New York ISO
Independent System Operator

Planning for a Grid in Transition

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Environmental Advisory Council
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State of the Grid – Key Themes

- Public policies continue to drive rapid change in the electric system in the state.
- Narrowing Reliability Margins: Electrification programs and economic development initiatives are driving projected demand higher. Generator deactivations are outpacing new supply additions.
- The potential for delays in construction of new supply and transmission, higher than forecasted demand, and extreme weather are threatening reliability and resilience to the grid
- Summer 2024: Electricity supplies are adequate to meet expected summer demand under normal conditions, but extreme weather and other factors pose reliability risks.
- New York is projected to become a winter-peaking system in the 2030s, primarily driven by electrification of space heating and transportation.

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State of the Grid – Key Themes (Cont.)

- On the coldest days, the availability of natural gas for power generation may be limited and significant interruptions to natural gas supply can disrupt reliable operations.
- NYISO's interconnection processes continue to evolve to balance developer flexibility with the need to manage the process to more stringent timeframes.
- To achieve the mandates of the CLCPA, new emission-free supply capable of providing the necessary reliability services are needed to replace the capabilities of today's generation. Such new supply is not yet available on a commercial scale.
- The wholesale electricity markets administered by the NYISO exist as an important tool to attract necessary investments to facilitate the transition of the grid in the coming decades.

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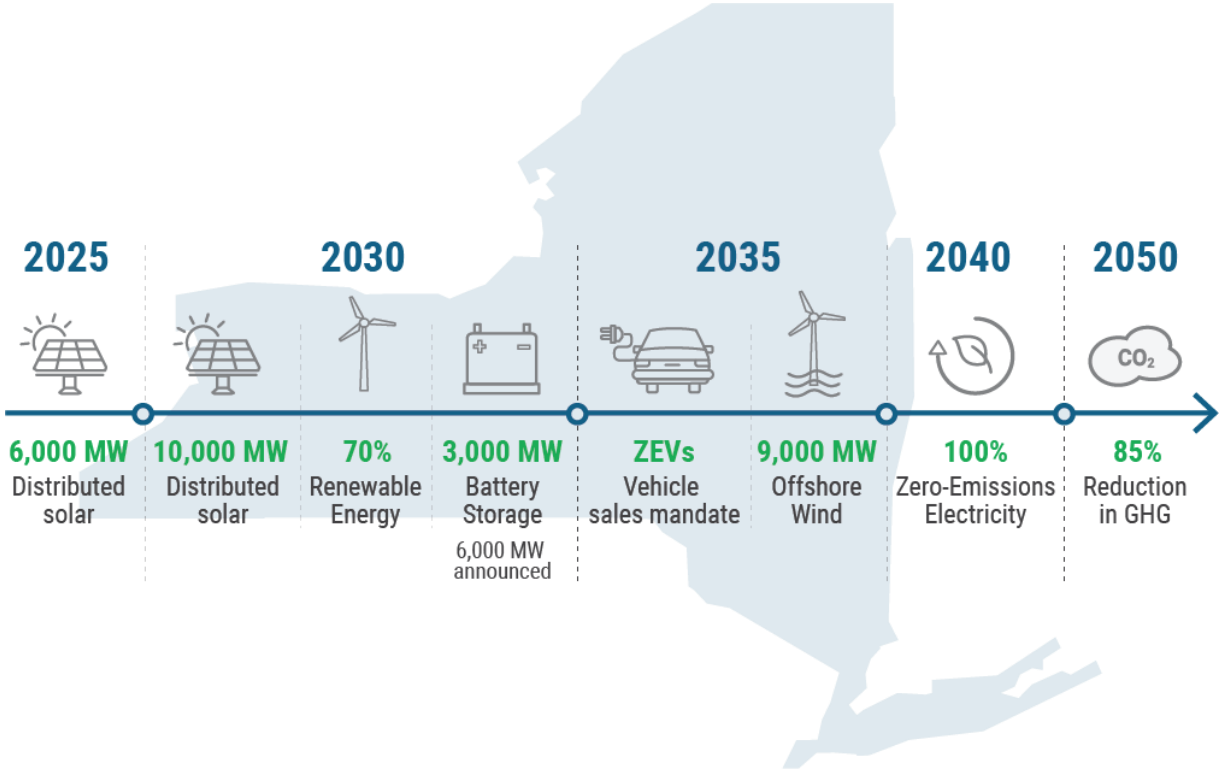
Public Policy Influence on Resource Mix

- Public policies are shaping investment on the grid, particularly the CLCPA
- Competitive markets will channel investment to achieve these goals while maintaining reliability at the lowest possible cost



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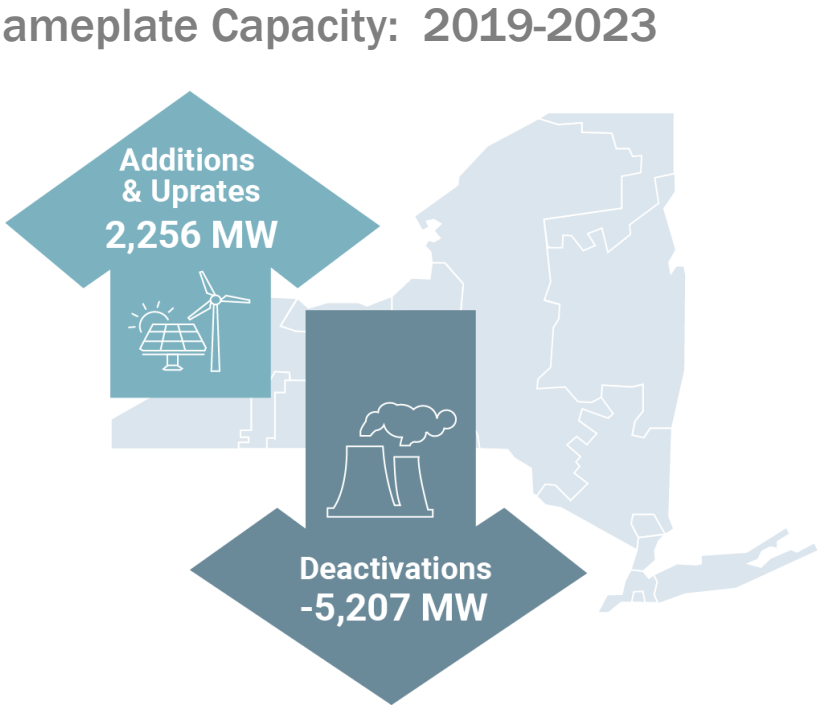
Additions, Uprates, and Retirements

- **Growing imbalance between generator deactivations and additions is contributing to shrinking reliability margins**
  - Deactivating resources tend to be dispatchable and located downstate
  - Generator additions are largely renewable resources located upstate
  - New resources do not provide the same reliability services as exiting resources
- **Since the CLCPA was approved in 2019, interconnection requests have quadrupled**
- **NYISO and stakeholders working to enhance process efficiency while maintaining reliability benefits**



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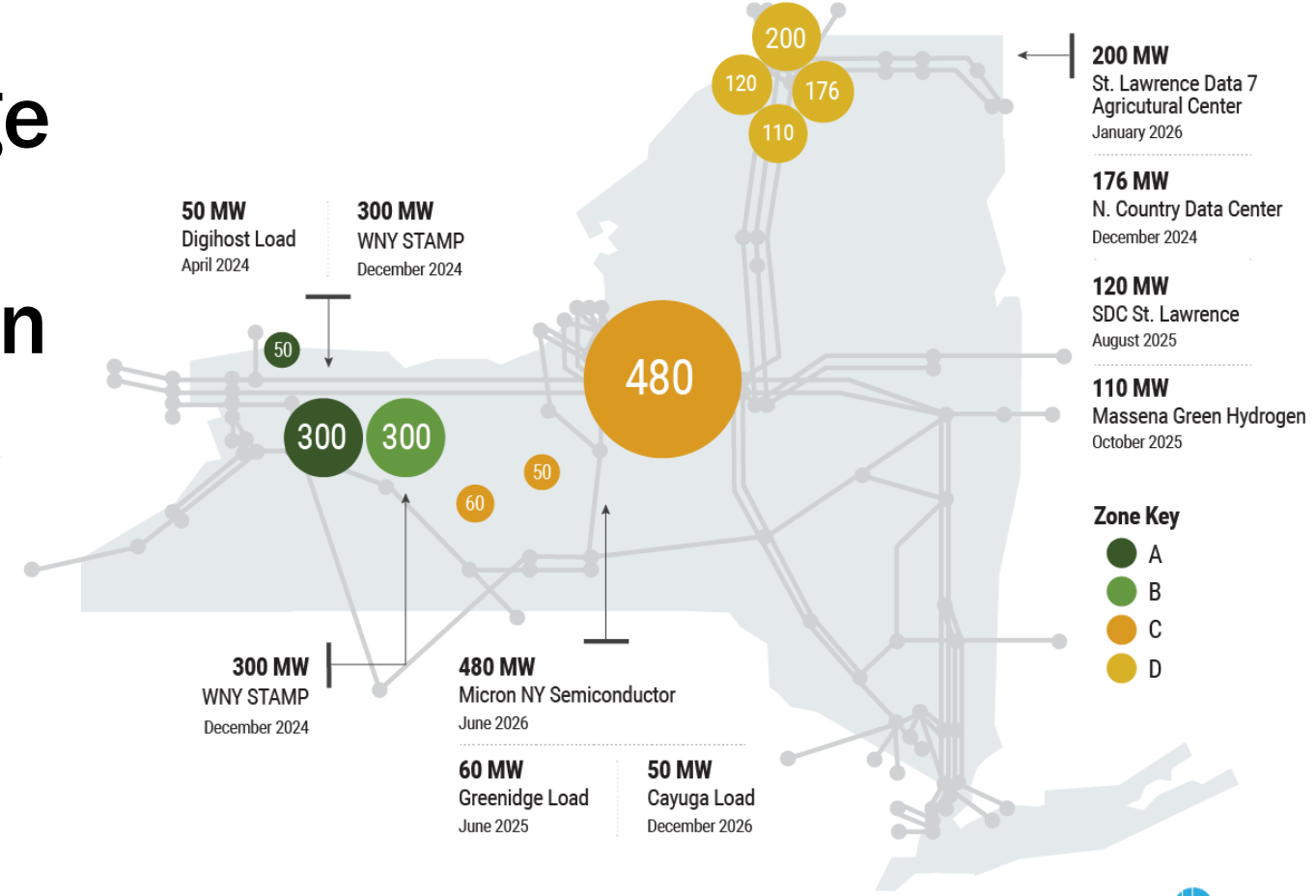
New Large Load Projects in New York State



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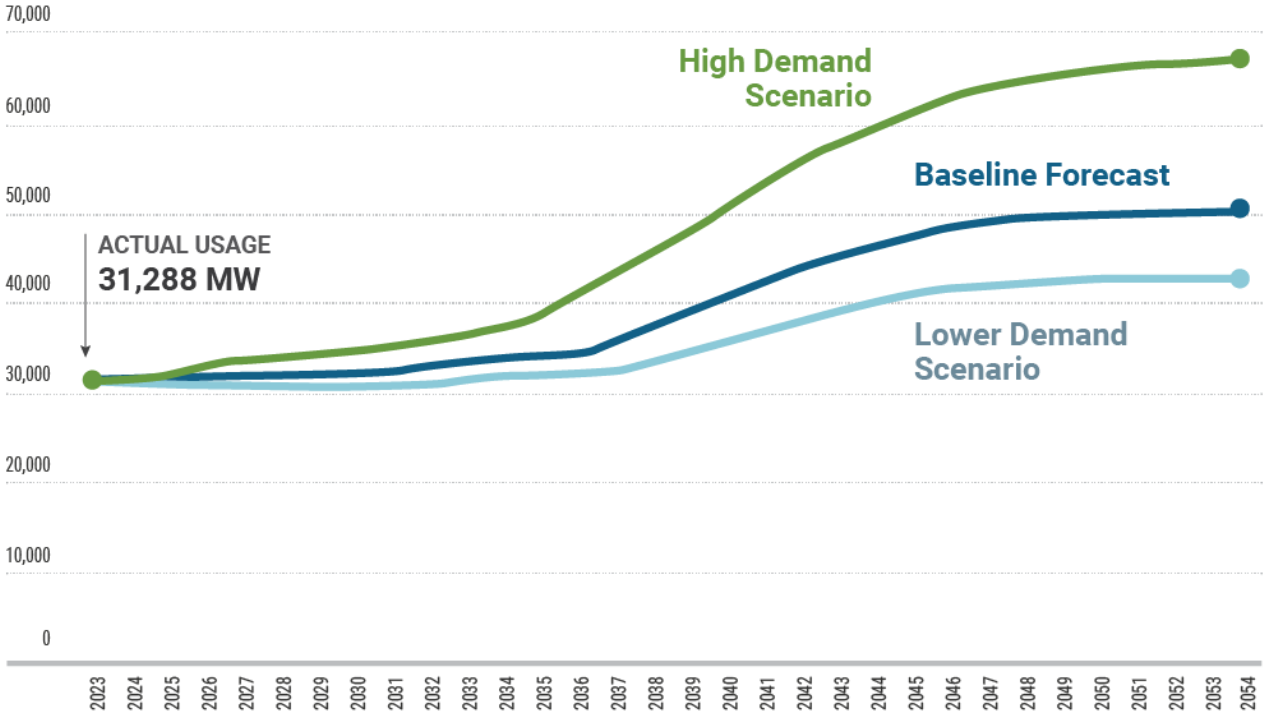
Actual & Forecast Peak Demand (MW)

Electric Energy Demand Forecast in New York State: 2023-2054



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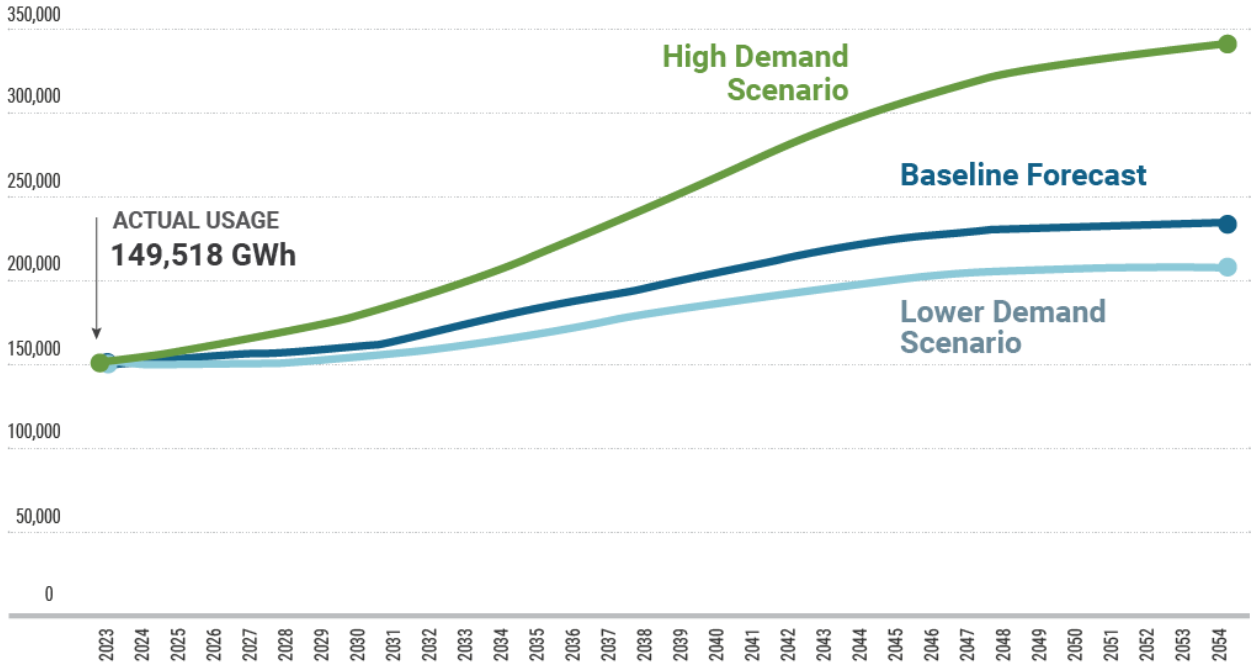
Actual & Forecast Energy Usage (GWh)

Electric Energy Load Forecast in New York State: 2023-2054



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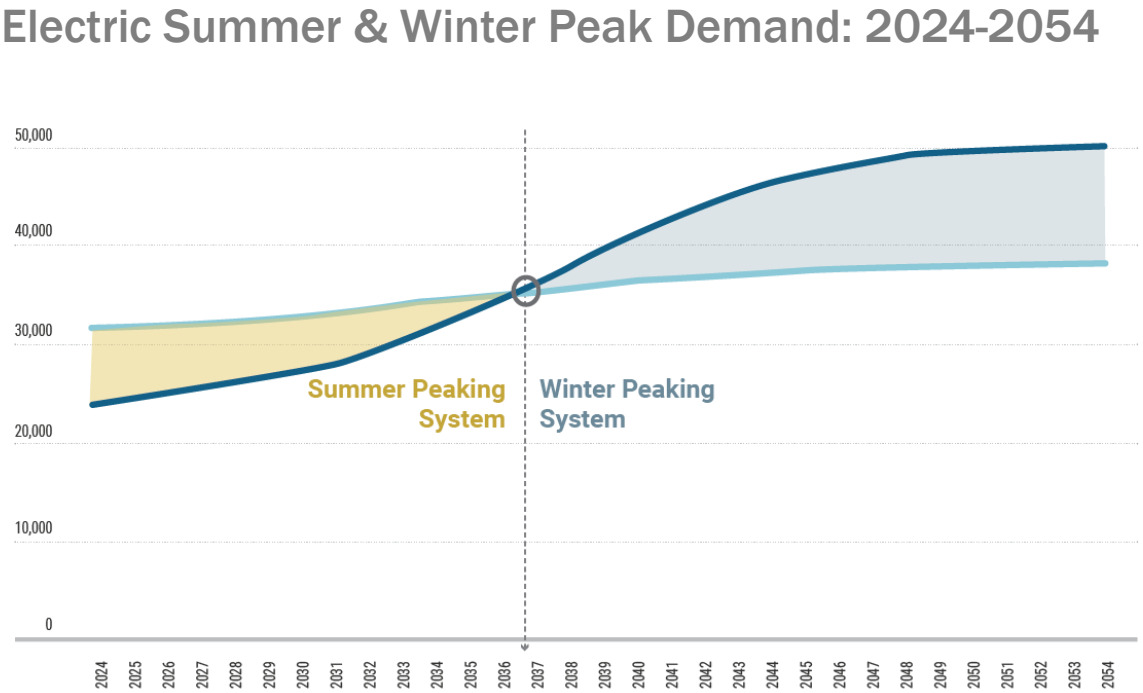
Demand Trends: Peak Demand Forecast

- The NYISO winter and summer peak load forecasts suggest that electrification will drive a shift in NY from a summer-peaking system to a winter-peaking system.
- The timing and degree of this shift will be influenced by EV and heat pump technology adoption.



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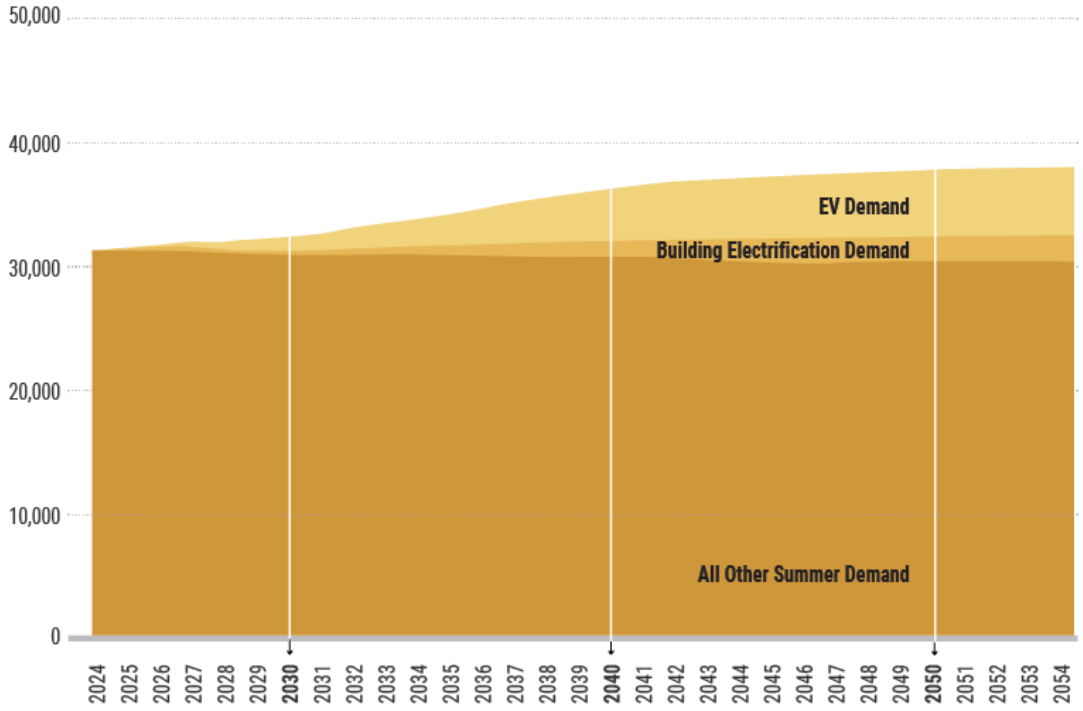
Expected Impact of Electrification on Statewide Summer Peak Demand (MW)



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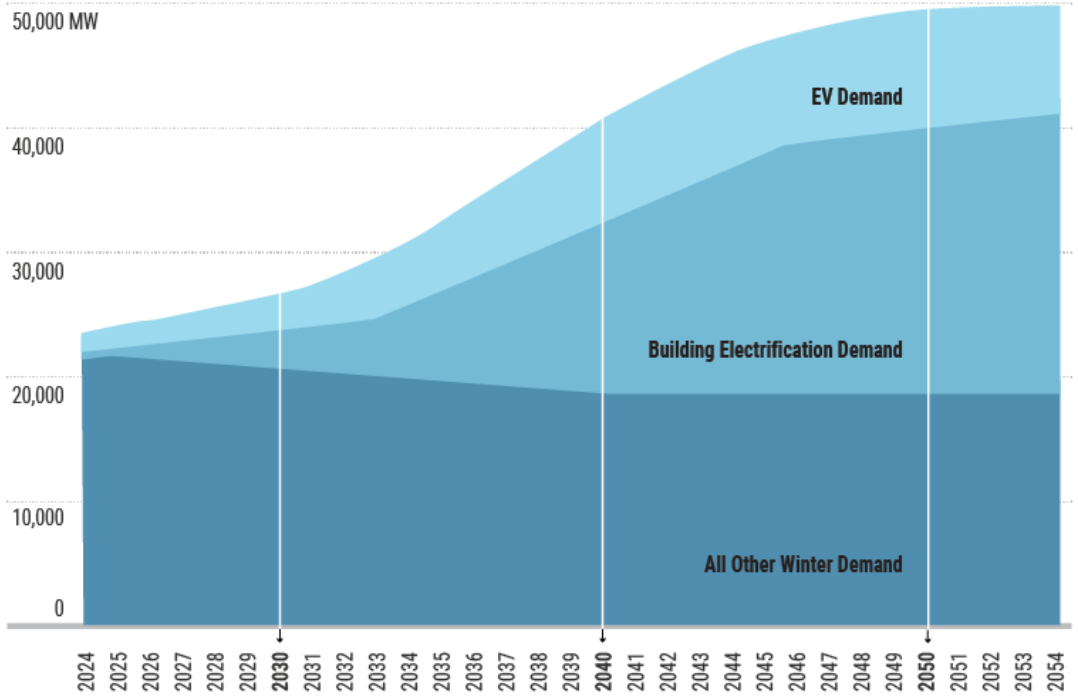
Expected Impact of Electrification on Statewide Winter Peak Demand (MW)



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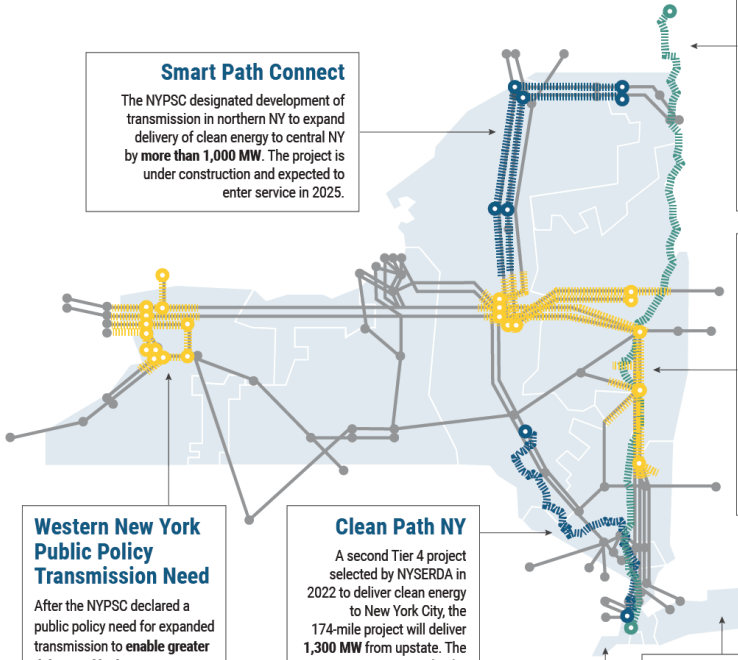
Public Policy Transmission

Ongoing Transmission Planning and Construction

The NYISO's planning process is supporting an unprecedented expansion of the transmission system in support of CLCPA goals.



Champlain Hudson Power Express (CHPE)

Awarded a Tier 4 REC contract by NYSERDA in 2022, the 339-mile cable will deliver **1,250 MW** of emissions-free electricity from Hydro-Quebec to New York City. The project is scheduled to come online in 2026. The NYISO reliability reports note that any delays in the completion of this project could lead to reliability challenges in the New York City area.

Smart Path Connect

The NYPSC designated development of transmission in northern NY to expand delivery of clean energy to central NY by **more than 1,000 MW**. The project is under construction and expected to enter service in 2025.

AC Transmission Public Policy Transmission Need

The NYPSC identified the need for transmission investment to increase power flow of energy from upstate to downstate by **at least 1,000 MW.** Through a competitive process, the NYISO selected two teams of developers to build out the 150-mile project that is in-service.

Western New York Public Policy Transmission Need

After the NYPSC declared a public policy need for expanded transmission to **enable greater delivery of hydro resources** from Niagara, the NYISO selected a 20-mile, $181 million project through an extensive, competitive process. The project is in-service.

Clean Path NY

A second Tier 4 project selected by NYSERDA in 2022 to deliver clean energy to New York City, the 174-mile project will deliver **1,300 MW** from upstate. The project is expected to be in-service in 2027.

Long Island Public Policy Transmission Need

In 2021, the NYPSC identified a need to expand the transmission capability between Long Island, NYC, and the rest of the state by **at least 3,000 MW** to support the CLCPA's offshore wind requirements. Expanded transmission is needed to move offshore wind energy from Long Island to the rest of NY. The NYISO Board of Directors selected a solution in June 2023.

NYC Public Policy Transmission Need

In June 2023, the NYPSC identified a need to expand the state's transmission system to **deliver energy from offshore wind resources to New York City.**

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NYC Public Policy Transmission Need

- The PSC issued an order in 2023 declaring that the Climate Leadership and Community Protection Act (CLCPA), constitutes a Public Policy Requirement driving the need for additional transmission facilities to deliver the output of offshore wind generating resources to New York City interconnection points.
- The Order calls for complete, end-to-end solutions that will accommodate the full output of at least 4,770 MW of incremental offshore wind generation injected into New York City (Zone J) and will have a high degree of constructability based on a timely and realistic construction schedule.
- Projects shall plan to complete all permitting and construction activities necessary to achieve an in- service date no later than January 1, 2033.
- Proposals are due June 17, 2024, at which time NYISO will be evaluating the projects to identify the more efficient or cost-effective solution.

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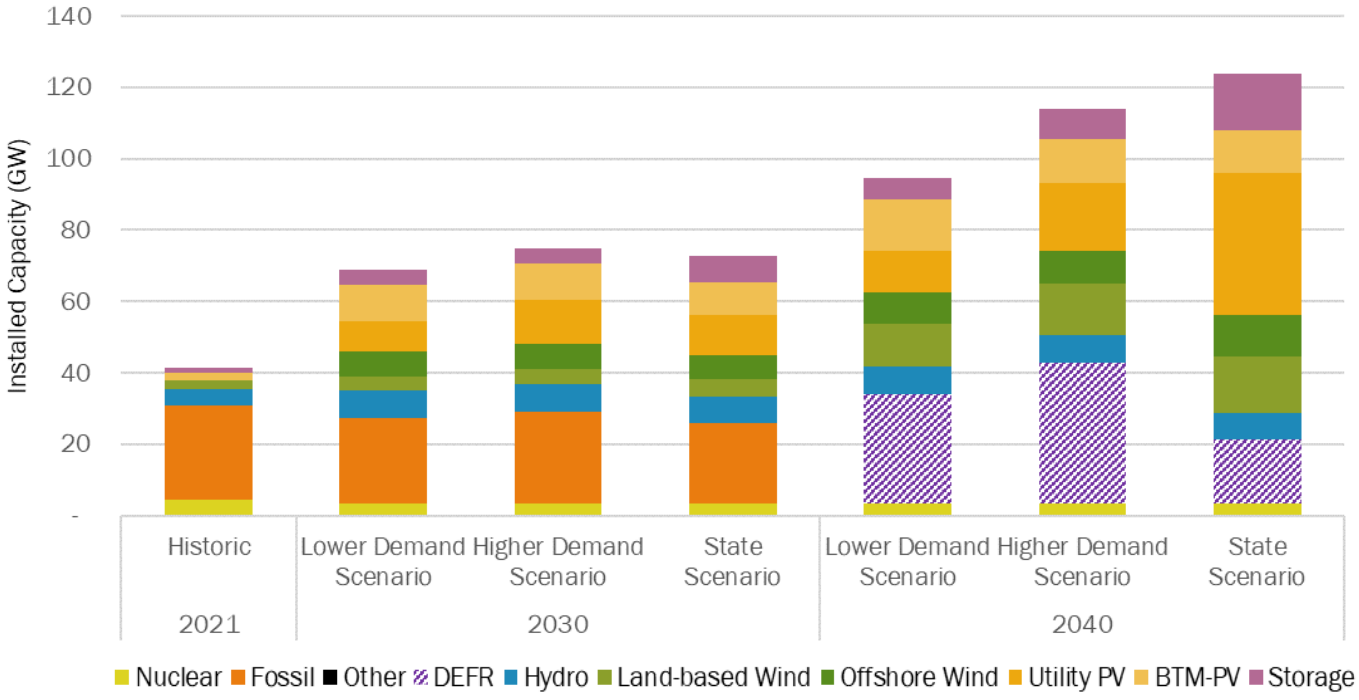
2023-2042 System & Resource Outlook

2030 & 2040 Installed Capacity



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System Needs for a 70% Renewable Grid

- **Dispatchability to address renewable balancing**
  - Dispatchable: Resources that can follow instructions to increase or decrease output on a minute-to-minute basis
  - Short Notification: Resources that can start quickly (<10 minutes)
  - Zero/Minimal Downtime: Resources that can cycle often with minimal to zero downtime
- **Flexibility to address renewable uncertainty**
  - Fast ramping: Resources that can quickly follow net load to manage ACE (Area Control Error – which measures regional generation to load balance) on a second-to-second basis
  - Energy Secure: Resources that can provide energy for multiple hours and days regardless of weather, storage, or fuel constraints
- **Support Power System Stability, Strength, and Minimize Operational Risk**
  - Resources that can hold their bus voltage regardless of topology or resource commitment
  - Resources sized to avoid extreme contingency scenarios, where contingency reserves may be expensive or unavailable and loss of generation does not contribute to LOLE/EUE

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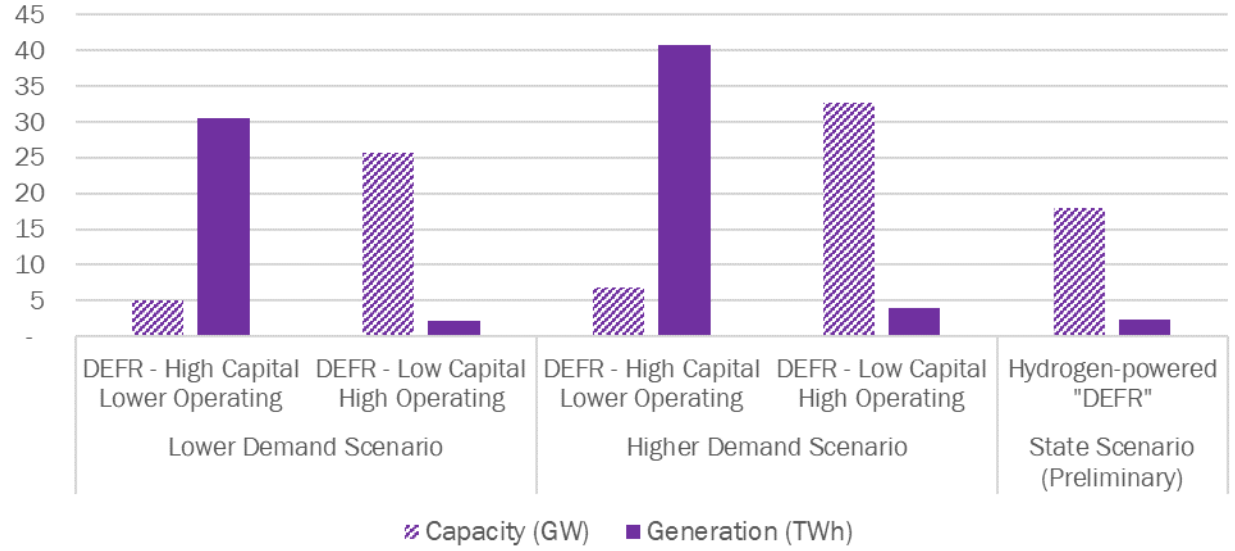
Dispatchable Emission-Free Resources: 2040 Capacity and Generation



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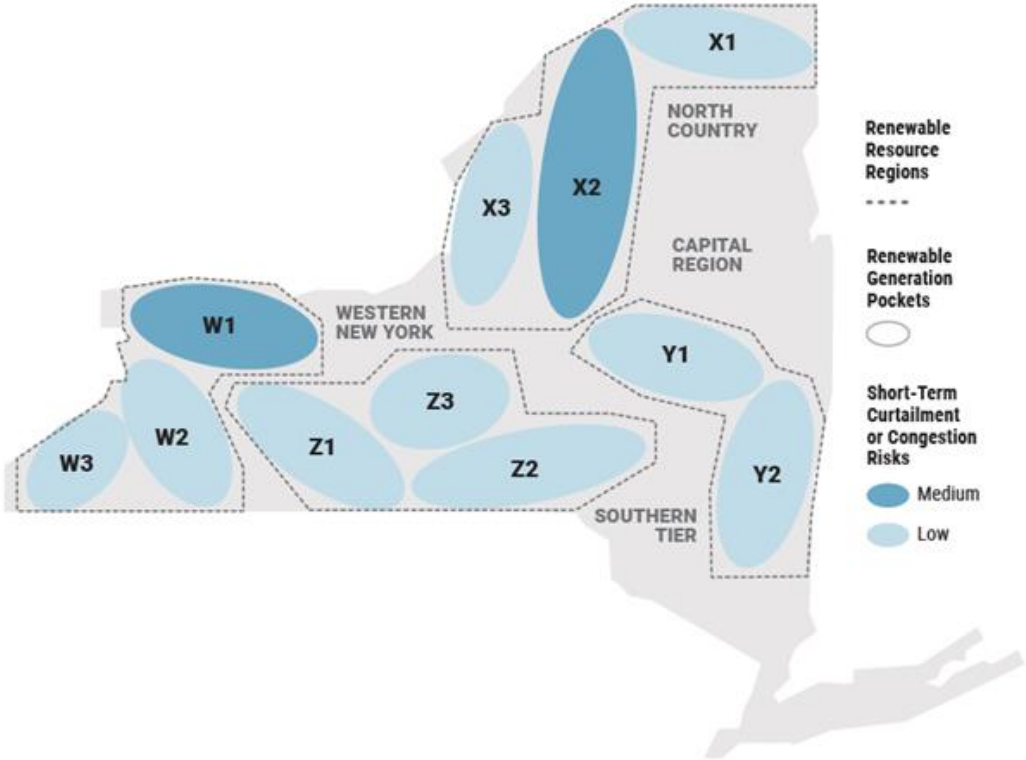
Renewable Pocket Curtailment Risk



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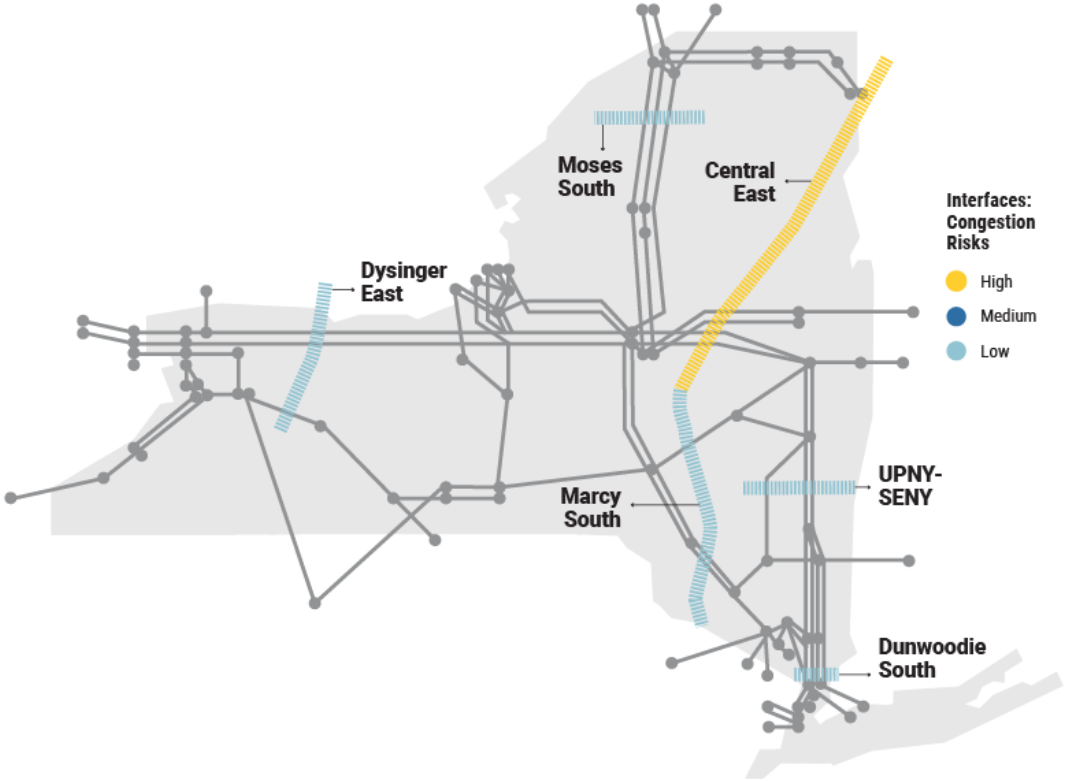
Bulk Interface Curtailment Risk



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Key Findings: Demand

- ✓ Electric energy consumption is projected to increase significantly in response to the economic development and decarbonization energy policies. Resources and the transmission system necessary to meet the changing energy demand need to evolve accordingly.
- ✓ Siting large loads in electrical proximity to renewable resources, or siting resources near large loads, may benefit both the loads and the resources, particularly if located upstream of known constraints.

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Key Findings: Supply Resources

- ✓ Dispatchable emission-free resources must be developed to provide the capacity, energy, and other essential grid services required to achieve the policy mandate for a zero-emissions grid by 2040.
- ✓ New York will require three times the capacity of the current New York generation fleet to meet projected future electricity demands.
- ✓ The coordination of new generator additions and existing generator retirements is essential to maintain the reliability of the New York power system while simultaneously pursuing achievement of CLCPA.
- ✓ Uncertainty in siting new renewable generation could lead to delays in or inefficient expansion of the transmission and distribution systems.

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Key Findings: Transmission

- ✓ Historic levels of investment in the transmission system are happening but more will be needed.
- ✓ Actionable expansion opportunities: To fully utilize the transmission facilities already in place, additional dynamic reactive power support must be added to the grid in upstate New York to alleviate curtailment over the Central East interface.
- ✓ Opportunities for further transmission investment in Western and Northern New York should be monitored as resources are developed in those regions.
- ✓ Planning energy exchange with neighboring systems is becoming more complex and will be increasingly so in the future as each system transitions to more decarbonized systems.

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Comprehensive Reliability Plan (CRP)

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2023-2032 CRP Findings

Changing Conditions

- The pace of fossil generator retirements exceeds the pace of new resource additions.
- Growth in demand, driven by electrification of heating, cooking, and transportation, is forecasted to have profound impacts.
- The ability to serve forecasted demand in New York will be more challenging as the grid transforms from a summer to a winter-peaking system.
- The reliance on dual-fuel resources will increase over the next decade.

Added Risks

- Added demand from new, large industrial customers creates the potential for a statewide resource deficiency.
- New York Power Authority's small natural gas plants will be phased out by December 2030.
- Extreme weather conditions such as heatwaves and cold snaps present operational challenges without additional resources.
- Planning for more extreme system conditions is currently beyond established reliability design criteria.

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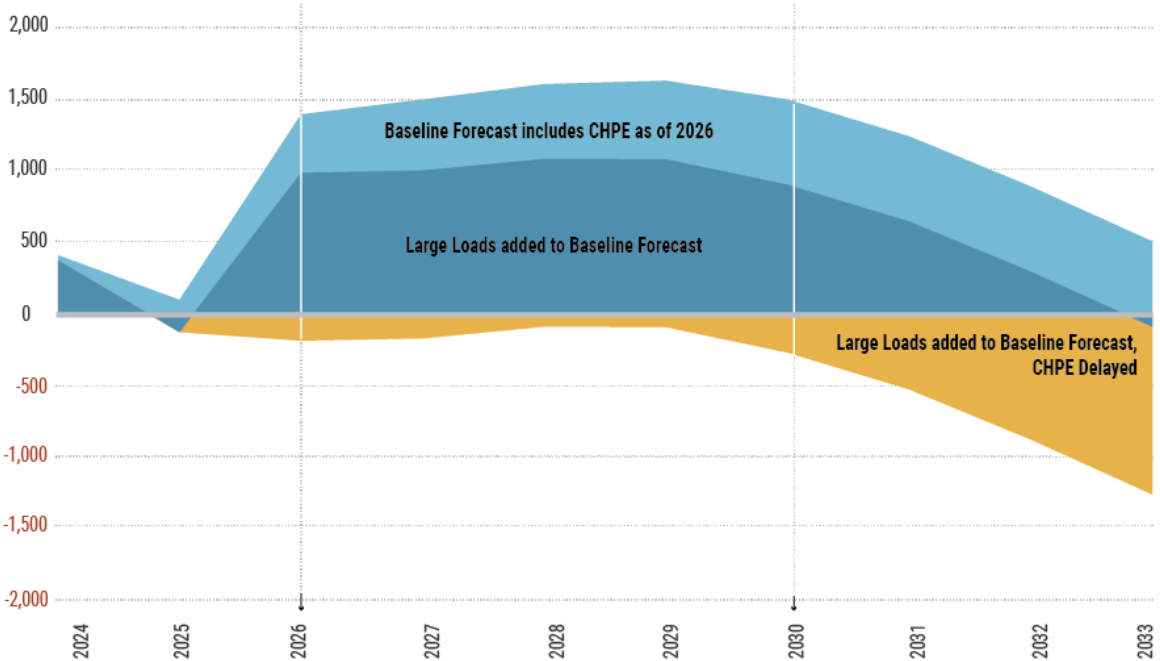
Statewide Reliability Margin – Summer, Expected Weather



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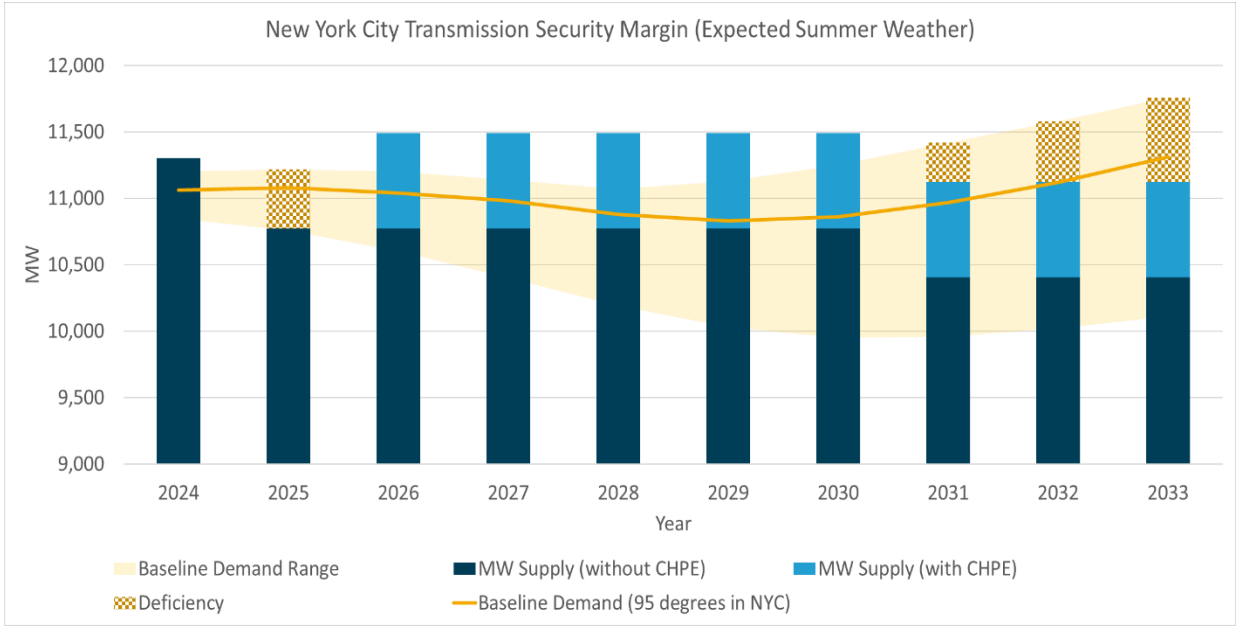
Impact of NYPA Small Plant Phase-Out

- New York City will have a transmission security deficiency starting in 2031 should NYPA's small gas plants (517 MW) retire in December 2030 without replacement resources.
- The deficiency worsens to over 600 MW by 2033 when considering the higher range of the forecast, and would be far worse without the CHPE project in service.



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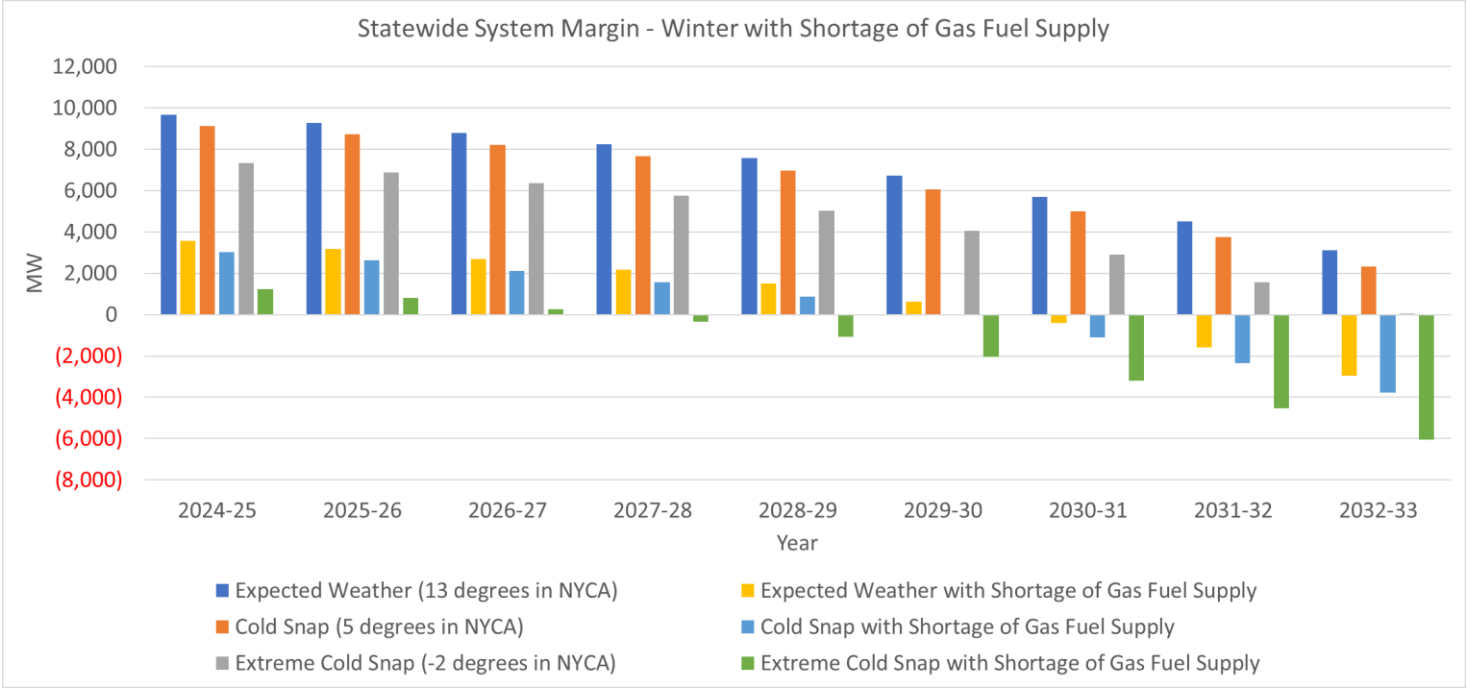
Impact of Winter Cold Snaps and a Potential Gas Fuel Shortage



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Reliability Needs Assessment (RNA)

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2024 RNA – A Look Ahead

- **The 2024 RNA will evaluate grid reliability from 2028 to 2034 and will closely evaluate risk factors, such as:**
  - Winter system conditions considering potential gas unavailability
  - Large industrial and other energy-intensive loads
  - Anticipated generator deactivations that could potentially lead to deficiencies in reliable electric service over the planning horizon.
- **Based on preliminary data, the upcoming RNA may identify actionable reliability needs driven by planned generator retirements outpacing new supply and growing demand**

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Questions?