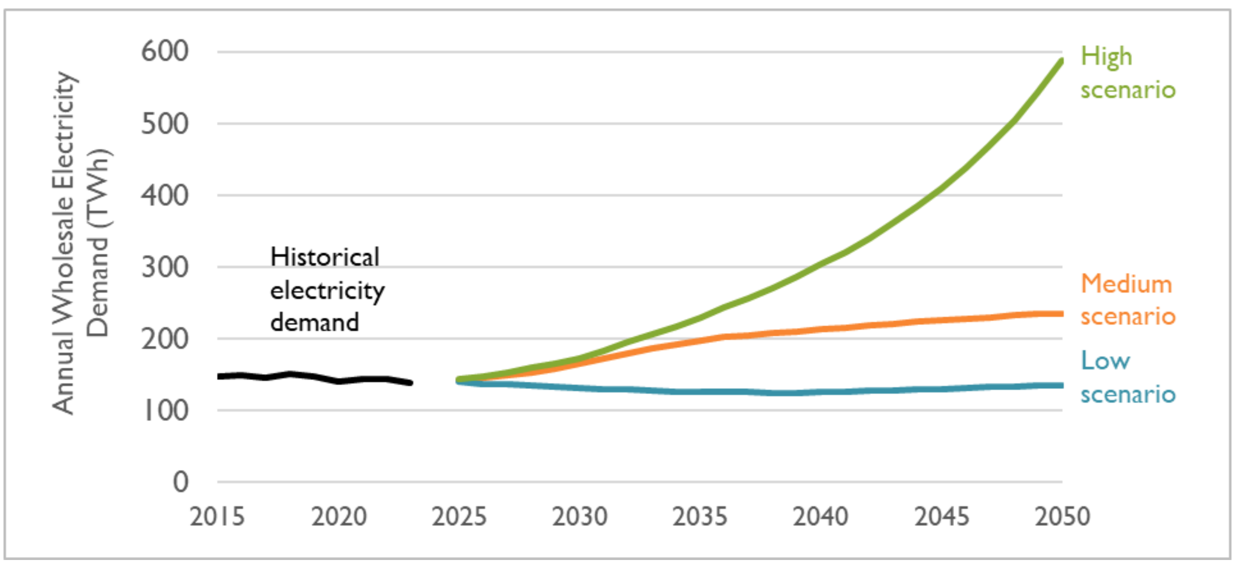
Figure 13 displays the aggregate impacts of all components on load.

In the low scenario, as a result of increased levels of energy efficiency (which offsets minor load growth from data centers, transportation electrification, and conventional load), 2050 load falls by 2 percent, relative to the recent past.

In the medium scenario, load grows by 97 TWh by 2050, an increase of 70 percent relative to the recent past. This increase is primarily driven by increasing loads from data centers, as well as increasing loads from EVs and heat pumps. Based on data in the latest PJM forecast, data center load increases are projected to slow in the mid-2030s, causing growth in this medium scenario to slow in years following this period.

In the high scenario, load grows by over 450 TWh by 2050, an increase of over 320 percent relative to the recent past. Data centers drive the vast majority (greater than 70 percent) of load growth in this scenario.

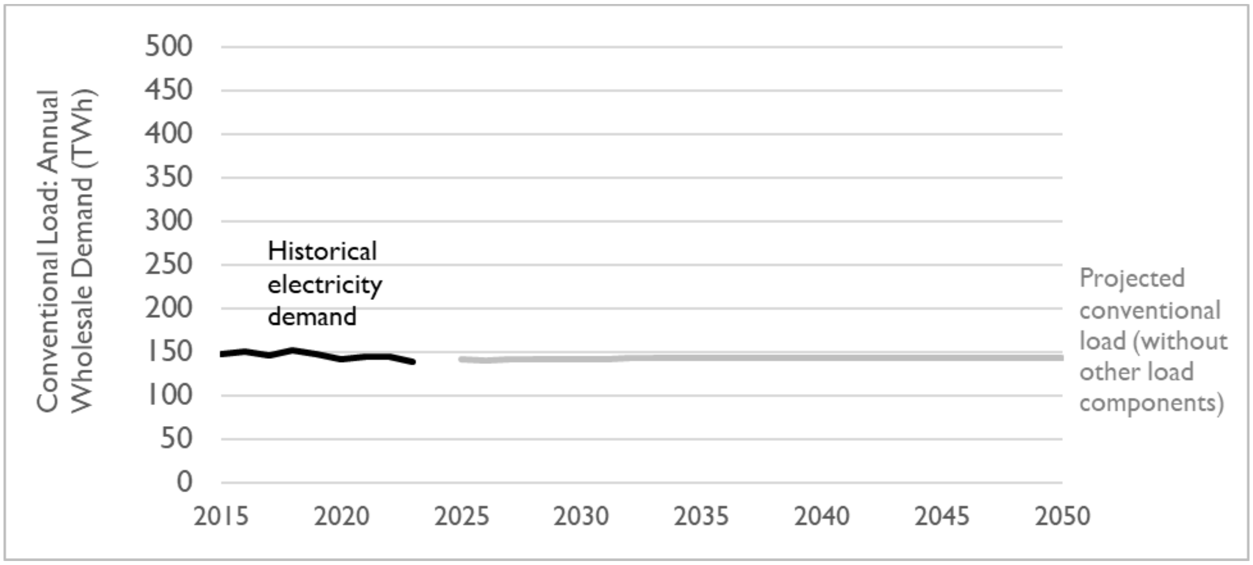
Figure 13. Projected electricity demand in low, medium, and high scenarios



Conventional Load

The conventional load forecast includes impacts from "traditional" electric end uses and excludes data center load, transportation and building electrification, and energy efficient measures installed as a result of utility-led programs. In February 2025, PJM released its annual load forecast for each PJM load zone.[113] The forecast is based on a multivariable regression model to estimate hourly peak load for each PJM zone. The model integrates electrical end-use trends, anticipated economic growth, and demographic activity, as well as historical weather patterns to estimate growth in energy use.[114] PJM's 2025 forecast was used for ComEd's conventional load projections, as well as for all other (small) Illinois utilities in the PJM region. For Ameren and MidAmerican, recent load forecasts for MISO Load Zone 4 (LRZ4) were used to project future load for both utilities, as well as all other utilities in the MISO region. Based on this forecast, annual conventional load in the state of Illinois is projected to remain flat at about 140 TWh over the study period (see Figure 14).

Figure 14. Projected load forecast for wholesale, conventional load



Note: Projected load does not include impacts from additional energy efficiency past 2023, building electrification, transportation electrification, or historical and future data center load.

Data Center Load

As a result of the rise in cloud computing and AI, the rapid expansion of data centers is becoming a key driver of electricity demand growth across the country. Since data centers have now become one of fastest-growing load segments in the United States, understanding the trajectory of data center growth is essential for state planners and utilities. We examine three possible data center load growth scenarios (high, medium and low) based on market trends and industry reports.

- Low scenario: This scenario is based on the "low-growth scenario" in EPRI's 2024 study. EPRI reports that 7 TWh of Illinois' electricity demand was from data centers in 2023. In

[113] PJM 2025 Load forecast. Available at https://www.pjm.com/planning/resource-adequacy-planning/load-forecast-dev-process.

[114] Load Forecasting and Analysis. Available at https://www.pjm.com/-/media/DotCom/documents/manuals/m19.pdf.

the study's "low-growth scenario," EPRI projects data center load to grow to 10 TWh by 2030, representing a compound annual growth rate (CAGR) of 3.7. EPRI's 3.7 percent annual growth rate in its "low-growth scenario" was based upon a Statista projection of data center financial growth issued prior to the release of ChatGPT.[115] We extrapolated the growth rate of EPRI's "low-load growth scenario" to develop a forecast through the remainder of the study period, with data center load reaching 20 TWh in 2050 (see Figure 15).[116]

- Medium scenario: This scenario is based on PJM's 2025 preliminary load forecast of data center load growth in ComEd's territory.[117] The forecast projects ComEd's data center load to reach 18 TWh by 2030, which doubles to 36 TWh by 2039. By 2050, data center load reaches 72 TWh in ComEd alone. We extrapolate this growth rate to the other two major electric utilities based on the utility's historical share of commercial retail sales in Illinois, resulting in a projected 103 TWh from Illinois data centers by 2050.
- High scenario: This scenario is derived from the "higher-growth scenario" in EPRI's study with a CAGR from 2023–2030 of 15 percent. EPRI derives the annual growth rate in its "higher-growth scenario" from an assessment developed by an expert commissioned by EPRI that is consistent with the rapid expansion of AI applications and limited efficiency gain.[118] In the "higher-growth scenario," EPRI's study projects that Illinois data center load could reach almost 20 TWh by

[115] Electric Power Research Institute (EPRI). Powering Intelligence; Analyzing Artificial Intelligence and Data Center Energy Consumption. May 2024. Available at https://www.epri.com/research/products/3002028905.

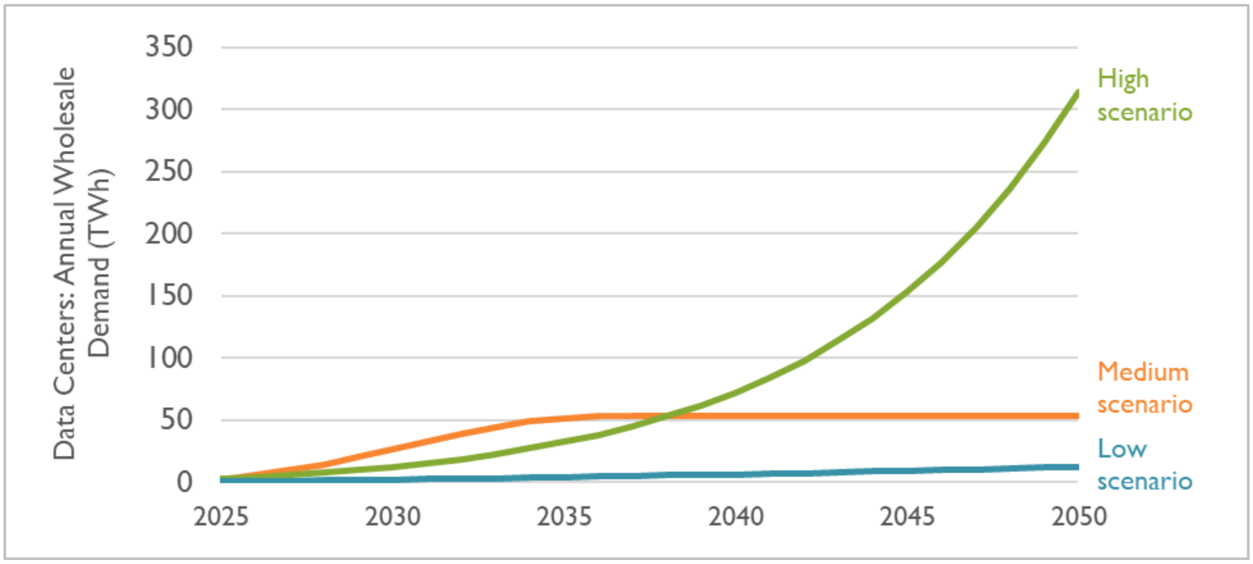
[116] This is a rapidly changing field; in late January Chinese startup DeepSeek, unveiled its open-source AI model reported to use just a fraction of the energy (as little as 10 percent) of its American AI counterparts. If this level of electricity use can be replicated for other machine-learning processes, it can have dramatic implications on future electricity needs related to data centers. See Baker, D. Will Wade, Sing Yee Ong. "DeepSeek hits energy-related business share prices and growth outlook." *Financial Post.* January 2025. Available at https://financialpost.com/investing/deepseek-reveals-how-badly-energy-industry-needs-ai-for-growth#:~:text=That%20became%20clear%20the%20moment,natural%20gas%20pipeline%20operators%20alike.

[117] Mooney, M. 2025 Preliminary PJM Load Forecast. December 9, 2024. Available at https://www.pjm.com/-/media/DotCom/committees-groups/subcommittees/las/2024/20241209/20241209-item-03---2025-preliminary-pjm-load-forecast.ashx

[118] Electric Power Research Institute (EPRI). Powering Intelligence; Analyzing Artificial Intelligence and Data Center Energy Consumption. May 2024. Available https://www.epri.com/research/products/3002028905.

2030. Extrapolating this same growth rate through the remainder of the study period yields 322 TWh data center load by 2050.

Figure 15. Data center load growth forecast for Illinois



Industrial Electrification

As a result of decarbonization policies, many industrial customers in Illinois and in other states are evaluating a transition to electricity as a primary energy source. While technologies for successfully electrifying some high-temperature energy uses are in their nascent stages, the majority of industrial end uses in Illinois utilize low- or medium-temperature processes, which can be readily electrified.[119] We examine three possible data center load growth scenarios –high, medium and low) based on market trends and industry reports.

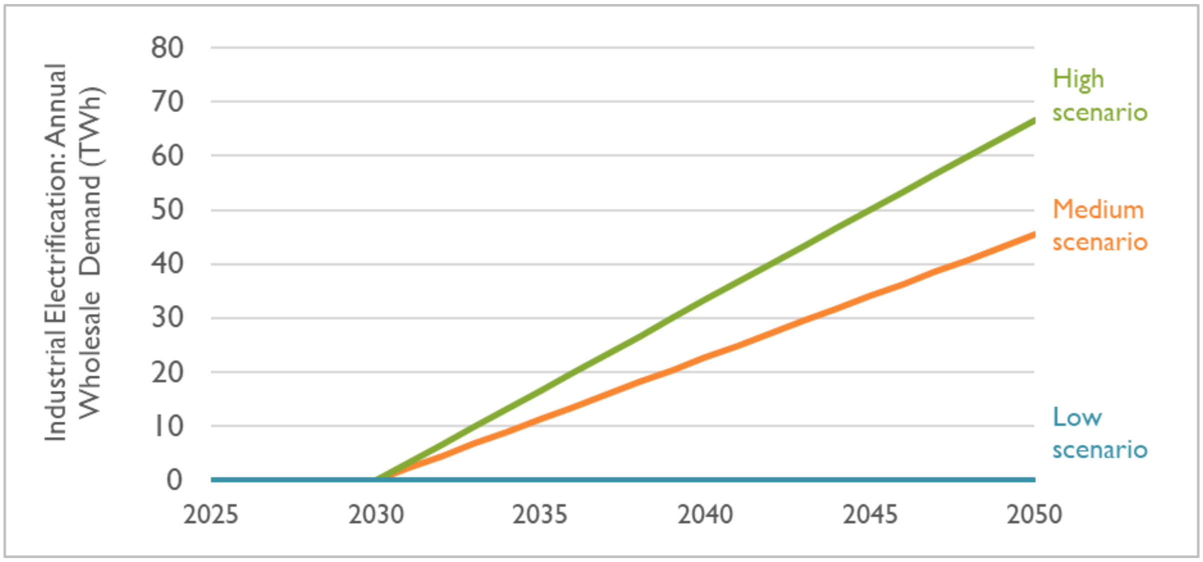
- Low scenario: This scenario assumes no increase in the quantity of industrial electrification (see Figure 16).
- Medium scenario: This scenario assumes a moderate amount of industrial electrification from low-temperature industrial processes by 2050, and smaller quantities of medium- and high-temperature being electrified by the same year. This is in line with expectations about existing available technologies and cost-competitiveness for these

[119] Energy Policy Simulator (EPS). Energy Innovation. Accessed March 2025. Available at https://energypolicy.solutions/simulator/illinois/en.

technologies.[120] All electrification trajectories are assumed to begin in 2031 and proceed on a linear trend.

- High scenario: This scenario assumes a higher quantity of industrial electrification from low-temperature industrial processes by 2050, and moderate quantities of medium- and high-temperature processes being electrified by the same year. This is in line with more ambitious expectations about future technologies and cost-competitiveness for these technologies. All electrification trajectories are assumed to begin in 2031 and proceed on a linear trend.

Figure 16. Industrial electrification growth forecast for Illinois



Energy Efficiency

Energy efficiency plays a crucial role in shaping Illinois's future electricity demand by reducing overall consumption through improved technologies, building upgrades, and demand-side management programs. Energy efficiency measures help offset growing electricity needs from energy end uses. Incorporating energy efficiency into load forecasting ensures a more accurate projection of future demand. The high, medium, and low scenarios look at different levels of energy efficiency implementation in Illinois in terms of net cumulative energy savings achieved.[121]

- High scenario: This scenario assumes no new energy efficiency measures are implemented after 2024. In this case, savings only come from previously installed energy efficiency measures, and as those measures reach the end of their lifespans,

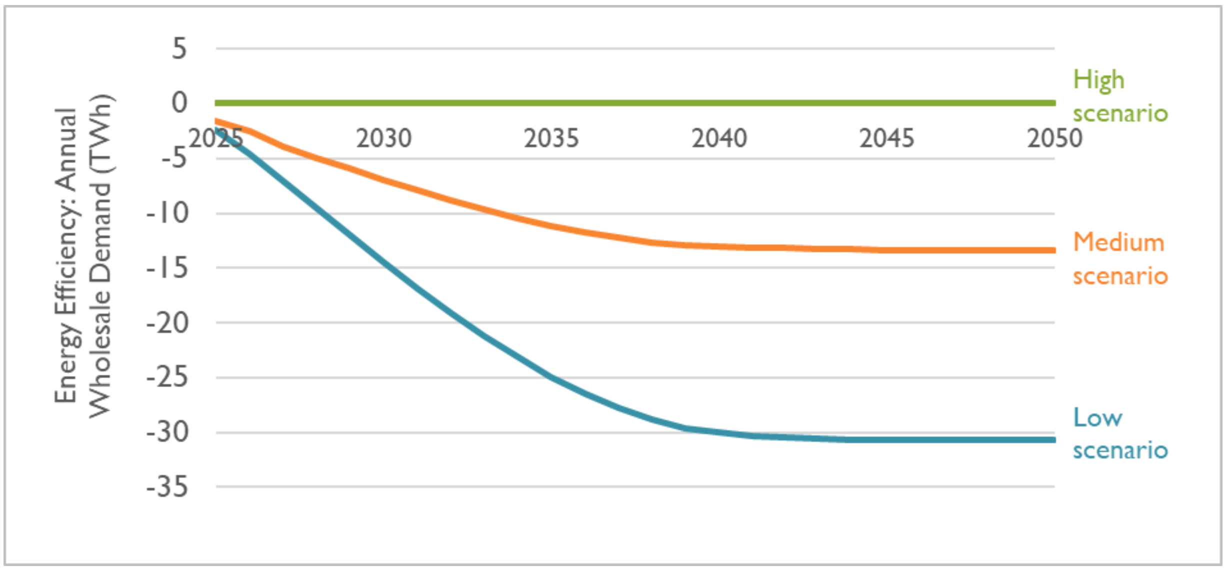
[120] *Utility Engagement Playbook for Industrial Customers*. Synapse Energy Economics. December 2024. Available at https://www.synapse-energy.com/utility-engagement-playbook-industrial-customers.

[121] Net cumulative savings are the sum total of new and persisting savings in a given year, net of expired savings.

their impact on reducing load gradually declines. Annual energy efficiency savings of 11 TWh in 2030 fall to 0.1 TWh by 2050. Electricity impacts of this scenario are assumed to also be represented in the "Conventional Load" projection, and are therefore assumed to be zero in this component. This scenario is the "High" scenario because it leads to the highest level of electricity sales.

- Medium scenario: This scenario assumes that utilities fulfill state set energy efficiency savings targets and maintain its first-year annual savings with no increase or decrease past 2030. In this scenario, energy efficiency savings total 13 TWh by 2050.
- Low scenario: In this scenario, aggressive policies and technological advancements would drive substantial energy savings. This scenario posits Illinois utilities as ramping up their energy efficiency levels to match those utilities found in leading states, achieving 2 percent first-year savings every year 2026 onwards. In the absence of more specific data, we assume that energy efficiency savings for 2024 and 2025 will remain consistent with recent historical trends. On this trajectory, energy efficiency would reduce energy demand by 29 TWh in 2050. This scenario is the "Low" scenario because it leads to the lowest level of electricity sales.

Figure 17. Net cumulative savings projections from energy efficiency measures



Transportation Electrification

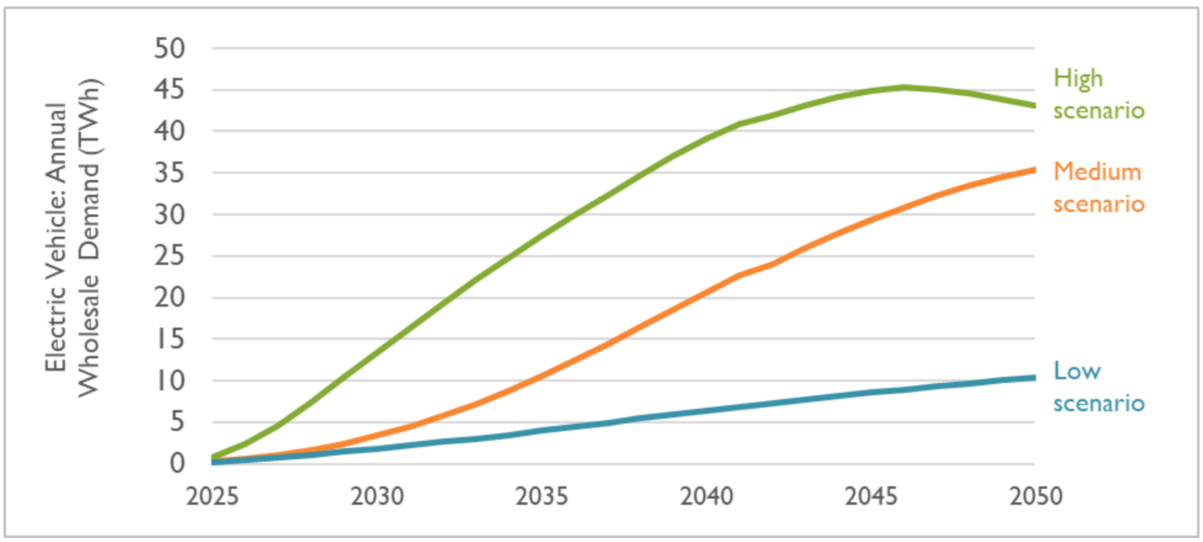
As a result of state policies and changing economics, EVs are being sold in increasingly high numbers. Electrification of light-duty vehicles, medium-duty vehicles, heavy-duty vehicles, and buses all lead to increasing usage of the grid. We examined three possible load growth scenarios (high, medium and low) based on different policy assumptions.

- Low scenario: This scenario assumes that sales of EVs proceed at the same rate of increase as observed in recent historical years. In other years, more and more EVs of all varieties (light-duty vehicles, medium-duty vehicles, heavy-duty vehicles, and buses) are sold each year, but the rate of increase is not assumed to accelerate. By 2050, this trajectory leads to 37 percent of all light-duty vehicles in Illinois being electric. This scenario leads to an additional 10 TWh of wholesale electricity in Illinois by 2050.

- Medium scenario: This scenario assumes that Illinois meets its EV sales goals as laid out in CEJA. This leads to one million light-duty EVs on the grid by 2030, and a proportional number of additions of other electric vehicles (medium-duty vehicles, heavy-duty vehicles, and buses). Meeting this one-million-by-2030 trajectory necessitates an acceleration of EV sales, which we assumed progresses along a standard technology adoption curve. By 2050, this trajectory leads to 92 percent of all vehicles in Illinois being electric. This scenario leads to an additional 35 TWh of wholesale electricity in Illinois by 2050.

- High scenario: This scenario assumes that Illinois pursues an even more aggressive set of policies towards EVs than the ones laid out in CEJA. In particular we assumed that Illinois adopts the additional standards for EVs already in place in California and other states: Advanced Clean Cars II, Advanced Clean Trucks, and Heavy-Duty Omnibus. In our modeling, this is rendered as a complete switchover to EV-only sales by 2035. By 2050, this trajectory leads to 99 percent of all vehicles in Illinois being electric. This scenario leads to an additional 43 TWh of wholesale electricity in Illinois by 2050. In this scenario, we observe electricity demand from EVs falling from the mid-2040s to 2050. This trend is caused by projected decreases in state population (which leads to fewer cars on the road), as well as projected increasing efficiencies of EVs.

Figure 18. Electric vehicle load growth forecast for Illinois



Building Electrification

Building electrification may be a substantial source of load growth in the future with buildings shifting from fossil-fuel-based heating and appliances to electric alternatives, primarily heat pumps for space and water heating. Policies such as CEJA and utility incentives are accelerating electrification efforts. We projected three different building electrification trajectories comprising four categories of end uses:

residential space heating, residential water heating, commercial space heating, and commercial water heating.[122]

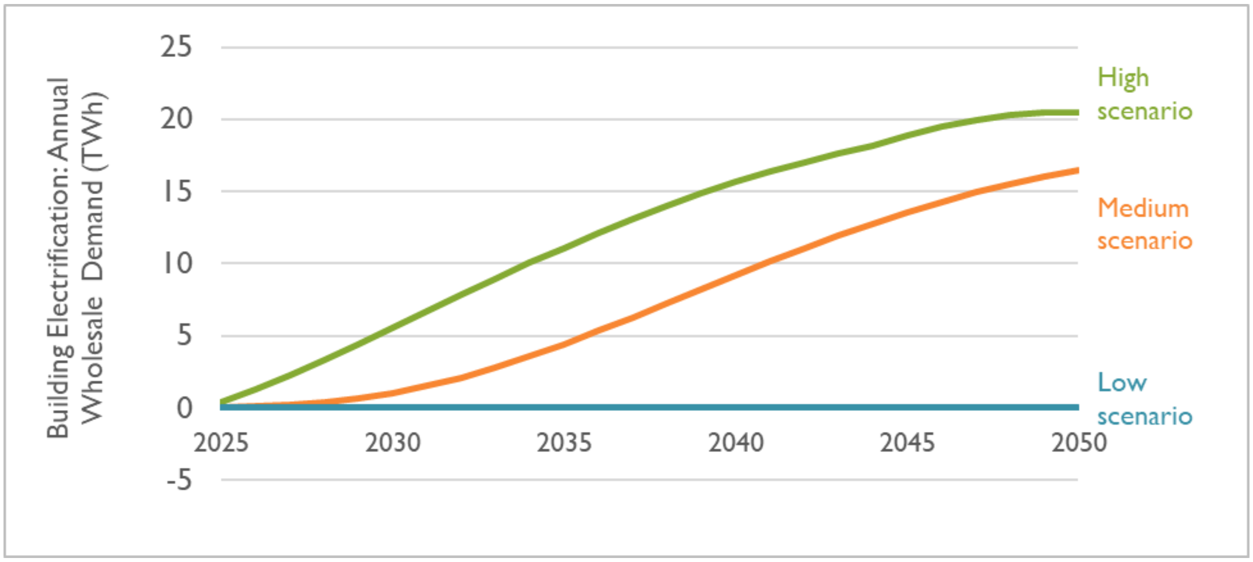
- Low building electrification scenario: This scenario represents a like-for-like replacement approach, where fossil-fuel-based (natural gas, propane, fuel oil) and electric resistance heating systems are replaced with similar technologies as they reach the end of their lifespan. In this scenario, natural gas remains dominant as a heating fuel. By 2050 in a low electrification scenario, fossil fuel systems make up 75 percent of total stock in Illinois followed by electric resistance with 14 percent. Heat pumps make up only 10 percent of stock by the end of the study period. Electricity impacts of this scenario are assumed to also be represented in the "Conventional Load" projection and are therefore assumed to be zero in this component.

- Medium building electrification scenario: In this scenario, heat pump adoption accelerates, with 100 percent of new heating system sales being all-electric heat pumps by 2050. This transition significantly reduces reliance on fossil-fuel-based heating systems over time, as older systems are gradually phased out. In this scenario, heat pumps make up 77 percent of total stock by 2050 followed by fossil fuel systems which make up 19 percent of total stock.

- High building electrification scenario: This scenario envisions a rapid transition where the entire building stock is electrified by 2050. This means that 100 percent of all heating system sales must be heat pumps as early as 2030. This advanced adoption scenario also means that fossil-fuel-based heating systems must face early replacement by heat pumps before the end of their typical lifespan starting 2045 to reach 100 percent heat pump stock by 2050. By 2050, heat pumps make up 98 percent of total heating stock. The remaining 2 percent is made up by electric resistance systems.

[122] We performed all analyses using Synapse's Building Decarbonization Calculator. For more on this tool, see https://www.synapse-energy.com/tools/building-decarbonization-calculator.

Figure 19. Electricity consumption (TWh) from building electrification



7.2. Illinois Gas Consumption Forecast

The same evolving customer trends that impact future electricity consumption in Illinois are likely to impact gas consumption trends. As with the electric power sector, we developed a set of low, medium, and high projections for natural gas based on analysis of individual customer sector components.

Figure 20 illustrates the aggregate impact of these projections. We observed:

- In the low scenario, gas consumption falls to near-zero levels by 2050. This is driven by decreasing demand in the residential, commercial sectors, and industrial sectors resulting from increased levels of heat pump deployment assumed in the high scenarios for building and industrial electrification described above. At the same time, this scenario assumes a phase-out of gas use in the electric sector in order to align with CEJA's goals of 100 percent clean energy by 2050.[123]

- In the medium scenario, gas consumption falls to levels of about 400 Bcf in 2050, a decrease of almost 60 percent compared to recent historical levels. This decrease is also primarily driven by the heat pump deployment trajectory assumed in the medium scenarios for building and industrial electrification described above. At the same time, this scenario assumes that gas consumption for electric power generation remains constant through 2050.

- In the high scenario, gas consumption increases by over 400 Bcf by 2050, an increase of over 35 percent. In this scenario, residential and commercial gas consumption follows the trends implied by heat pump deployment in the low scenario for building electrification described above. In other words, gas consumption follows a like-fuel-for-like fuel replacement of heating end uses, with equipment becoming more efficient over time. At the same time, this scenario assumes that the share of gas generation in the electric power sector remains constant through 2050, and that the quantity of gas used in industrial processes also remains constant through 2050.

[123] Our analysis does not account for any power sector modeling that would provide more detailed insight into future gas consumption trends in the electric power sector. Our analysis also considers gas consumption by small sectors constituting less than 2 percent of today's natural gas use in Illinois.

Figure 20. Projected natural gas consumption in low, medium, and high scenarios