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2025 Resource Adequacy Study

Executive Summary

Submitted to the Illinois General Assembly.

Prepared in accordance with the
Illinois Environmental Protection Act
(415 ILCS 5/9.15(o)).

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

IPA
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Executive Summary

The Climate and Equitable Jobs Act (CEJA) was passed by the Illinois General Assembly and signed into law by Governor Pritzker as Public Act 102-0662 on September 15, 2021. CEJA established a series of important changes to Illinois energy policy, including an overhaul to the Illinois Renewable Portfolio Standard (RPS), creation of a statewide policy target of 100% clean energy by 2050, targeted reduction of greenhouse gas (GHG) emissions from fossil generation facilities, incentives to promote electric vehicle adoption and reduce transportation sector fuel emissions, support for at-risk zero emission nuclear plants, financial support for communities faced with generation facility closures, financial support for clean energy workforce programs, and new equity requirements and labor standards applicable to the clean energy economy. CEJA also amended Section 9.15(o) of the EPAct to require the completion of a Resource Adequacy Study (RA Study) that assesses the State's progress towards its renewable energy, green hydrogen technologies, and emissions reduction goals, along with the current and projected status of electric resource adequacy and reliability throughout Illinois with proposed solutions for any shortfalls that may be identified. In effect, this new provision implements a two-step process whereby (i) a RA Study is completed to determine if a resource adequacy shortfall is likely to occur given the current and projected state of the electric grid—communicated through the issuance of a report,[1] and (ii) if such a shortfall is projected, a mitigation plan is completed to assess options to address the projected shortfall.

This Resource Adequacy Study was developed through a coordinated effort among the Illinois Commerce Commission (ICC), the Illinois Power Agency (IPA), and the Illinois Environmental Protection Agency (IEPA), collectively "the Agencies." The Agencies have prepared this report in response to the directive under Section 9.15(o) of the Illinois Environmental Protection Act (EPAct).

The Agencies utilized the services of the IPA's Procurement Planning Consultant, Energy and Environmental Economics, Inc. (E3), to conduct the analysis and support the overall process and development of the RA Study. The Agencies also conducted engagement with stakeholder groups, the RTOs, and Illinois utilities. The Agencies coordinated with PJM and MISO to verify modeling assumptions and seek guidance on available data resources and coordinated with the Illinois utilities to inform the treatment of load forecasts and cross-reference approaches with other utility-driven studies. This collaborative structure ensured

[1] The RA Study report is to be issued publicly and delivered to the Illinois General Assembly and Governor's Office.

that the study was grounded in the best available data and reflected current market developments.

1.1. Resource Adequacy Context for Illinois Consumers

Resource Adequacy (RA) evaluates whether there is sufficient electricity supply available to meet corresponding customer demand in all hours with a defined level of certainty. This is a critical concept for electricity system planning, which evaluates how future resource portfolios meet policy, affordability, and reliability objectives. No electric system is "perfectly reliable"—meaning that there is a zero percent chance of a loss of load event. Electric systems are instead designed to achieve a specific reliability standard which represents an acceptable probability of lost load over a range of possible conditions while balancing the feasibility and costs of meeting this target with available technologies.

Illinois was one of many states to restructure its electric industry during the late 1990s and early 2000s to create competition in retail electricity service. In practice, restructuring shifted the day-to-day responsibility for organizing resource adequacy from vertically integrated utilities to the regional transmission organizations (RTOs) such as PJM and MISO, which provide two primary functions: i) system operations including generation dispatch and control of the high-voltage transmission system, and ii) market operations including the design, implementation, and settlement of wholesale market prices and transactions for energy, ancillary services, and capacity. PJM and MISO design and administer capacity markets as the primary mechanisms by which resource adequacy is assessed, measured, and compensated within each regional market.

Customers in Illinois are served by several types of Load-Serving Entities (LSEs): municipal utilities, electric cooperatives, Alternative Retail Electricity Suppliers (ARES), and electric utilities, including electric utilities that that rely on the IPA to procure supply for default service for customers who do not select an ARES for service. Under the market structure of retail competition in Illinois, the costs of supplying customers with electricity are backstopped by the RTO wholesale markets through locational marginal prices (LMPs) for energy and by capacity market prices in each RTO zone in Illinois. In a competitive equilibrium, which is typically assumed for studies of this nature, retail customers in Illinois can expect to pay the wholesale market price for energy and capacity in their market zone.

For eligible retail customers—defined as the residential and small commercial customers of Ameren, ComEd, and MidAmerican who have not switched to an ARES or enrolled in real-time pricing—the IPA determines, through its annual Electricity Procurement Plan, how to procure the capacity obligations needed to serve such customers. The IPA, and by extension the utilities, currently utilize different approaches to secure capacity for these residential and small commercial customers, along with hourly pricing default service customers. Through the 2025 Electricity Procurement Plan, the IPA has only sought to secure a capacity hedge on behalf of Ameren customers. Subject to the terms of the IPA Electricity Procurement Plan, any capacity obligations not secured through an IPA electricity procurement event are acquired by the utilities through the MISO Planning Resource Auction (PRA). ComEd currently secures all capacity obligations for default service customers through the PJM Base Residual Auction (BRA). For default service customers on hourly pricing service, Ameren or ComEd procure capacity through the MISO PRA or PJM BRA, respectively, and pass those costs on directly to customers. ARES are responsible for meeting the energy and capacity needs of their customers. For MidAmerican, the level of exposure to capacity markets faced by eligible retail customers is negligible.

Municipal electric utilities and rural electric cooperatives are load serving entities and thus responsible for the capacity obligations of their customers. Unlike Ameren and ComEd, municipal utilities and cooperatives either own generation or enter into contracts with generators for resource adequacy.

The different mechanisms and different types of LSEs in Illinois contribute to challenges in managing future resource adequacy in the state. Each entity is focused on serving the immediate needs of its own customers, not in concert with each other, resulting in a patchwork of approaches by LSEs that make it difficult to plan for long-term resource adequacy needs. For example, an ARES cannot guarantee what its market share will be over time—the ARES may gain or lose customers. As a result, there is an inherent risk for an ARES to enter long-term capacity contracts. Similarly, the IPA has hedged capacity for Ameren Illinois eligible retail customers to manage price volatility in the MISO capacity auction rather than carry any long-term capacity commitments. Like an ARES, the IPA must consider the risk of customers switching prior to determining the amount of capacity to hedge.

It can be challenging under the Illinois market construct to make any long-term commitments that could have an impact on changing the resource adequacy paradigm. Capacity prices are difficult to forecast with MISO utilizing a prompt auction format and PJM's forward auction format only providing a three-year outlook. PJM and MISO have engaged in a series of reforms to their capacity market constructs, creating a cycle of continuous changes to their market rules which adds additional risk and uncertainty. The recent passage of the Clean and Reliable Grid Affordability Act (CRGA) holds numerous opportunities to potentially adjust the current paradigm, including provisions surrounding the completion of an Integrated Resource Plan (IRP) and providing the IPA with a potential pathway to complete long-term clean capacity procurements on behalf of all customers instead of just default service customers. However, the mechanics of these provisions and numerous others are pending development and implementation.

1.2. Resource Adequacy Study Approach and Methodology

The principal objective of this report is to assess resource adequacy for Illinois consumers over an appropriate planning horizon. The development of new electric supply resources typically takes five to seven years,[2] with certain kinds of resources and critical grid infrastructure expected to require even longer timelines, including transmission, which can often take ten years or more to develop.[3] Accordingly, this report includes an assessment of reliability needs in MISO, PJM, and Illinois from 2026 through 2045 to inform how resource adequacy needs may change as the load and generation mix evolves in these regions. Many actions taken today effect resource development, retirement, or extension, have longer term and cascading impacts on reliability, costs, and the broader energy landscape, thereby affecting future actions. Therefore, it is important to assess near-term resource adequacy needs amidst the context of a longer time horizon to inform decision-making.

Assessing resource adequacy risk requires answering three principal questions:

1. What is the expected reliability requirement over the resource adequacy evaluation period?
2. How will the projected mix of existing and future resources contribute to the expected reliability requirement?
3. What are the risks to achieving resource adequacy for Illinois in the future?

To address these questions, two complementary analyses were undertaken in this study: an assessment of resource adequacy needs and risk in the near-term to medium-term (2026 through 2035), and an analysis of how resource adequacy needs are expected to evolve for Illinois within the context of the broader regional markets over a longer time horizon from 2030 through 2045.

To assess resource adequacy needs and risk in the near-term, the study team projected resource adequacy balances for PJM, MISO, and relevant Illinois zones from 2026 through 2035. These projections assess whether expected supply will be sufficient to meet projected demand, given identified major drivers of risk and uncertainty in the near term. The model

[2] "Queued Up: 2024 Edition — Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2023," Lawrence Berkeley National Laboratory (April 2024): https://emp.lbl.gov/publications/queued-2024-edition-characteristics.

[3] "Power Delayed: Economic Effects of Electricity Transmission and Generation Development Delays," Resources for the Future, Working Paper No. 25-14 (May 2025): https://www.rff.org/publications/working-papers/power-delayed-economic-effects-of-electricity-transmission-and-generation-development-delays.

begins with peak load forecasts from PJM, MISO, Ameren Illinois, and ComEd for each year, and builds a supply stack that includes the existing resource fleet, adjusted for announced retirements and new capacity that is projected to be online based on interconnection queue data. The study team assessed the risk of achieving near term resource adequacy targets based upon the uncertainties and risk factors governing load growth, new resource development, and resource retirements.

E3's portfolio analysis addressed resource adequacy from 2030 through 2045. The analysis involved simulating forward-looking resource needs and effective load carrying capabilities (ELCCs) of existing and future resources in MISO and PJM and then modeling resource portfolios that could meet the future system's resource adequacy requirements under different scenarios. E3 assessed the risks of achieving long term resource adequacy by examining the feasibility and potential challenges of developing one or more resource adequate portfolios under current regulatory, policy, and market structures.

1.3. Findings on Near-Term Resource Adequacy (2026-2030)

The capacity market auctions run by PJM and MISO are forward-looking assessments of the supply and demand balances in each region, representing the best available data on near-term reliability needs and capacity contributions by all resources in the current system. Based on the latest auction results in both markets (PJM 2026/2027 BRA and MISO 2025/2026 PRA), both PJM and MISO (and by extension, Illinois zones) are resource adequate today to meet the RTOs' reliability standards of a loss of load event occurring at most one day in ten years.

Table 1: Capacity Auction Results for PJM (2026/2027) and MISO (2025/2026)

	PJM 2026/2027 BRA	MISO 2025/2026 PRA
Capacity Balance	PJM secured 134,311 MW of unforced capacity (UCAP) through the auction, plus 11,933 via Fixed Resource Requirement (FRR) commitments, totaling 146,244 MW. Total resources exceeded the RTO-wide target of 146,105 MW by 138.8 MW (0.1%).	137,559.3 MW cleared for the summer season, including 19,947 MW contributed by Fixed Resource Adequacy Plan (FRAP) participants. Total resources exceeded the RTO-wide target of 135,213.4 MW by 2,345.9 MW (1.7%).
Reserve Margins	The BRA cleared at 18.9% reserve margin, slightly below the 19.1% target.	Summer: 9.8% cleared vs. 7.9% target Fall: 17.5% cleared vs. 14.9% target Winter: 24.5% cleared vs. 18.4% target Spring: 26.8% cleared vs. 25.3% target
Clearing Prices	PJM-wide capacity prices hit the FERC-approved cap of $329.17/MW-day in all market zones.	Annual Average: $217/MW-day (North/Central) and $212/MW-day (South)

However, resource adequacy margins in both regions are becoming increasingly constrained due to load growth, thermal generator retirements, and updates to resource adequacy market structures, including the resource accreditations for renewable, storage, and thermal resources. Data centers are the primary driver of load growth in the latest forecasts from utilities and the RTOs,[4] with load growth projections at levels well above those observed in either market over the past twenty years. Combined with an aging fleet of coal and gas generators, this load growth is likely to pose significant challenges for the reliability of both systems. The latest auctions in PJM and MISO each set record high capacity prices, providing an incentive for new resource development and the retention of existing generation as reliability margins become tight. While this price signal is designed to support resources needed for system reliability, it also increases costs to consumers.

Based on current load forecasts and resource adequacy targets, both PJM and MISO are projected to face capacity shortfalls over the coming decade unless additional new capacity resources are developed. PJM's resource adequacy target increases by approximately 20% between 2025 and 2030, while MISO's target grows by around 10% over the same period, driven primarily by rapid, concentrated load growth from data center development in addition to load growth from residential and commercial customers. Both RTOs have significant volumes of new capacity in development—nearly 88 GW in PJM and over 70 GW in MISO of new nameplate capacity by 2030.[5] However, most of these new resources are variable and intermittent renewable energy projects, and when adjusted for accredited capacity these additions amount to 24 GW in PJM and 26 GW in MISO.[6] At the same time, accredited capacity retirements are projected to reach nearly 15 GW in PJM and 18 GW in MISO, primarily consisting of aging thermal generators.[7] When accounting for these supply and demand dynamics, including announced retirements by generators in Illinois and within each RTO market and accredited new builds currently in the queue or fast-tracked through the PJM RRI or MISO ERAS programs,[8] PJM is expected to experience a capacity shortfall beginning in 2029, with the deficit projected to widen in subsequent years if left unabated. MISO remains resource adequate through 2030, but a shortfall is projected to emerge in 2031 and grow thereafter. These projections reflect baseline conditions "as reported" from

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[4] See Section 4.2.1 for more detail on load growth projections.

[5] Data from Velocity Suite and RTO Interconnection Queues, inclusive of projects in the PJM Reliability Resource Initiative (RRI) and MISO Expedited Resource Addition Study (ERAS) queues.

[6] Capacity accreditations by resource type for existing resources, new additions, and retirements in the load-resource balance model are all based on published values from PJM and MISO. See Section 4.2.3.1 for details.

[7] Retirements are based on announcements by plant owners as reported by Velocity Suite, in addition to assumed retirements in Illinois to meet CEJA emissions requirements by 2030.

[8] The PJM RRI and MISO ERAS initiatives are fast-track interconnection processes for projects which have been selected by the RTOs for expedited development to meet reliability needs.

each data source used, with the projections assuming no acceleration or delays in new resource development or retirements.

Figure 1: PJM RA Balance (2026-2035) | Resource Additions and Retirements "As-Reported"

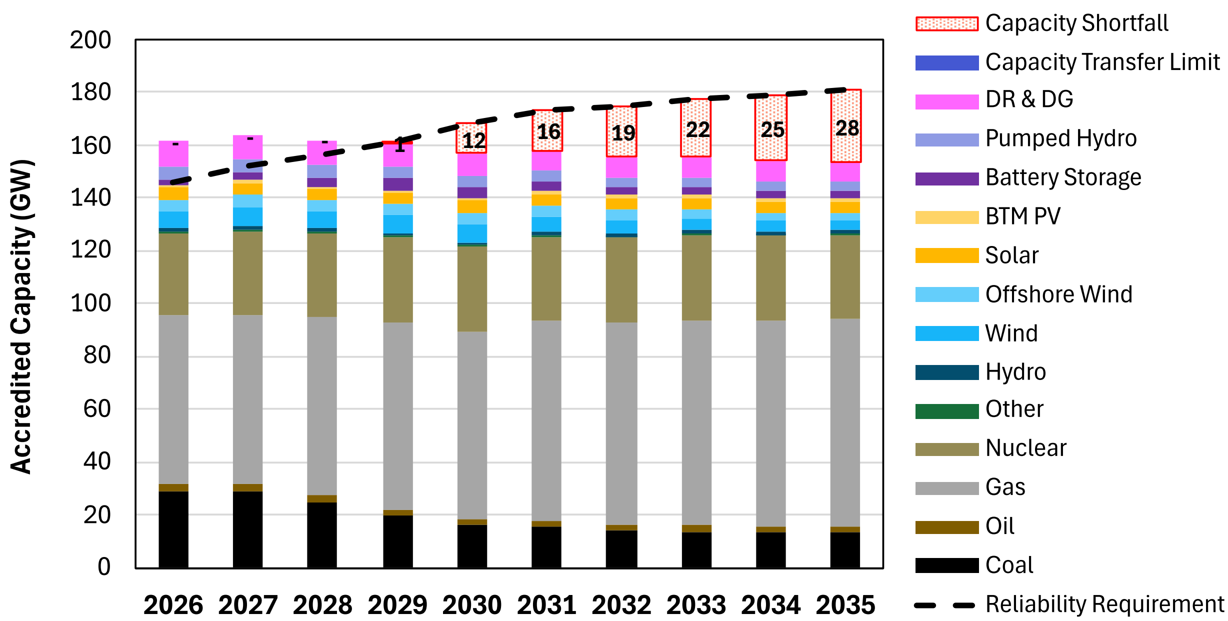
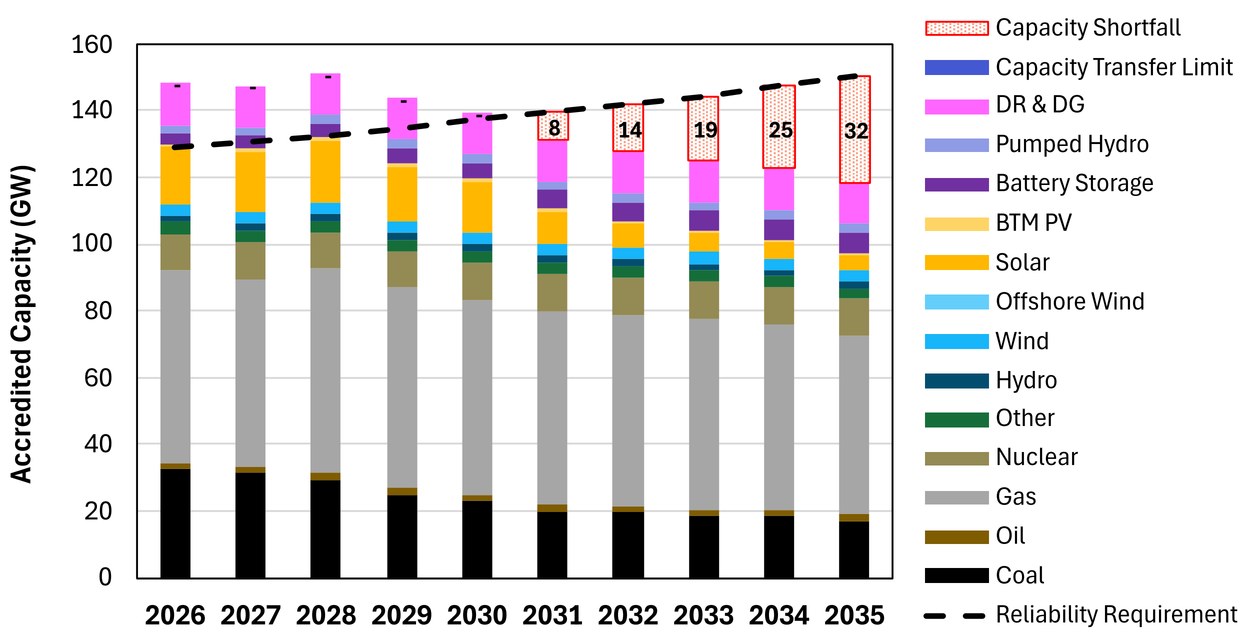


Figure 2: MISO RA Balance (2026-2035) | Resource Additions and Retirements "As-Reported"



The preceding results summarized in Figure 1 for PJM and Figure 2 for MISO illustrate the broader system-wide supply and demand conditions across both markets through 2035. Using the same analytical approach, resource adequacy throughout Illinois was also evaluated, focusing on the PJM ComEd zone and MISO LRZ 4 (the primary Illinois zone in MISO). Both PJM and MISO conduct zonal resource adequacy assessments as part of their capacity market structures to ensure that each zone has access to sufficient deliverable capacity. These zonal assessments are informed by transmission transfer capabilities, specifically the Capacity Emergency Transfer Limit (CETL) in PJM and the Zonal Import Ability (ZIA) in MISO, which define how much capacity can reliably flow into each zone from the rest of the system during critical hours.

This analysis incorporates these transfer limits to evaluate whether Illinois' zones meet their reliability requirements, as shown in Figure 3 and Figure 4 below. However, it is important to note that these metrics assume the broader RTO has sufficient surplus capacity available to support these transfers. If the RTO is short on capacity, as established in the previous section, Illinois cannot rely on imports from neighboring zones to maintain resource adequacy. In that context, system-wide resource adequacy is a prerequisite for zonal RA balances to be meaningful. Even if a zone appears to meet its internal planning requirement, it will remain exposed to the consequences of a regional shortfall, including capacity price spikes, transmission line congestion, and elevated loss of load risk.

Under conditions where new resources are in-service according to their reported commercial operation dates and RTO-wide retirements proceed as planned, the resource adequacy outlooks for these two Illinois zones diverge notably. The ComEd zone meets its zonal requirements through 2032 but begins to rely on imports from the broader PJM system via the CETL starting in 2030. Projected load growth in the zone drives a 24% increase in resource adequacy requirements between 2025 and 2030, which contributes to growing dependence on external capacity even before the onset of an outright shortfall in 2032.

In contrast, MISO LRZ 4 meets its zonal requirements through 2035. The zone experiences a more modest increase in its resource adequacy requirement (approximately 11% from 2025 to 2030) and there is sufficient in-zone accredited capacity to meet the zone's needs through 2030 before beginning to rely on imports through 2035. Even when the MISO LRZ 4 zonal capacity balance appears sufficient, emerging reliance on interzonal transfers and the MISO-wide results indicate a risk of shortfall at the system level, which poses a corresponding resource adequacy risk for Illinois consumers.

These projections for the ComEd and MISO LRZ 4 zones assume that coal, oil, and gas-fueled generators in Illinois are retired in alignment with emissions limits enacted through CEJA and applicable to future years beginning in 2030.

Figure 3: PJM ComEd Zone RA Balance (2026-2035) | Resource Additions and Retirements "As-Reported"

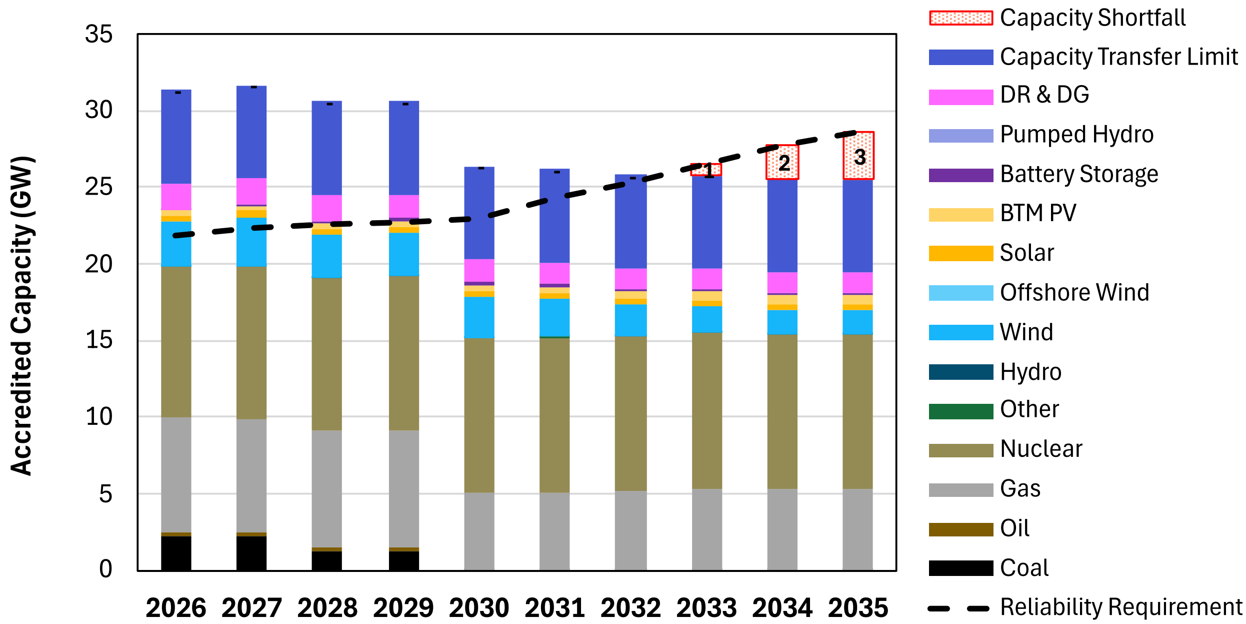
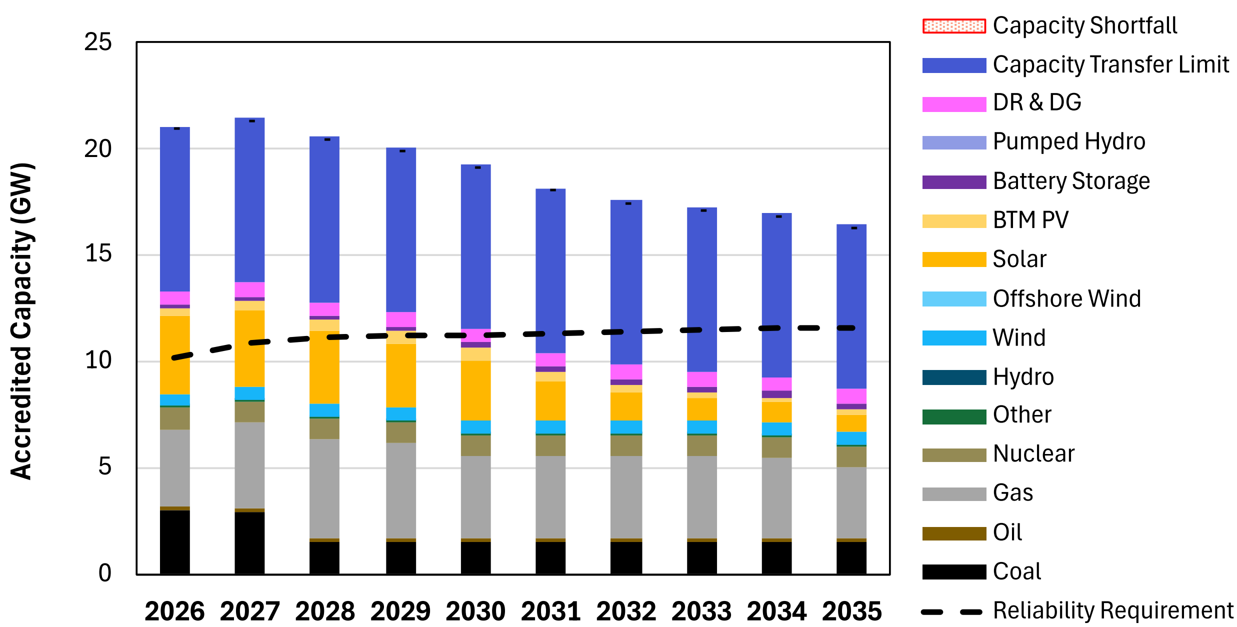


Figure 4: MISO LRZ 4 RA Balance (2026-2035) | Resource Additions and Retirements "As-Reported"



Taken together, the resource adequacy balance projections indicate that Illinois faces a resource adequacy risk over the coming decade—not because the local Illinois zones are structurally deficient under baseline assumptions, but because both PJM and MISO are projected to face sustained system-wide capacity shortfalls in the presence of rapid, data center-driven load growth, changing market structures and associated accreditation methodologies, and the absence of additional new resource development beyond those projects already in RTO interconnection queues.

As explained below, under scenarios with development timelines that incorporate delays in bringing new resources online, both PJM and MISO and the ComEd and LRZ 4 zones experience tighter conditions sooner. And while scenarios with limited in-state retirement deferrals modestly improve the resource adequacy balance in Illinois, they do not meaningfully change the outcome: resource adequacy in Illinois is fundamentally constrained by the availability or scarcity of surplus capacity in PJM and MISO.

1.4. Findings on Longer-Term Resource Adequacy Needs (2030-2045)

Building on the assessment of near-term resource adequacy through supply and demand projections, this study also explores how Illinois and the broader RTO systems might maintain reliability through 2045 under continued load growth and decarbonization policies along with changing resource economics. This long-term analysis is informed by capacity expansion modeling to identify various potential resource portfolios which could meet the evolving resource adequacy needs of PJM, MISO, and the Illinois market zones. A loss-of-load probability model is also used to project resources' ELCCs into the future as an input to the portfolio analysis and to ensure that the selected portfolios meet the RTOs' reliability standards of a 1-day-in-10-year loss of load expectation. This modeling approach identifies least-cost, policy-compliant long-term portfolios that can help inform near-term decisions and policy recommendations around resource adequacy in the context of future system dynamics and requirements.

The modeling framework implemented for this study relies on the interplay between capacity expansion and resource adequacy models:

Resource Adequacy: RECAP[9] identifies total effective capacity needed for resource adequacy and evaluates each resource's contribution towards meeting that need through extensive simulations of load and weather conditions.

[9] RECAP is an E3 in-house loss-of-load probability (LOLP) model; it has been used by utilities and system operators across North America.

Capacity Expansion: PLEXOS[10] is used to optimize generation and transmission portfolios to minimize cost while satisfying policy and resource adequacy constraints.

RECAP calculates Total Reliability Need (TRN) and Planning Reserve Margin (PRM) values that ensure sufficient effective capacity is built in each market, along with market- and technology-specific curves that relate the marginal Effective Load Carrying Capabilities (ELCCs) of each resource type to its total penetration (MW) in the system. These curves are then used to constrain the PLEXOS model's resource selection to meet the TRN in each market and each projection year at the lowest total cost. Together, these models ensure portfolios are cost-optimal, reliable, and compliant with policy targets. The same models and assumptions are also used in the Illinois 2025 Draft Renewable Energy Access Plan (REAP), ensuring analytical consistency between the two studies which have complimentary focus and objectives. This is also the same fundamental modeling framework used as a 'best practice' in Integrated Resource Planning (IRP) processes across North America, including those supported directly by E3.

Evaluating future resource adequacy needs requires understanding how system conditions may evolve under uncertainty. To capture a wide range of possible futures, this study uses a scenario framework to evaluate how these uncertainties impact system reliability and the types of resources needed to maintain resource adequacy over time. Table 2 provides an overview of the key scenario drivers utilized in modeling.

Table 2: Key Scenario Drivers

Scenario Driver	When included	When excluded
New Illinois Gas Allowed	New gas combustion resources are allowed to be developed in-state	No new gas resources can be constructed in Illinois
CEJA Retirement Extension	Thermal plant retirements under CEJA emissions standards do not occur by 2045[11]	Thermal plant retirements under CEJA occur as scheduled
Illinois Net Zero Emissions	Illinois must achieve net-zero carbon emissions by 2045[12]	Illinois does not have a 2045 net zero emissions target
Low Battery Costs	Optimistic costs for new battery storage projects are assumed	Base costs for new battery storage projects are assumed

[10] PLEXOS is a commercially available capacity expansion and production simulation modeling software developed by Energy Exemplar; it is used by utilities and system operators across North America, and it is the model currently used by MISO and PJM. For more information, see: https://www.energyexemplar.com/plexos.

[11] Non-CEJA-driven retirements in Illinois still occur as planned.

[12] Net-zero emissions are achieved by requiring all in-state gas generation to convert to a zero-carbon fuel by 2045, as well as requiring Illinois to be a net exporter of energy in 2045.

The Base Case serves as a central reference point, reflecting a continuation of current law, state policies, and development trends. Other cases apply combinations of scenario drivers to examine how Illinois state policies (such as extending CEJA retirement deadlines or disallowing new in-state gas generation), meeting deeper decarbonization targets, and a low battery cost trajectory affect selected resource portfolios. Table 3 provides the concatenation of the modeling cases used in this RA Study relative to the drivers as summarized in Table 2. Each modeling case considered a different mix of predominant drivers as a means to derive meaningful and comparable results.

Data inputs for the portfolio modeling exercises in RECAP and PLEXOS were drawn from the best-available sources, including the RTOs, Illinois utilities (ComEd and Ameren), and third-party databases. Data inputs included existing generation resources and characteristics, load shapes, renewable generation profiles, generator retirements, new resources in development, new resource costs, load projections, and transmission limits by modeled zone. More information on the modeling methodology and key assumptions and inputs is detailed in Chapter 5 and in the Appendices to this study.

Table 3: Scenario Matrix

Modeling Cases	New Illinois Gas Allowed	CEJA Retirement Extension	Illinois Net Zero Emissions	Battery Costs
Base Case	Yes	No	No	Base
CEJA Extension	Yes	Yes	No	Base
No New Illinois Gas	No	No	No	Base
CEJA Extension, No New Illinois Gas	No	Yes	No	Base
Illinois Net Zero	Yes[13]	Yes	Yes	Base
Low Battery Costs	Yes	Yes	No	Low

1.4.1. Key Findings from Portfolio Analysis

Figure 5 and Figure 6 below summarize the accredited (ELCC-adjusted) capacity by technology in the Base Case scenario for PJM and MISO. These figures are inclusive of Illinois capacity. These results illustrate the growing capacity need between 2030 and 2045 in both

[13] New combustion equipment can still be selected, but all in-state gas generation is assumed to run on zero-carbon fuels by 2045.

RTOs. In PJM, roughly 25 GW of effective capacity additions are needed over the modeling horizon just to meet load growth, while additional capacity is needed to replace the planned retirements of large coal and gas generators. The 20 GW of Li-ion battery additions provide roughly 15 GW of effective capacity in 2030, but most additional incremental capacity additions through 2045 are gas generators—either simple cycle combustion turbines (CTs) or combined cycle gas turbine (CCGT) units.

MISO has a larger capacity need in 2030 relative to its peak load compared to PJM, and large volumes of batteries are selected in the Base Case scenario by 2030 to meet the PRM. However, starting in 2035, CCGTs emerge as the predominant new capacity resource added to the system. Since MISO has higher penetrations of renewable energy and battery storage compared to PJM, and consequently does not need as much additional generation, by the 2040s some additional combustion turbine (CT) peaking capacity is added.

Figure 5: PJM Total Accredited Capacity (GW) | Base Case

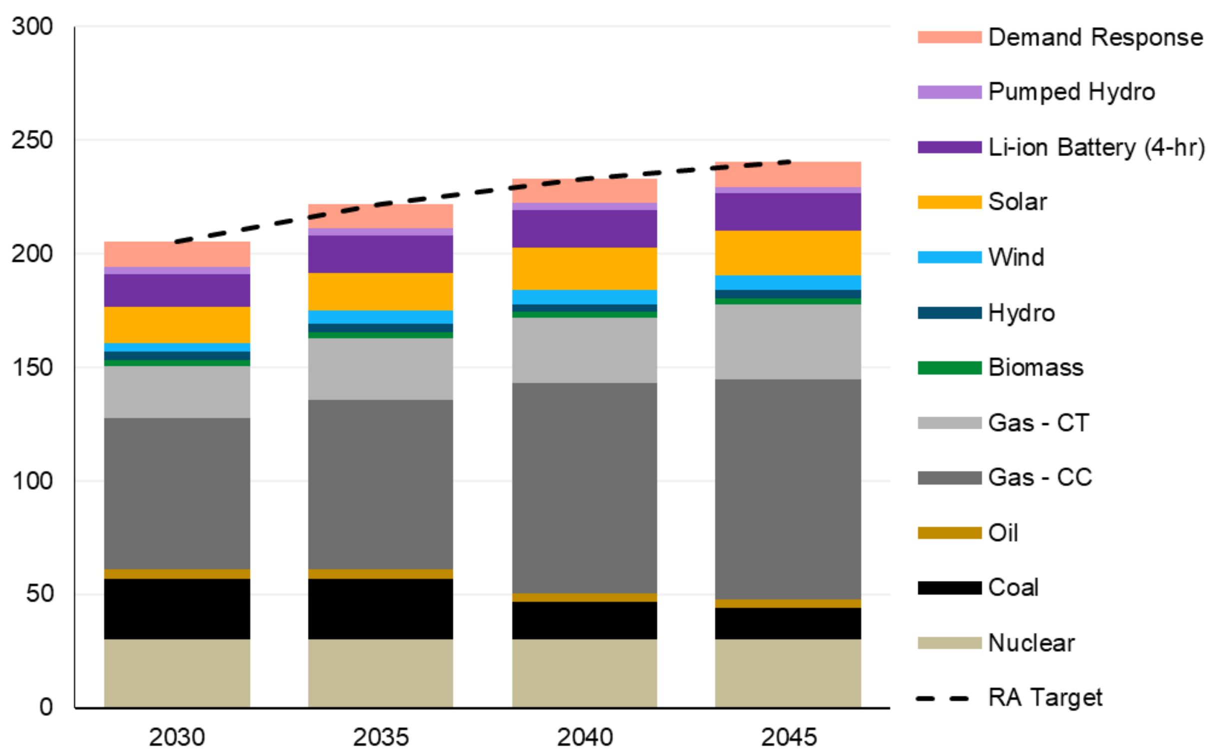
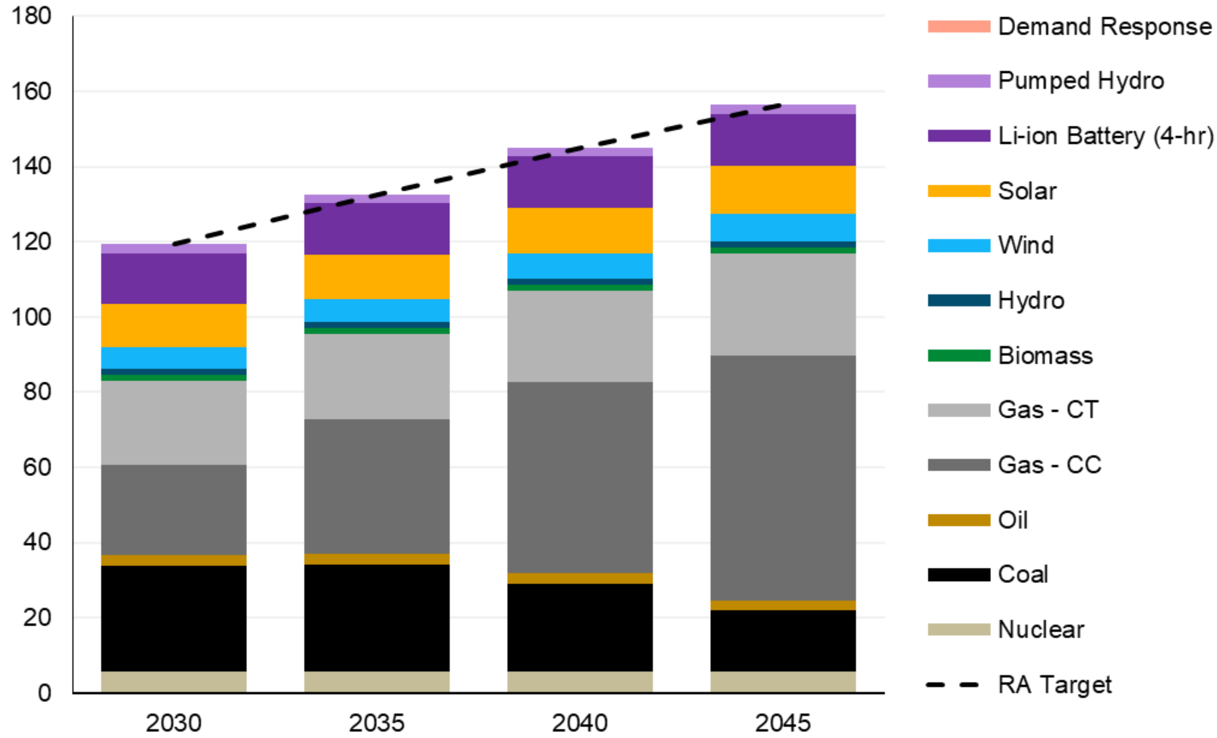


Figure 6: MISO LRZs 1-7 (North/Central) Total Accredited Capacity (GW) | Base Case



The figures below summarize the selected capacity additions and capacity contributions by technology in MISO LRZ 4 and the ComEd zone of PJM for the Base case. These results underscore the differences between MISO LRZ 4, a renewables-rich supply zone with ample interregional transmission access and moderate load growth, and the ComEd zone, a supply- and transmission-constrained region that must procure larger volumes of effective capacity to meet growing load and replace retiring fossil generators. While MISO LRZ 4 does experience load growth and CEJA-driven generator retirements throughout the modeling horizon, its zonal reliability targets within the MISO market can be met by importing capacity from neighboring regions without exceeding the modeled transmission limits. The base case portfolio includes roughly 1 GW of Li-ion batteries in the Ameren zone by 2030, as the model sees batteries as cheaper than out-of-state gas for incremental capacity. As CEJA-impacted generators are decommissioned and replaced with capacity imports, the in-state accredited capacity total falls by 2045 to nearly half of its 2030 value.

In the ComEd zone, the compounding effects of load growth, CEJA-driven retirements, and import capability limits paint a different picture. In 2030, in addition to 2 GW of new Li-ion batteries, the model decides to use the entire available transmission import rating of the ComEd zone to meet the resource adequacy requirements. In later years, new in-state gas CT units are selected to replace retiring CEJA-impacted generators and maintain local reliability within the zone. After 2030, some additional wind resources are selected in the ComEd zone to provide low-cost energy generation, complementing the large volumes of resources selected purely for their capacity contribution. By 2045, the firm capacity previously provided by CEJA-impacted generators is entirely replaced by new in-state CTs (assumed to comply with zero-emissions standards through use of alternate fuels such as green hydrogen) and capacity imports.

The Base Case resource portfolio replaces existing in-state fossil fuel generation with over 13 GW of new in-state combustion turbines (CTs) and 18 GW of out-of-state capacity imports to meet local reliability requirements, while also adding roughly 11 GW of solar and 13 GW of wind in Illinois to meet the 50% RPS target by 2045. Figure 7 and Figure 8 below present the model-selected new resource builds in the ComEd zone and MISO LRZ 4—these builds are stated in cumulative nameplate capacity (GW) by resource type. All of the new in-state combustion turbines are built in the ComEd zone in the Base Case because the projected load growth (and reliability requirement) of the ComEd zone exceeds the sum of accredited capacity from existing generators and the import capability of the zone. In contrast, MISO LRZ 4 has much more transmission import capability and less load growth compared with the ComEd zone, and the model elects to use the transmission limits to import capacity from outside LRZ 4 to meet the reliability target while building solar and wind in the zone to meet Illinois renewable energy targets.

Figure 7: ComEd Zone Cumulative Selected New Resource Builds (GW) | Base Case

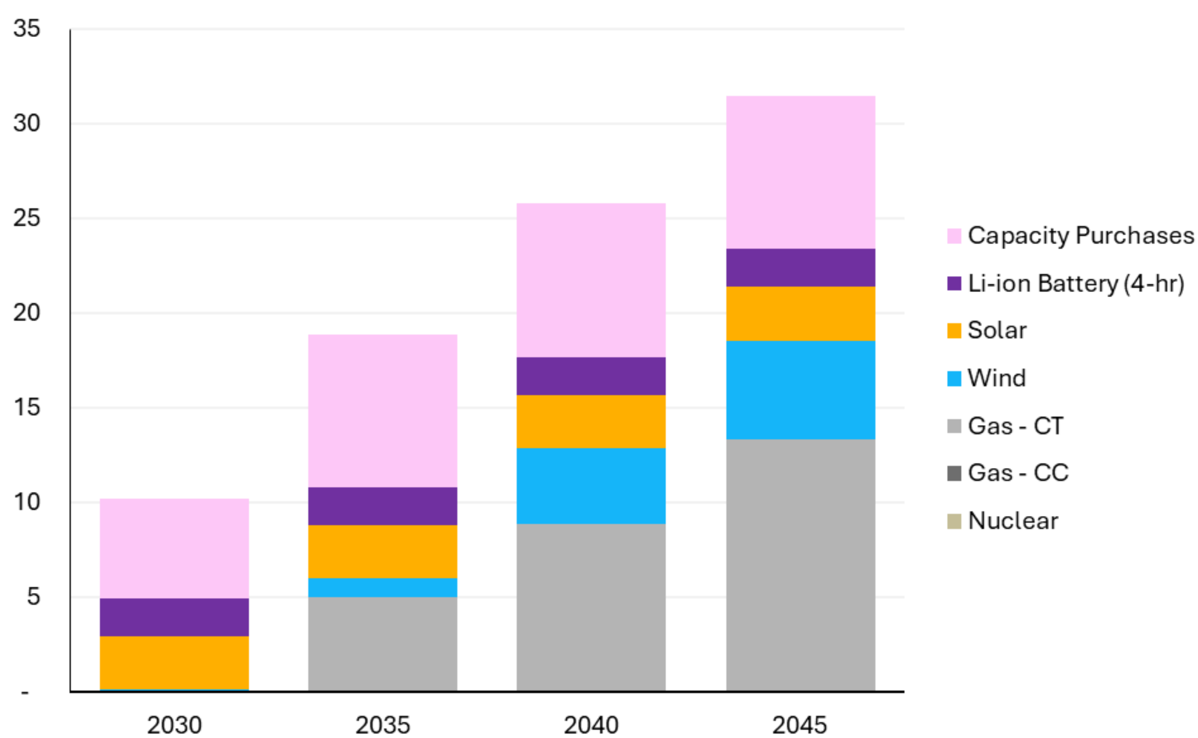


Figure 8: MISO LRZ 4 Cumulative Selected New Resource Builds (GW) | Base Case

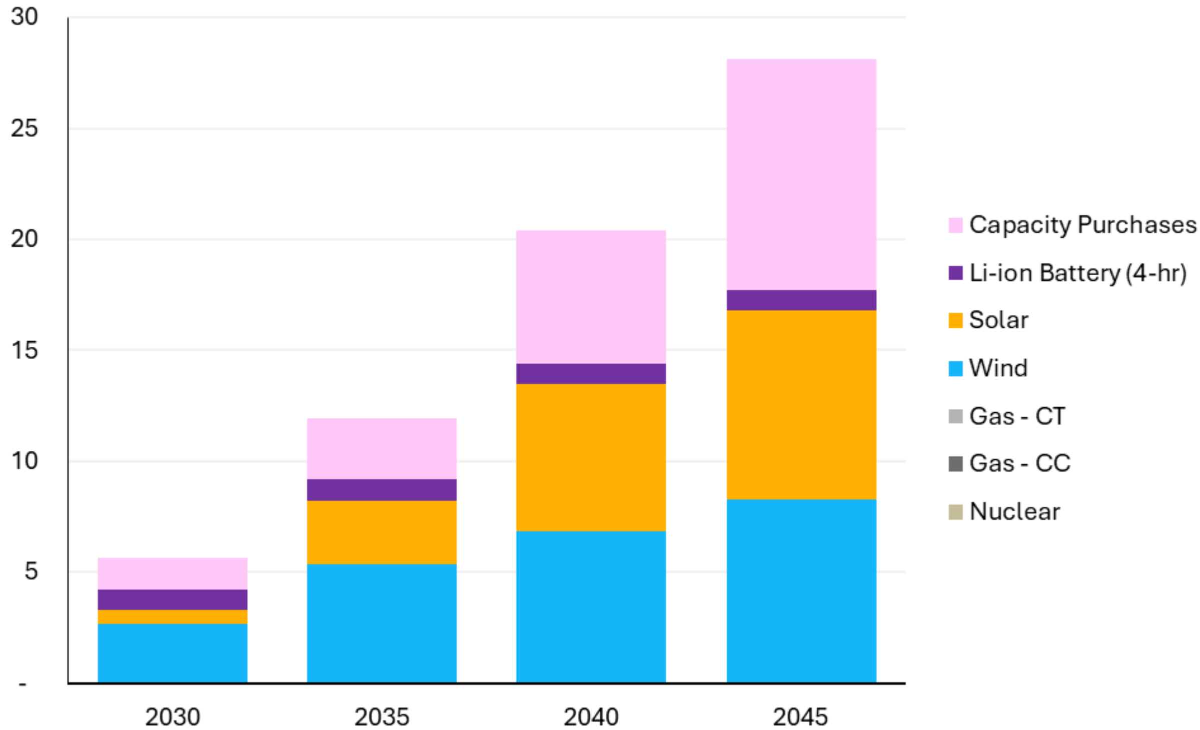


Figure 9 and Figure 10 present how existing resources, planned resources, model-selected new resources, and transmission import capabilities combine as total accredited capacity to meet the reliability requirements projected for the ComEd zone and MISO Zone 4 in the Base Case.

Figure 9: ComEd Zone Total Accredited Capacity (GW) | Base Case

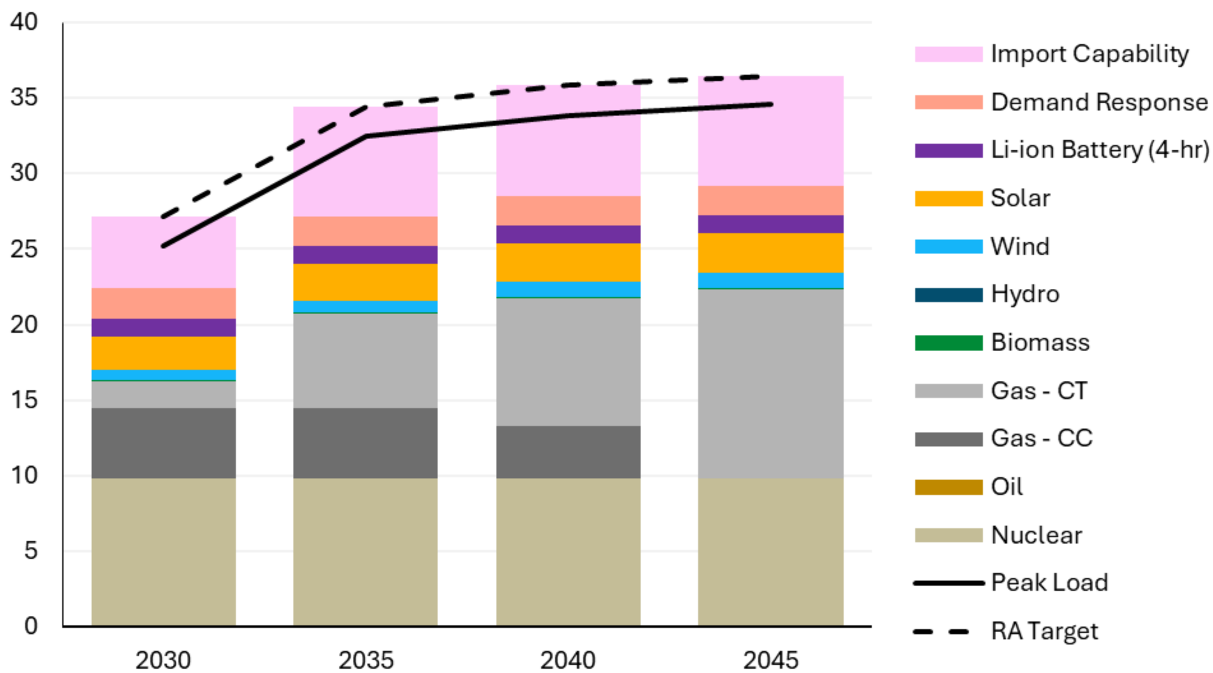
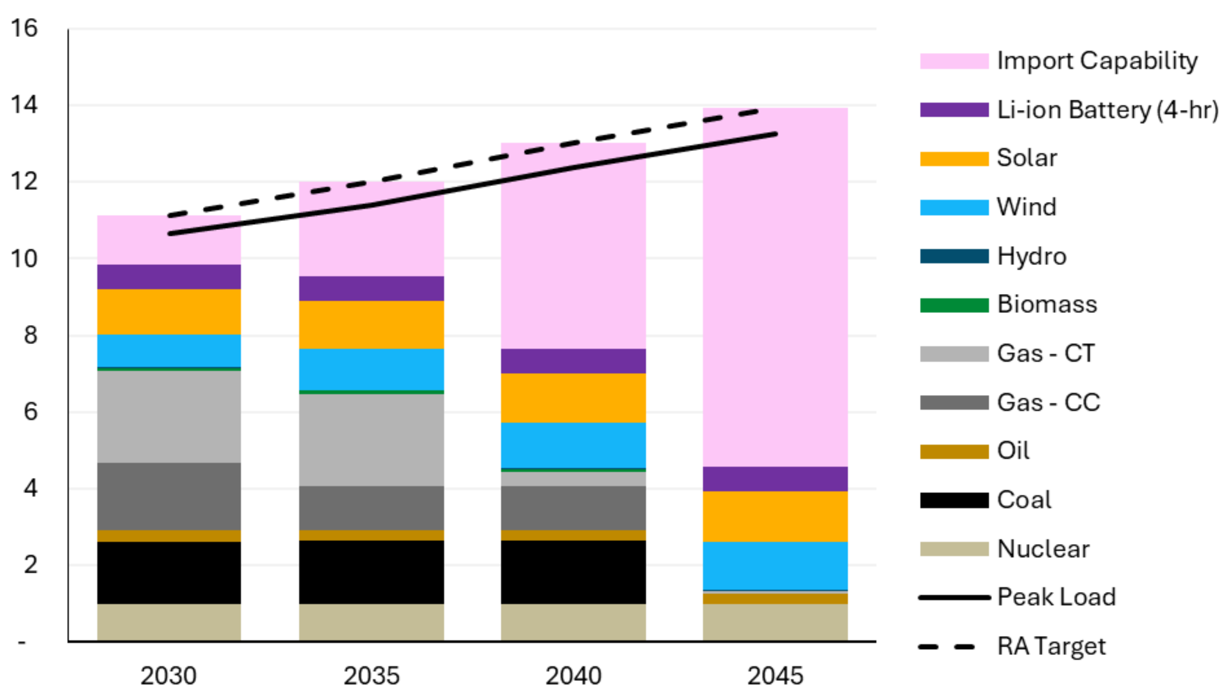


Figure 10: MISO LRZ 4 Total Accredited Capacity (GW) | Base Case



The Base Case portfolio modeling results illustrate one potential path forward by which Illinois could meet its evolving resource adequacy needs and its decarbonization and clean energy targets established by CEJA and other state policies through 2045. The resource mix involves a combination of new wind, solar, and battery storage alongside new gas-fired combustion turbines that use non-emitting fuels after 2045. New renewable energy resources drive carbon emissions savings while batteries, new gas turbines, and imports from the broader regional markets provide reliability during critical hours. Figure 11 and Figure 12 below illustrate the generation mix in the ComEd and LRZ 4 zones for the Base Case resource portfolio in the PLEXOS modeling.

Figure 11: ComEd Zone Annual Generation 2030-2045 (TWh) | Base Case

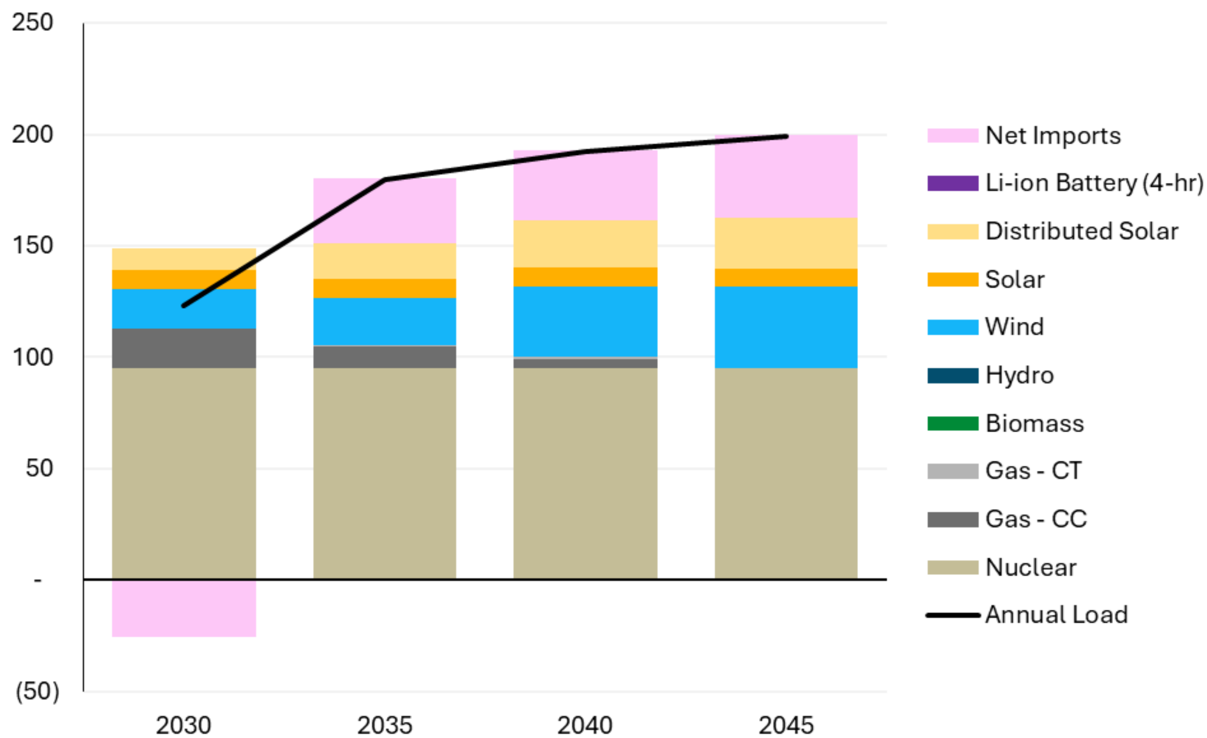
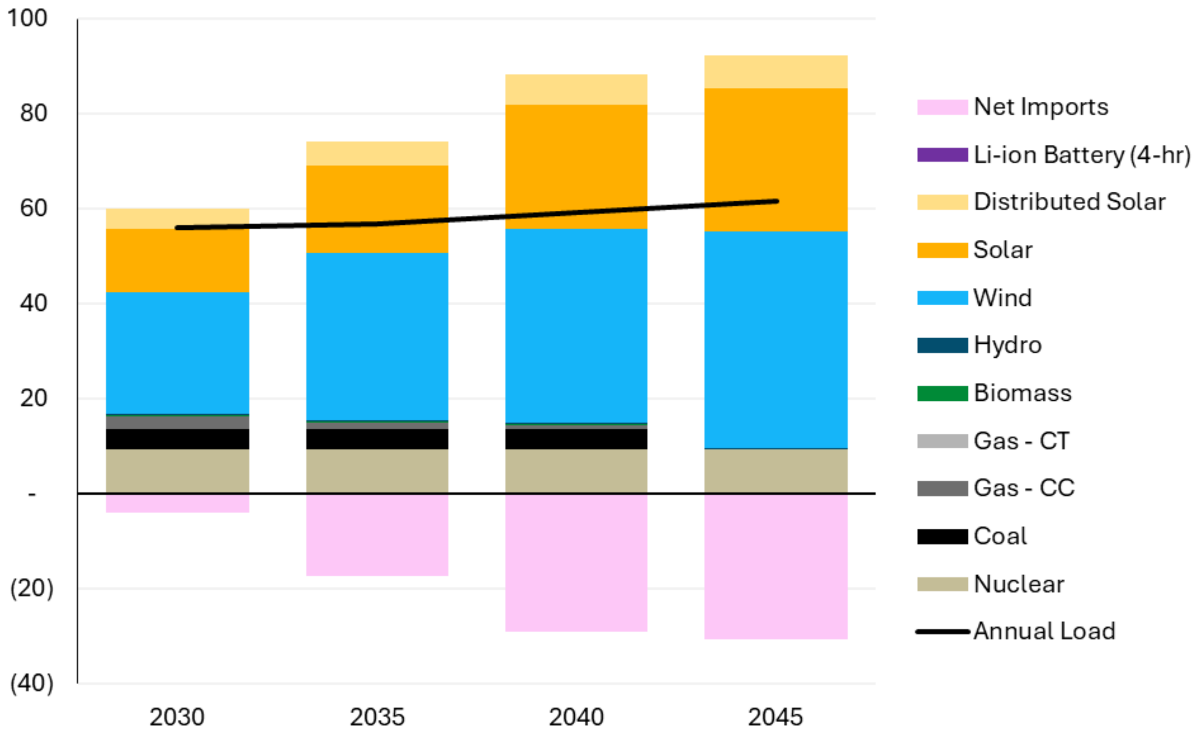


Figure 12: MISO LRZ 4 Annual Generation 2030-2045 (TWh) | Base Case



Other scenarios considered within this study illustrate the durability of this finding—that thermal generation is an important source of resource adequacy along with new battery storage resources, while new renewable energy resources (wind and solar) can continue to drive reductions in carbon emissions from electrical energy consumed in Illinois. The scenarios evaluated in this study do not constitute an exhaustive or comprehensive set of potential scenarios Illinois may face in the future, nor do these portfolio results by themselves indicate a required resource trajectory for the state. The Base Case scenario and others presented in this report are intended to provide an illustration of the nature of the challenges that Illinois faces with resource adequacy and clean energy targets in the future and provide constructive guidance on the nature of the potential resource solutions to meet these challenges. More comprehensive portfolio analysis and additional scenarios will be an important component of any forward planning or procurement for Illinois in the future, including a future Integrated Resource Planning exercise.

1.5. Conclusions and Next Steps

Illinois has entered a period of significant transformation in its electric power system. Accelerating load growth, evolving RTO market conditions, state clean energy and climate policies, and challenges with new resource development collectively point to a tightening reliability outlook in the near and medium term. This Resource Adequacy Study, developed jointly by the IPA, ICC, and IEPA, assesses these dynamics, identifies the scale and timing of prospective challenges, and begins to establish a path to ensuring that Illinois can meet both its climate and reliability objectives. Based on extensive analysis of RTO conditions, state policy requirements, and forward-looking resource needs, several key findings emerge.

1. There are resource adequacy challenges in PJM and MISO which are likely to affect the costs and reliability of electricity supply for Illinois businesses and consumers.

The challenges emerge from a combination of factors at the regional and national scale. Load growth is accelerating, driven by data centers, transportation demand, and industrial expansion. At the same time, many coal, gas, and oil units are planned to retire across both RTOs due to age, economics, and emissions limits. New resource development also faces significant challenges. New gas generation faces long equipment lead times (5–7 years for gas turbines) and significant barriers to siting and permitting. Wind, solar, and storage projects face development challenges from long interconnection queues, transmission constraints, supply chain disruptions, tariffs, and domestic content requirements for tax credit eligibility. These conditions create a credible risk of regional capacity shortfalls that will impact Illinois' future ability to import power during critical hours and may cause reliability issues in Illinois even if Illinois market zones have enough capacity to meet their zonal RA requirements as determined by the RTOs.

2. There are pathways for Illinois to achieve its climate goals in the electricity sector while ensuring a reliable electric grid, using available commercialized technologies.

The state can successfully navigate both near-term reliability risks and longer-term decarbonization goals through a diversified resource strategy. This includes combining continued growth of new in-state wind and solar supported by IPA procurements and programs, greater use of existing and planned transmission to import power from MISO and PJM when available, and the continued use of fueled thermal generators as reliability assets even as their energy output declines with higher renewable penetration. This strategy also involves adding more short-duration battery storage and other flexible technologies to meet peak reliability needs, as well as developing new clean firm capacity resources to replace the reliability contribution provided by fossil generators in the long-term future, including long-duration storage and other emerging zero-emission technologies. The RA Study's analysis reinforces that substantial new capacity from renewable, storage, and clean firm resources will be needed even if Illinois retains a portion of its existing thermal fleet. New resource planning should also consider the potential contributions from demand-side measures, including energy efficiency and demand response—especially the potential load flexibility of new large loads such as data centers given the importance of these loads in the forecast.

3. Illinois has the responsibility, authority, and policy tools to conduct planning, identify solutions, and support implementing actions to address these challenges.

Following from the conclusions of this Report, IPA and IEPA will develop a Mitigation Plan that considers the use of renewable energy, energy storage, demand response, transmission development, or other strategies to resolve the identified resource adequacy shortfall as well as considering solutions involving the delays and/or reductions of CO_2e and co-pollutant emissions reductions requirements in the Section 9.15(o) the Illinois General Assembly passed the Clean and Reliable Grid Affordability Act (CRGA), which establishes a formal Integrated Resource Planning (IRP) framework for Illinois once signed into law. The new IRP process is expected to take place throughout 2026 and 2027, and it is intended to provide a more comprehensive venue for addressing many of the foundational issues identified through the RA Study within a unified, multi-year planning framework. As a result, the RA Study should be viewed as both an input to, and an early bridge toward, the prospective IRP process.

Both the RA Study and Mitigation Plan focus on the identification of key resource adequacy challenges and prospective solutions to those challenges, which can be evaluated in greater depth through IRP proceedings. The Agencies recognize that parallel processes addressing similar subject matter and requiring similar evaluations before the same forum is ripe for synergies, and the Agencies look forward to discussions with stakeholders on process alignment options.

In addition to the IRP and Mitigation Plan processes, Illinois is also conducting its Renewable Energy Access Plan (REAP) which is a rolling multi-year study of transmission needs to facilitate the development of new renewable energy resources in the state. Illinois continues to drive forward its renewable energy goals through programs and procurements directed by the Illinois Power Agency, and new mandates from CRGA would take effect on June 1, 2026, including planning and procurement processes for battery storage and potential proposals for other clean capacity resources.