1. Electricity

Draft New York State Energy Plan

July 2025

Key Findings

- **New York State is a leader in the deployment of clean energy resources to meet demand and preserve reliability**. The State should continue to support the deployment of clean energy resources as well as strategically navigate challenges (including federal policy uncertainty and siting and permitting hurdles) that affect the pace of progress.
- **The State should continue to leverage and expand the deployment of storage and demand-side resources**, including energy efficiency measures and flexible technologies, to lower the cost of the clean energy transition and to enhance grid reliability.
- **The State will need to be strategic in identifying and integrating clean firm technologies** that have the attributes necessary to support the achievement of a zero-emissions electric grid by 2040.
- **Continued State action to advance smart and strategic energy system planning is critical** to enhance system reliability and drive down the cost of necessary transmission and distribution system investments. These planning efforts are particularly important considering the anticipated economic-development-driven load growth and long-term electrification of transportation and buildings.
- **The State should continue to evaluate wholesale market and retail rate structures** to ensure they properly value and compensate new energy resources and market services and prioritize energy affordability for consumers. This will attract and maintain the resources and services needed for the future electric grid.
- **Future investments in our energy system should be designed to withstand the impacts of a changing climate.**

Key Terms

- **Bulk Power System:** Operated by the NYISO, which generally consists of transmission lines operating at 230 kilovolt (kV) and above and certain lower voltage facilities, which the NYISO manages to ensure system reliability. The bulk power system in New York consists of approximately 4,100 miles of high-voltage transmission lines.
- **Electric Peak Demand:** The highest actual average hourly load that occurred during a calendar year. Given that the electric transmission and distribution systems are designed and built to serve peak load, reducing peak demand is important for improving system efficiency, reducing wholesale electricity prices, and delaying the need for additional infrastructure.
- **Installed Capacity:** The amount of electric power that can be generated in the state.
- **Install Reserve Margin (IRM):** The IRM represents the amount of generation capacity that must be in place to ensure an acceptable level of reliability. The IRM is measured by the amount of generation and other capacity resources above 100 percent of forecasted peak load that must be available to serve all customers without interruption.
- **Joint Utilities (JU):** The Joint Utilities are comprised of Central Hudson Gas and Electric Corporation, Consolidated Edison Company of New York, Inc. ("Con Edison"), New York State Electric & Gas Corporation, Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid"), Orange and Rockland Utilities, Inc. and Rochester Gas and Electric Corporation. Together, the Joint Utilities provide electric service to over 13 million households, businesses, and government facilities across New York State.
- **Load Factor:** Load factor is a measure of the degree of uniformity of demand over a period of time, usually one year, and equivalent to the ratio of average demand to peak demand expressed as a percentage. It is calculated by dividing the total energy provided by a system during a period by the product of peak demand during the period and the number of hours in the period.[1]
- **Load-Serving Entity (LSE):** A retail electric service provider (e.g., a utility) that is obligated to procure or purchase wholesale electricity to serve its end-use customers.
- **The New York Control Area:** The New York Control Area (NYCA) is comprised of eleven geographic zones (also referred to as "load zones") from western New York (Zone A) through Long Island (Zone K).[2]
- **Strike Price:** The strike price a predetermined fixed price at which the owner of an option can buy or sell an underlying asset.

[1] North American Energy Standards Board Wholesale Electric Industry Glossary.

[2] NYISO Comprehensive Reliability Plan https://www.nyiso.com/documents/20142/2248481/2023-2032-Comprehensive-Reliability-Plan.pdf

1. Overview

The availability of reliable electric power at reasonable rates is the backbone of the State's economy and critical to public health and safety. Economic growth, changes in demand patterns, and environmental policy objectives do and will continue to drive changes in both the electric supply portfolio and the State's power delivery systems. These changes must be managed within the constraints imposed by federal and State reliability requirements while protecting New York ratepayers. New York has successfully managed significant system changes over the last decade, but the pace of decarbonization and the emergence of new sources of energy demand present significant challenges.

1.1. Electric Industry Participants and Regulatory Oversight Organizations

This section describes the key participants in the electric power sector.

The electric industry in New York today is comprised of investor-owned utilities, governmental utilities, generation companies, transmission-only companies, and energy service companies (ESCOs). The roles of each of these as participants in the energy sector are regulated by the Federal Energy Regulatory Commission (FERC) and/or the Public Service Commission (PSC). In the late 1990s, New York's investor-owned utilities sold their major generation assets to independent power companies, while retaining their transmission and distribution delivery systems and customer service functions. Independent power producers now own and operate most of the power plants that supply the electricity consumed in the State. Other industry participants include governmental utilities, such as the New York Power Authority (NYPA), the Long Island Power Authority (LIPA), municipally owned electric utilities, and rural electric cooperatives. In addition, since the early 2000s, independent transmission companies (ITCs) have had a significant role as developers and owners of new bulk power transmission facilities.

The **PSC** regulates the State's electric, gas, steam, telecommunications, and water utilities and is charged by law with the responsibility of setting rates and ensuring the provision of safe and reliable service in New York. The PSC exercises its regulatory oversight primarily through utility rate cases, where it sets performance requirements and establishes the rates utilities are allowed to charge their customers, among other things. Additionally, the PSC has important powers to oversee reliability and to require the construction of facilities, when necessary.

FERC is the federal agency that regulates wholesale sales of hydroelectric power, electric, gas, and oil and sets rates for transmission in interstate commerce. Among other electric energy-related responsibilities, the U.S. Energy Policy Act of 2005 gave FERC additional responsibilities in the areas of interstate electric transmission siting and planning. Section 215 of the Act expanded FERC's authority to include oversight and enforcement of mandatory reliability rules developed and administered by the North American Electric Reliability Corporation (NERC) (see below).

The **New York Independent System Operator, Inc.** (NYISO) is the FERC-approved entity established in 1999 as the transmission system operator and administrator of wholesale energy markets for New York. The NYISO is organized as a not-for-profit corporation governed by an independent board of directors consisting of ten members with varying backgrounds in the power industry, environment, and finance. The NYISO performs its functions in accordance with its FERC-approved tariffs.

The NYISO provides the platform for wholesale sales of electric energy and related services provided by generators and other market participants. The utilities, in their role as Load Serving Entities (LSEs), purchase the energy and services needed to serve their customers in the NYISO markets.

The New York Control Area (NYCA) is comprised of eleven geographic zones (also referred to as "load zones") from western New York (Zone A) through Long Island (Zone K).[3] A map of the NYISO load zones is shown in Figure 1.

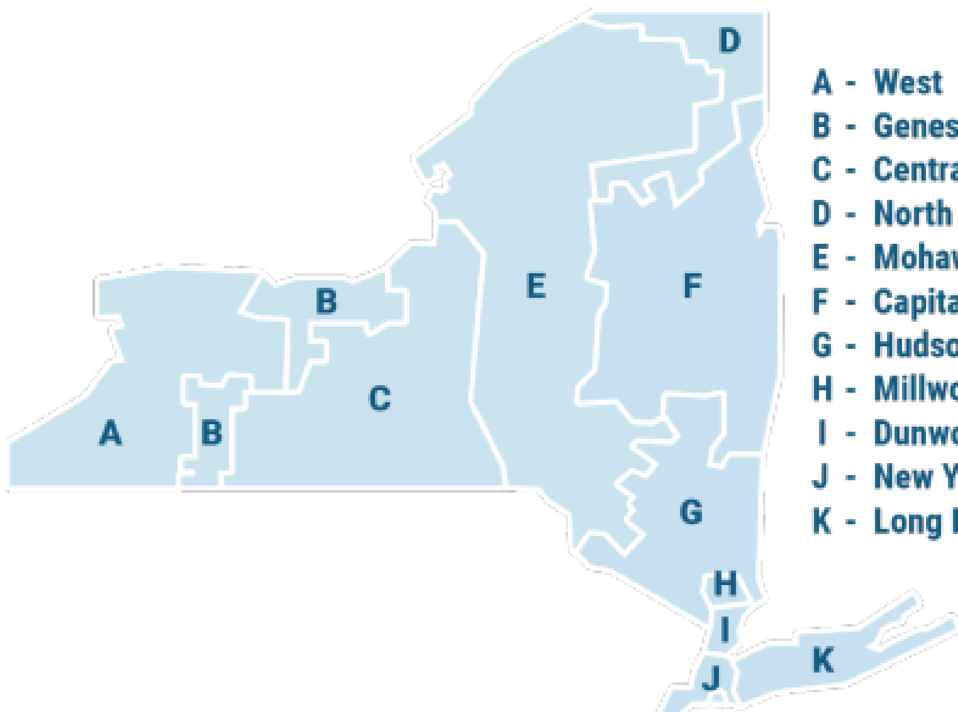

Figure 1: NYISO Load Zone Map

Source: NYISO Comprehensive Reliability Plan

NERC is an independent not-for-profit corporation with the responsibility to ensure the reliability of the North American bulk power system through the establishment and enforcement of reliability standards. NERC oversees eight regional reliability entities that encompass the interconnected power systems of the contiguous United States, Canada, and a portion of Baja California in Mexico. NERC's activities outside of U.S. boundaries related to the reliability of the bulk-power system are recognized and overseen by the appropriate governmental authorities in that country.

The **Northeast Power Coordinating Council (NPCC)** is a not-for-profit corporation responsible for promoting and enhancing the reliability of the international, interconnected bulk power system in northeastern North America. NPCC's regional entity division operates under a delegation agreement

[3] NYISO Comprehensive Reliability Plan https://www.nyiso.com/documents/20142/2248481/2023-2032-Comprehensive-Reliability-Plan.pdf

with NERC. Its geographic region includes the State of New York and the six New England states as well as the Canadian provinces of Ontario, Québec, New Brunswick, and Nova Scotia. NPCC establishes regional reliability criteria that may be more specific or more stringent than NERC's reliability standards. NPCC responsibilities include:

- Development of regional reliability standards and regional-specific criteria, compliance assessment, monitoring, and enforcement;
- Administration and enforcement of continent-wide and regional standards in coordination with NERC; and
- Coordination of system planning, design, operations, and reliability assessment among member planning areas, transmission owners, and others.

The **New York State Reliability Council (NYSRC)** was approved by FERC as part of the establishment of the NYISO and the wholesale markets. Pursuant to Section 215 of the Federal Power Act, the State of New York may promulgate and enforce reliability standards that are more specific or more stringent than NERC standards or NPCC criteria so long as those standards do not degrade reliability outside of New York. The NYSRC's rules set forth requirements that are more stringent or specific than either NERC standards or NPCC criteria and are adopted by the PSC. The NYSRC is also responsible for the establishment of the annual statewide installed reserve margin (IRM) for the New York power system. The IRM represents the amount of generation capacity that must be in place to ensure an acceptable level of reliability. The IRM is measured by the amount of generation and other capacity resources above 100 percent of forecasted peak load that must be available to serve all customers without interruption. Both FERC and the PSC approve the IRM. The NYISO uses the IRM to establish the amount of generating capacity that must be located within certain transmission-constrained regions (such as New York City and Long Island).

Transmission Owners (TOs) are the investor-owned utilities, public authorities, or independent transmission providers that own transmission services under FERC-approved tariffs and State regulatory oversight. Investor-owned utilities are responsible for developing local transmission plans to provide safe and reliable service within their franchise areas that meet State, regional, and national reliability standards and/or criteria.

2. State of the Sector and Progress Report

The following section describes energy use and demand, the supply mix and pricing in New York during the 2013–2023 period.

2.1. Electricity Requirements: Annual Usage and Peak Demand

New York's recent electricity usage and peak demand are described below along with data on the average 5-year growth rate (2019 through 2023) of these parameters.

2.1.1. Electricity Usage

As noted above, New York State is divided into eleven load zones. Figure 2 shows electric energy usage in these NYCA load zones for year 2023, and the 5-year historic average annual growth rate for each. This provides both a snapshot of usage in 2023 along with recent trends in energy usage over the period 2019-2023. For example, Zone G (Hudson Valley) consumed approximately 9,014 gigawatt hours (GWh) of energy and experienced a 1.3 percent average annual decline in consumption over the 5-year period. Negative average annual growth is evident in all zones except D (North) with a positive growth rate of 3.4 percent. Zone J (New York City) and Zone K (Long Island) usage decreased by an average of 1.5 and 1.2 percent annually, respectively, during this 5-year period.

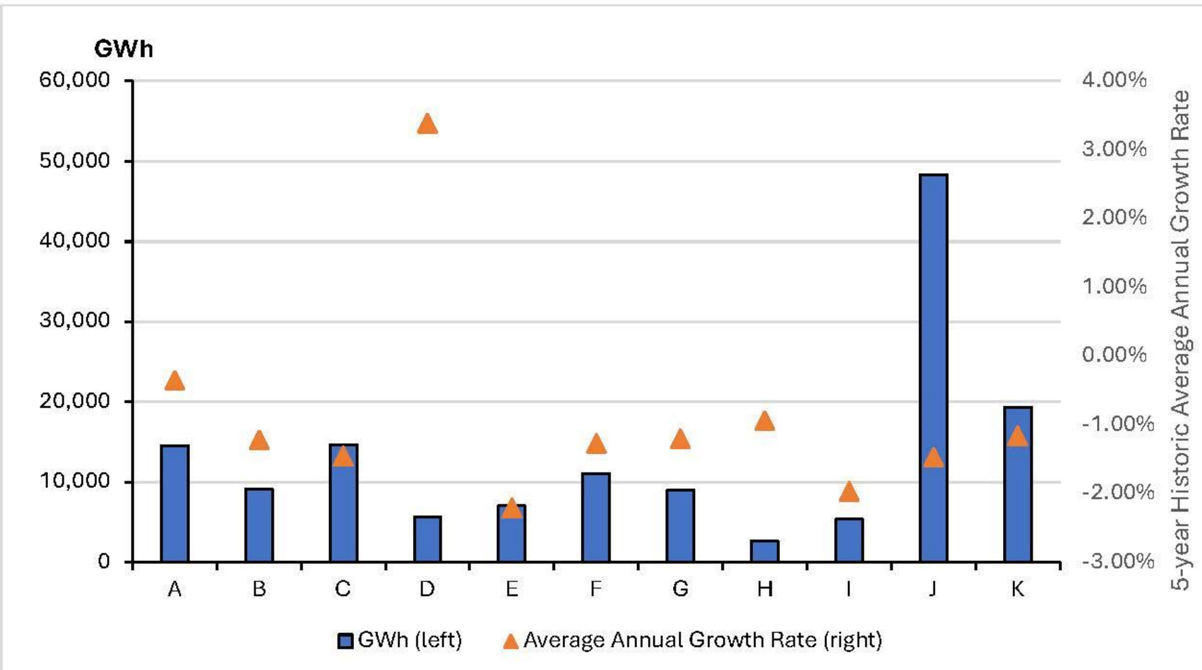

Figure 2: New York State 2023 Zonal Electricity Usage and 5-Year Growth Rate

Source: NYISO 2024 Load and Capacity Data Report

2.1.2. Electric Peak Demand

The electric peak demand is the highest actual average hourly load that occurred during a calendar year. Given that the electric transmission and distribution systems are designed and built to serve peak load, reducing peak demand is important for improving system efficiency, reducing wholesale electricity prices, and delaying the need for additional infrastructure.

Figure 3 shows the 2023 electric peak demands for each of the NYCA load zones and the average annual 5-year growth rate of peak demand for each zone. No individual zone experienced significant positive peak demand growth, with the majority of load zones seeing negative peak demand growth and no individual load zone peak increasing more than 0.40 percent annually.

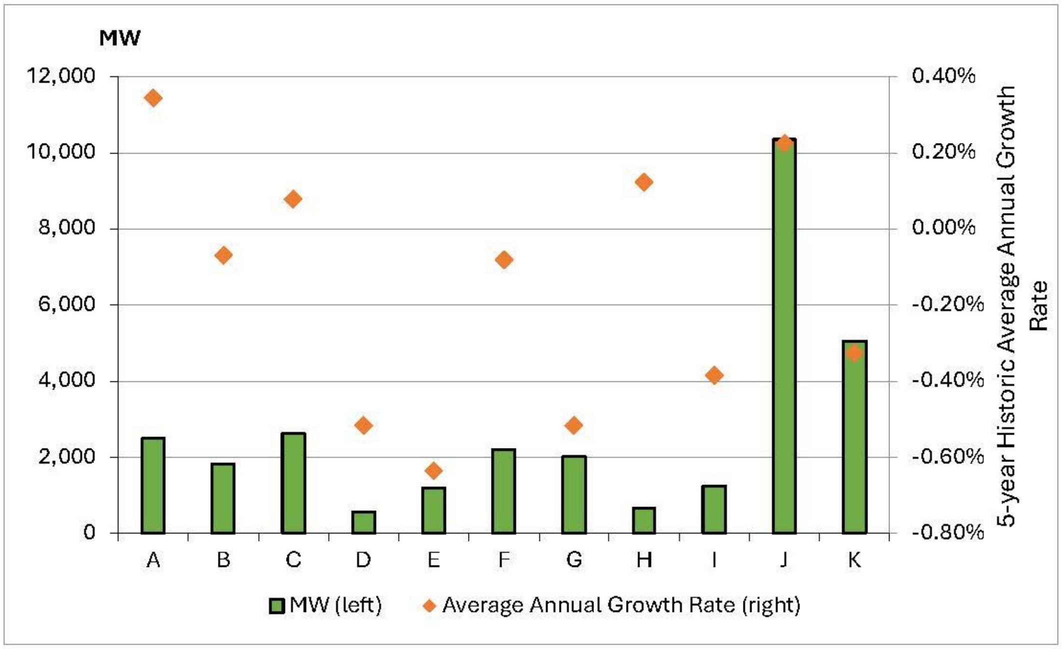

Figure 3: New York State 2023 Zonal Electric Peak Demand and 5-Year Growth Rate
Source: NYISO 2024 Load and Capacity Data Report

2.1.3. Electricity Sales by Customer Sector

Figure 4 depicts 2023 New York electricity sales by sector, with the 5-year average annual growth for each sector also shown. Sales in the commercial sector made up approximately 51 percent of total sales in 2023, compared to approximately 52 percent in 2019. For all sectors combined, sales decreased by an average of 0.9 percent over the 5-year period.

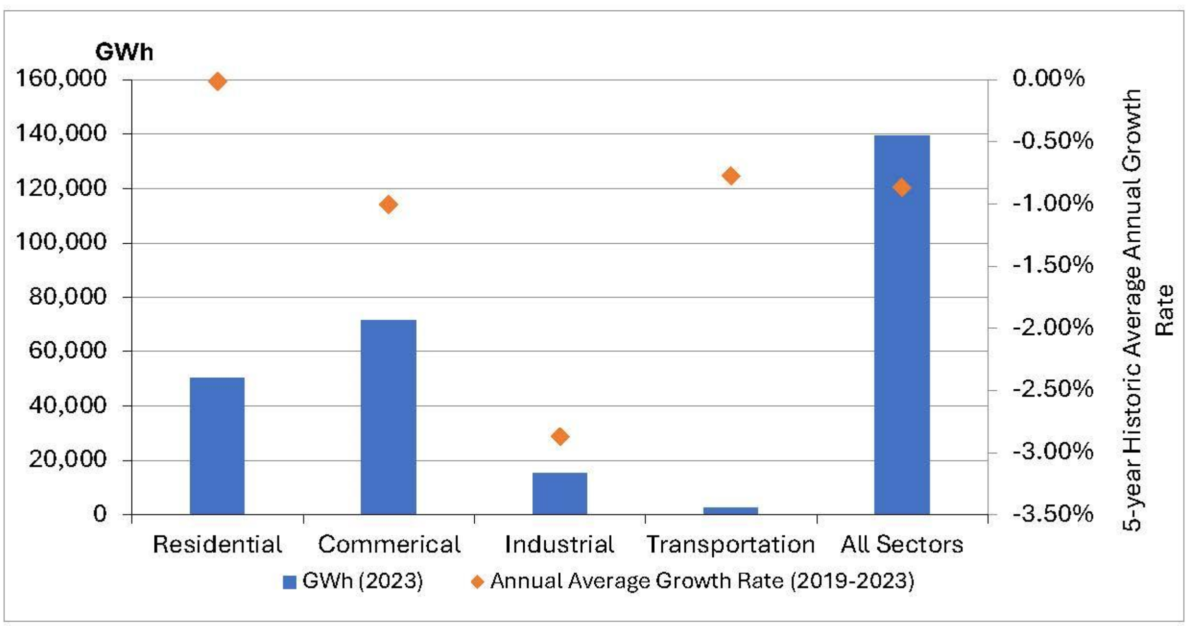

Figure 4: New York State 2023 Electric Sales by Sector and 5-Year Growth Rate
Source: EIA, data.ny.gov. 2023 Retail Sales of Electricity by State by Sector by Provider.

2.1.4. Trends in Annual Electricity Usage

Figure 5 shows the slight downward trend in historical electric energy usage for upstate, downstate and the entire New York State between 2013 and 2023.[4] On average, the statewide or NYCA electric energy usage decreased by 1.0 percent annually; this trend remains constant even when broken down by geographic region.

For the past ten years, energy usage in load zones J and K (New York City and Long Island, respectively) has consistently accounted for 46 percent of electric energy usage statewide, however, energy usage in those zones has decreased by a total of 7,800 GWh over that same period.

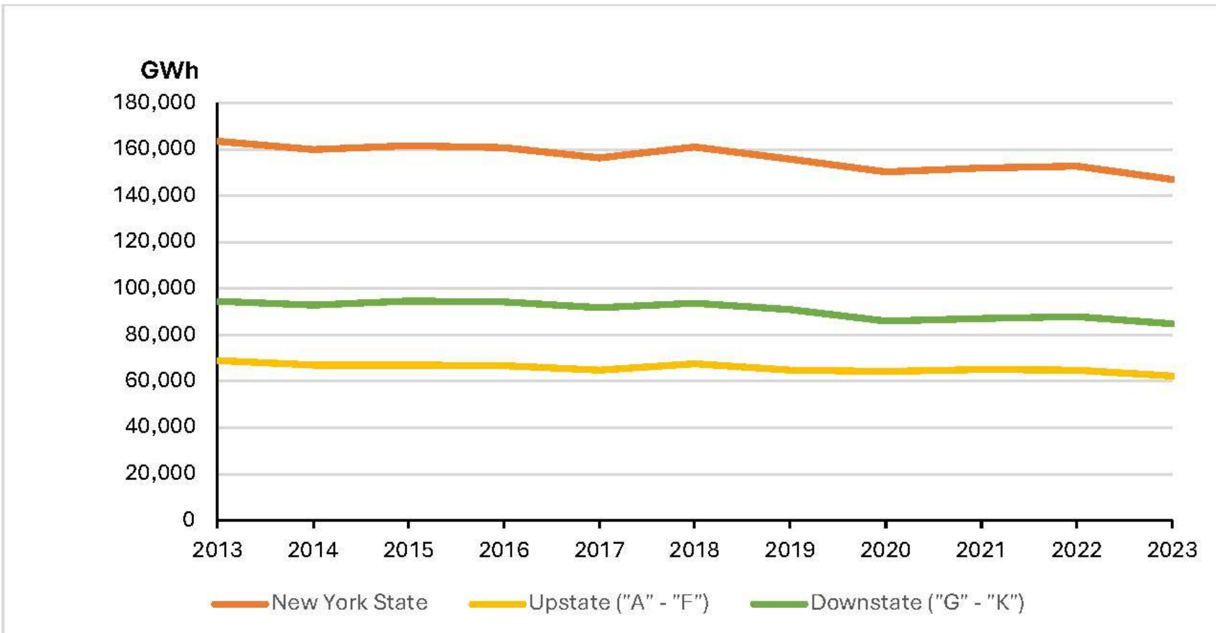

Figure 5: Annual New York State Electric Energy Usage, 2013-2023

Source: NYISO 2024 Load & Capacity Report

2.1.5. Trends in Peak Demand

Figure 6 illustrates the upstate, downstate, and statewide annual electric peak demands from 2013 through 2023.[5] While statewide electric energy usage declined by an average of 1.0 percent annually over that period, the statewide electric peak demand declined by an average of 1.1 percent over the same period. It should be noted, however, that the all-time NYCA historic electric peak demand (33,956 MW) occurred at the outset of this measurement period, in 2013.

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[4] NYISO 2024 Load & Capacity Data Report (Gold Book). April 2024.https://www.nyiso.com/documents/20142/2226333/2024-Gold-Book-Public.pdf

[5] NYISO 2024 Load & Capacity Data Report (Gold Book). April 2024. https://www.nyiso.com/documents/20142/2226333/2024-Gold-Book-Public.pdf

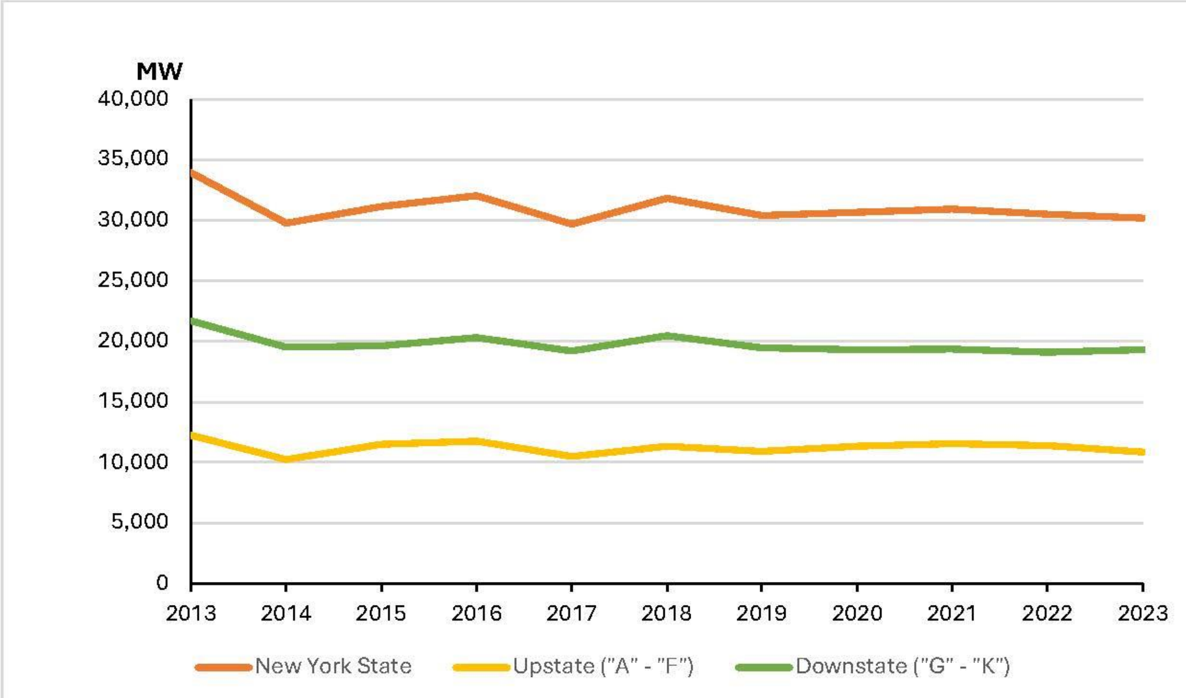

Figure 6: New York State Annual Electric Peak Demand, 2013-2023

Source: NYISO 2024 Load & Capacity Report

2.1.6. Load Factor

Load factor is a measure of the degree of uniformity of demand over a period of time, usually one year, and equivalent to the ratio of average demand to peak demand expressed as a percentage. It is calculated by dividing the total energy provided by a system during a period by the product of peak demand during the period and the number of hours in the period.[6] A high load factor indicates high utilization of a system's equipment and is a measure of efficiency. Figure 7 shows the load factor trends statewide and for upstate (Zones A through F), and downstate (Zones G through K) from 2013 to 2023.[7] Expanding programs for mandatory hourly pricing, demand response, and advanced metering are being pursued to improve the load factor throughout the State.

[6] North American Energy Standards Board Wholesale Electric Industry Glossary.

[7] NYISO 2024 Load & Capacity Data Report NYISO 2024 Load and Capacity Data Report. https://www.nyiso.com/documents/20142/2226333/2024-Gold-Book-Public.pdf

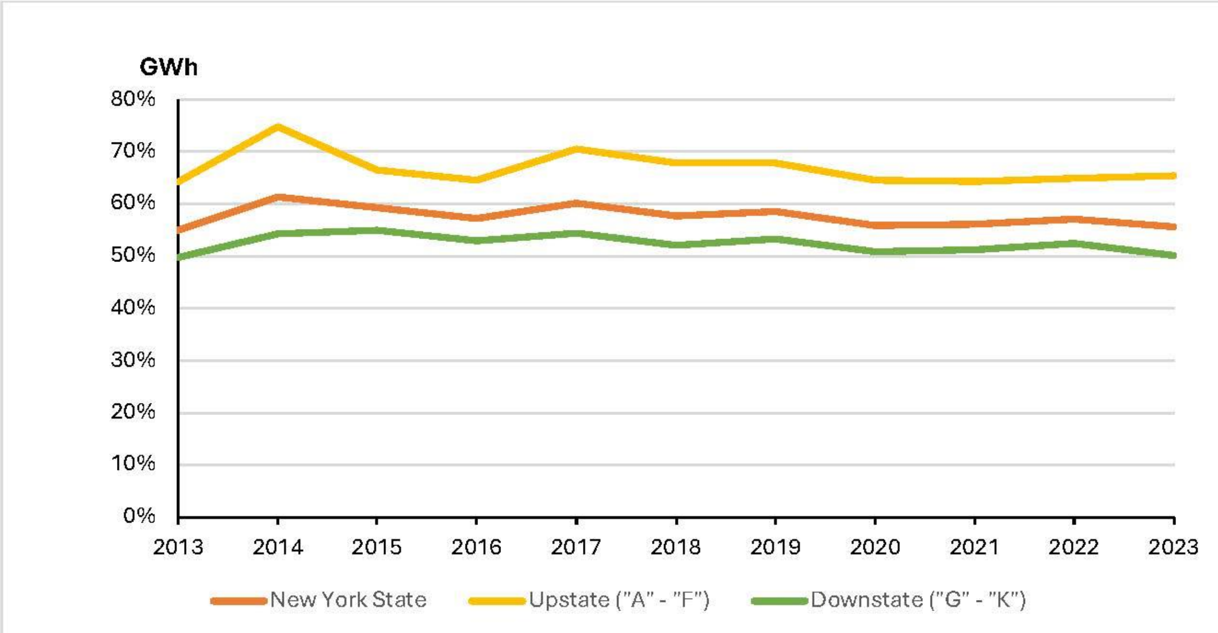

Figure 7 New York State Annual Load Factor, 2013-2023

Source: NYISO 2024 Load & Capacity Report

2.2. Electricity Supply

This section provides a current snapshot of the generation and storage resources available to meet electricity usage and demand requirements in New York. The data shown below indicates that New York's electricity system is supported by a diverse fuel mix, with clean firm resources (i.e., nuclear and hydroelectric generation), growing renewable contributions, and dual-fuel flexibility to ensure system reliability as the State advances the decarbonization of the electric system and its clean energy agenda.

2.2.1. Generation Mix

New York's electricity generation sector is comprised of the following types of generation facilities:[8]

- Fossil fuel-fired
- Nuclear
- Hydropower
- Wind
- Solar
- Energy storage

[8] Coal is not used for electricity generation in New York. The last remaining coal-fired power plant closed in 2020, following New York State Department of Environmental Conservation's (DEC) adoption of revisions to 6 NYCRR Part 251 in 2019 establishing carbon dioxide (CO_2) emission limits for existing power plants.

In 2023, renewable resources, including hydroelectric, wind, and solar accounted for approximately 27 percent of the State's in-state electricity generation. Meanwhile, nuclear resources contributed about 22 percent of the in-state electricity generation. Combustion sources, including natural gas, oil, biofuels, and solid waste generation, produced roughly 51 percent of in-state electricity generation. Figure 8 below illustrates New York's 2024 Summer generating capability in MW and the 2023 energy production in GWh by fuel type.[9] It also reflects the average capacity factor[10] for each type of generation.

Figure 8 also reflects that New York's nuclear facilities had the highest aggregate capacity factor (94 percent) of all fuel types in 2023. Unlike natural gas and oil units, nuclear and hydroelectric units are often considered to be "base load" units. Base load units are generally less sensitive to wholesale electricity market clearing prices, largely due to the lower fuel costs inherent to these units. However, in recent years, due to relatively low natural gas prices, more natural gas plants function as "base load" units, operating at higher capacity factors than in previous years.

Generators fueled by natural gas or oil (NG, Oil, and NG & Oil shown in the figure below) accounted for 69 percent of New York's summer generating capability (MW). However, these units accounted for only 49 percent of total in-state energy production (MWh) resulting in an aggregate capacity factor of 25 percent.

The State's fleet of fossil-fuel-based generation includes more than 10,000 MW, about 25 percent of the State's total generating capacity, that has been in operation for more than 50 years; 7 percent of in-State generation comes from these units. As discussed in the NYISO 2025 Power Trends Report, the aging fleet is concerning given the ongoing ability for these units to provide essential reliability services to the grid at a time when reliability margins are shrinking.[11]

In 2024, the summer generating capability of generators in New York was 37,375 MW.

Figure 9 shows the combined 2024 Summer generating capability in MW in load zones J and K (New York City and Long Island) and the 2023 energy production in GWh by fuel type, as well as each fuel type's aggregate capacity factor. 97 percent of energy production in New York City and Long Island is fueled by natural gas, oil, or both and most of the generators have dual-fuel capability, i.e., they can burn both natural gas or oil, signifying the importance of having the ability to shift to oil should there be natural gas delivery problems in New York City and Long Island.

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9 NYISO 2024 Load & Capacity Data Report NYISO 2024 Load and Capacity Data Report. https://www.nyiso.com/documents/20142/2226333/2024-Gold-Book-Public.pdf

10 Capacity factor is a measure of how much a power plant actually generates electricity compared to its maximum potential output.

11 NYISO 2025 Power Trends Report. https://www.nyiso.com/power-trends

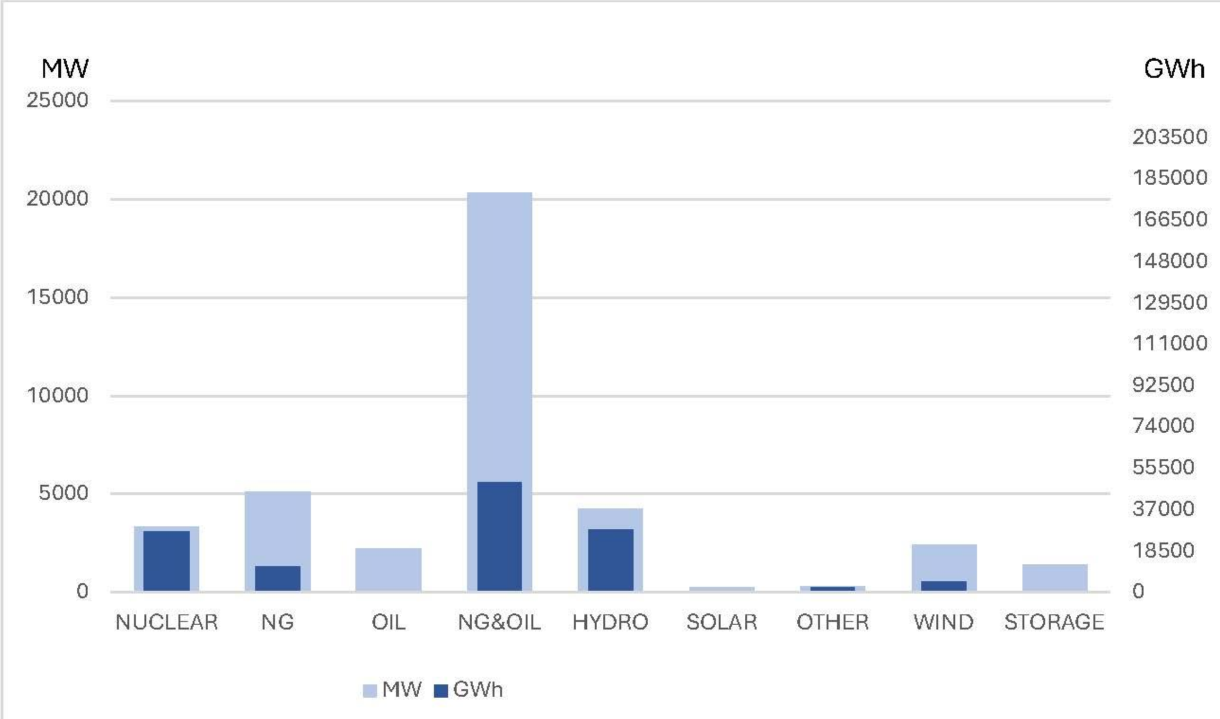

Figure 8: New York State 2024 Generation Capacity and 2023 Energy Production Type by Fuel

Source: NYISO 2024 Load and Capacity Data Report

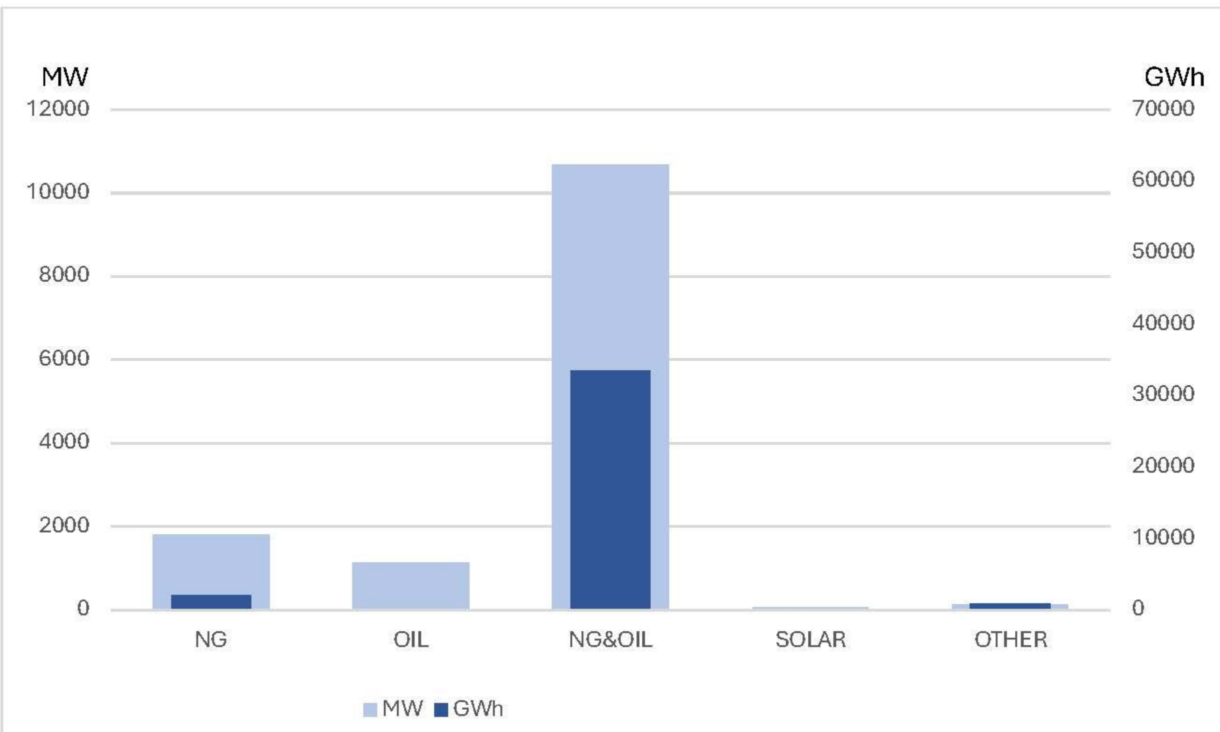

Figure 9: New York City and Long Island 2024 Generation Capacity and 2023 Energy Production by Fuel

Source: NYISO 2024 Load and Capacity Data Report

Fuel Diversity

New York has a diverse fuel mix. This diversity can benefit the State by mitigating the impacts of supply disruptions for any given fuel source, and by mitigating price volatility due to fuel price fluctuations. This, however, is not the case in New York City and on Long Island, which rely heavily on gas-fired generation, although most of those units also are able to burn oil.

Half of New York fossil fuel generation capacity facilities can burn at least two fuels. In the event that the supply source for one fuel is disrupted, these units can burn an alternate fuel. This diversity provides New York consumers with a resilient electricity supply, should one fuel supply source be compromised, particularly at a time of high end-user demand on the electric system.

2.2.2. Electricity Supply Trends

Figure 10 shows the generation by fuel type over the period 2013 to 2023.[12] Note that this data differs from that shown in Section 2.3.1. Where that data represents all of the in-State generation, the data in this section reflects all of the electricity needed to meet in-State demand (i.e., includes net interchange of imports/exports from neighboring regions). In 2023, renewable resources accounted for approximately 23 percent of the State's electricity needed to meet load, up from 18 percent in 2013. Meanwhile, nuclear resources contributed about 19 percent of the electricity needed to meet load in the State, compared to 27 percent in 2013. This decrease in nuclear resources is attributed to the closing of the Indian Point nuclear facility between 2020 and 2022. Fossil fuel generation, including natural gas, oil, and dual fuel generation, contributed more than 42 percent of statewide electricity needed to meet load in 2023, compared to 38 percent in 2013. The reliance on coal has decreased significantly in recent decades, with the last remaining coal-fired power plant closing in 2020, following New York State Department of Environmental Conservation's (DEC) adoption of revisions to 6 NYCRR Part 251 in 2019 to establish carbon dioxide emission limits for existing power plants. Net imports make up the remaining 15 percent of electricity needed to meet load in 2023, unchanged from the 15 percent in 2013.

Figure 11 shows the installed capacity by fuel type from the period 2013 to 2023.[13] In 2023, renewable resources accounted for approximately 21 percent of the State's installed capacity, compared to 19 percent in 2013. Fossil fuel generators make up the majority of capacity in the State, at 69 percent of capacity in 2024, compared to 66 percent in 2010. Most of the fossil fuel capacity is made up of dual fuel (natural gas and oil) units. Nuclear units make up 9 percent of capacity in 2023, compared to 14 percent in 2013. As noted above, this drop in capacity is attributed to the closing of the Indian Point nuclear facility that took place between 2020 and 2022. Additionally, since 2019 there have been 4,315 MW of generator deactivations and 2,274 MW of additions and uprates.[14]

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[12] NYISO Power Trends Reports, 2016-2024. Note the solar generation shown in Figure 10 refers only to utility-scale solar photovoltaics, and not behind-the-meter solar

[13] NYISO Capacity and Load Data Reports, 2010-2024. Note the solar capacity shown in Figure 11 refers only to utility-scale solar PV, and not behind-the-meter solar.

[14] NYISO Power Trends 2025, https://www.nyiso.com/power-trends

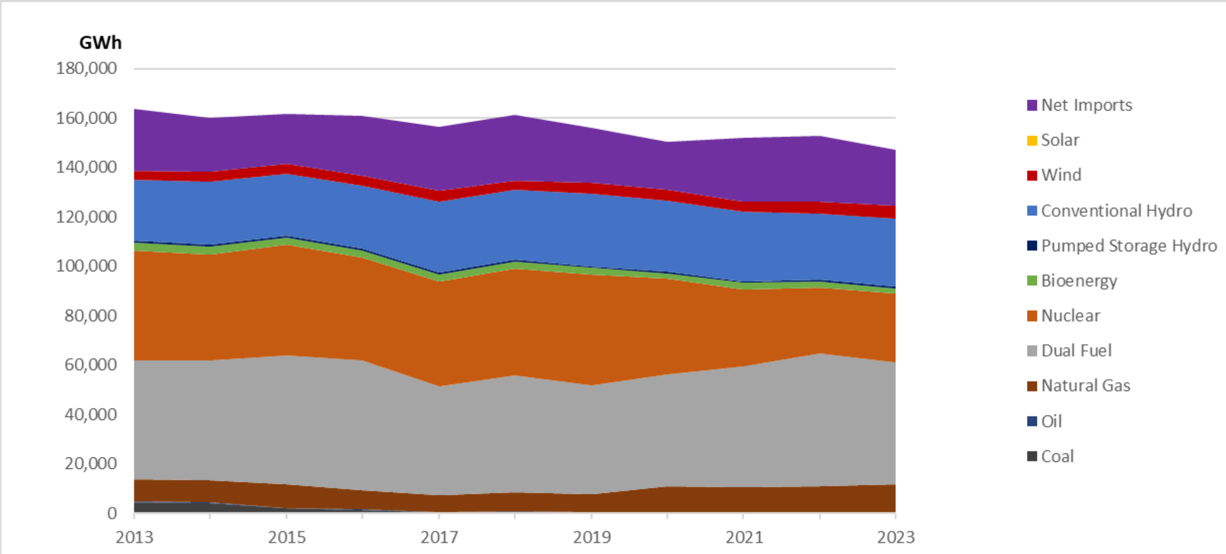

Figure 10: New York State Annual Electricity Generation by Fuel Type, 2013–2023

Source: NYISO Power Trends Reports, 2016–2024

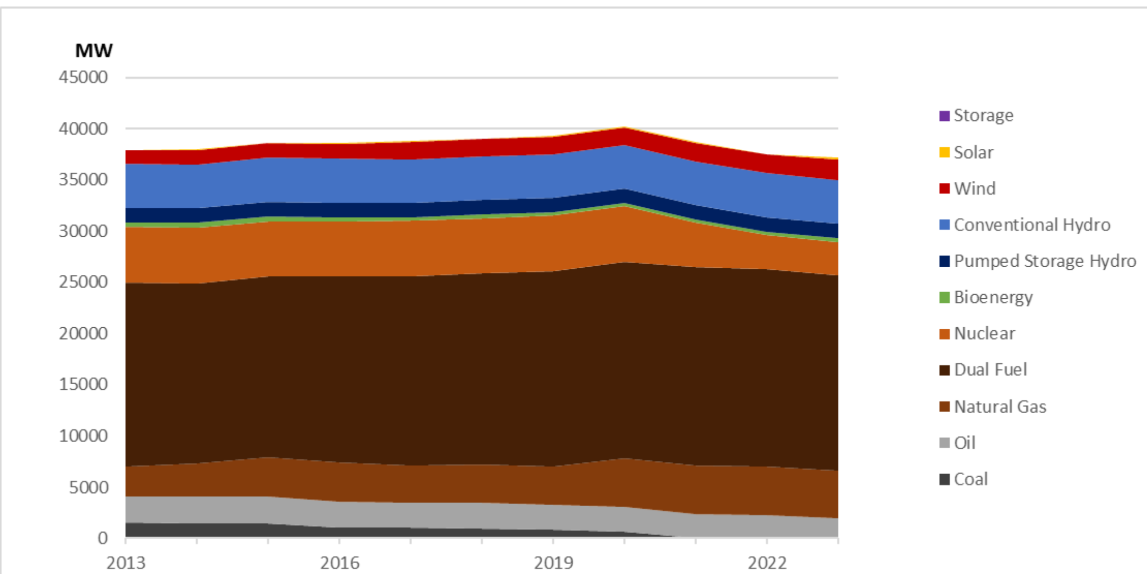

Figure 11: New York State Annual Electric Capacity by Fuel Type, 2013–2023

Source: NYISO Capacity and Load Data Reports, 2010–2024

2.3. Transmission and Distribution

The State’s transmission and distribution networks are designed to support a reliable and resilient electric system in New York State.

2.3.1. Transmission

Electric power transmission occurs between an electric generation station and a substation where the voltage is reduced, allowing it to be distributed either to a sub-transmission system or directly to a distribution system serving customer loads, neither of which is generally considered part of the bulk power system. The energy delivered to the bulk transmission system is normally transmitted at relatively high voltages to minimize power losses along the way. Bulk power typically is transmitted over long distances through overhead power lines, although in New York City underground circuits are used. The New York transmission system consists predominantly of alternating current (AC) transmission lines, similar to what exists in most of the U.S. Only a small portion of the New York system consists of direct current (DC) facilities.

Figure 12 displays the "bulk power system" operated by the NYISO, which generally consists of transmission lines operating at 230 kilovolt (kV) and above and certain lower voltage facilities, which the NYISO manages to ensure system reliability. The bulk power system in New York consists of approximately 4,100 miles of high-voltage transmission lines. The facilities that are not considered part of the NYISO-operated system include approximately 7,000 miles of 138-kV and 115-kV transmission lines.

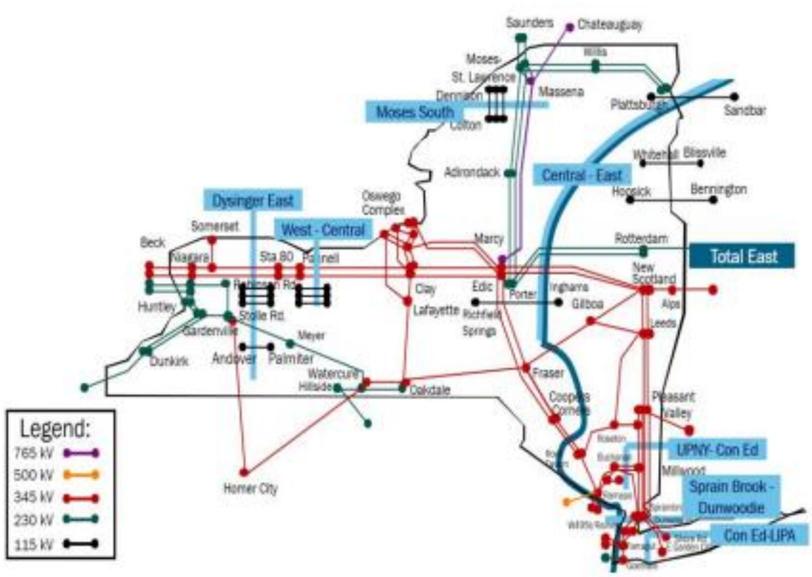

Figure 12 New York State Bulk Power System – NY Internal Interfaces

Source: NYISO Power Systems Fundamentals

The blue highlighted lines in Figure 12 display key transmission interfaces, which are groupings of transmission lines over which transfer capability is determined (Note: not all NYCA interfaces are shown).[15] Interface limits can create constraints on the flow of power, and some interfaces impact the flow of power more compared to others. The transfer capability is the measure of the ability of

[15] New York Independent System Operator, *Power System Fundamentals*, 2020.

interconnected electrical systems to reliably move power from one area to another over all transmission facilities (or paths) between those areas under specified system conditions.

The electric system is designed such that high-voltage, high-capacity lines are used to move power around the State. Closer to customer load, lines are operated at lower voltages and carry less electricity. While the higher-voltage lines deliver power across large areas, the lower-voltage lines generally consist of local distribution grids. This design tends to keep local problems isolated, so that a low-voltage system problem in one municipal or geographic area will not affect customer service in another. However, the bulk power system is closely interconnected; in the event of a system response to a large disturbance on the bulk power system in Florida, for example, effects can be seen in New York. This characteristic gave rise to the need for reliability standards that establish planning and operating protocols for the bulk power system, with the goal of preventing local system disturbances cascading into a neighboring system.

The NYISO and individual utilities work together to monitor and control the electric system constantly. System operators ensure that electricity production is instantaneously balanced with electric demand and that the system is operated reliably. Reliable operation of the system is guided by established rules that specify voltage, thermal, and other limits within which the system must be maintained. While the goal is to serve load at all times, even under contingency situations, i.e. unexpected equipment failure, the operating rules are designed to interrupt load temporarily, if necessary, to prevent physical damage to the system.

2.3.2. Distribution

The State’s electric utilities are responsible for operating and maintaining their respective distribution systems to supply electricity to meet their customers’ needs. Distribution systems are designed as either radial or network systems and can be located either overhead or underground.

Radial distribution systems consist of several primary circuits extending radially from a distribution substation. The radial system is principally an overhead system and subject to interruptions caused by tree contact, accidents, and lightning. It should be noted, however, that service interruptions on the radial system are mitigated by fusing and reclosers that isolate customers downstream from the fault. Customer impact can be mitigated further by isolating the cause of the outage through manually reconfiguring the circuit through field ties. In some instances, utilities have installed switching equipment that automates the reconfiguration process. Advances in technology are making automation more cost-effective and will be used more in the future.

A network system is most frequently found in high-load-density metropolitan areas because a dense population of customers affords the economical design and installation of redundant parallel lower voltage feeder cables, network transformers, and protective relays. By design, the network systems are more reliable than radial systems because service interruptions generally occur only when there is a failure within the connection to the customer, erroneous construction activities, or when the substation supplying the network suffers a complete collapse in its ability to serve the load. Consolidated Edison Company of New York, Inc.’s (Con Edison) extensive underground system is an example of such a network.

2.4. Electricity Cost Trends

The wholesale price of electricity varies over time and at different scales (i.e., at monthly and annual intervals); retail prices also have the potential to be volatile, largely driven by swings in the price of natural gas. The PSC requires that regulated utilities maintain supply portfolios in order to reduce commodity volatility in the prices charged to their residential, small commercial, and industrial customers. The supply portfolios include a combination of fixed hedges, indexed hedges, and, where applicable, their own generation; the balance of the supply portfolio is made up through spot market purchases.

It is important to note that electric market prices are dependent on present market conditions, and the utilities under PSC jurisdiction have no control over the market price. The cost of electricity is determined largely by the energy and capacity markets administered by the NYISO. As discussed above, the utilities do have the ability to mitigate the month-to-month volatility of end-use supply prices for their mass-market customers through hedging and their supply rate mechanisms. The end-use full-service mass market residential supply rate mechanisms have some flexibility, through the ability to spread large reconciliations over more than one month, a practice that utilities have utilized more frequently in the last several years.

The PSC requires the regulated electric utilities measure and monitor the price volatility of their supply portfolios and file quarterly reports. The Department of Public Service (DPS) regularly meets with each utility to discuss its hedging plan for the upcoming year as well as for future years. Such efforts to mitigate volatility have been consistently successful as the utilities' electric supply portfolio has consistently experienced less volatility as compared to the market.[16] This trend is expected to continue in future years.

This section provides an overview of wholesale energy market price and retail energy cost trends over the last 15 years to show the evolution of price and costs during this time period.

2.4.1. Wholesale Energy Market Prices

Since 1999, wholesale electricity prices have been determined primarily through the NYISO's energy markets. These Locational Based Marginal Prices (LBMP) in the NYISO grid consist of three key components: the Marginal Energy Price, the Marginal Loss Price, and the Marginal Congestion Price. These are described below.

- **Marginal Energy Price.** Represents the cost of producing the next unit of electricity to meet system demand at a specific location—essentially the price of electricity at the "reference point" (load-weighted average of system node prices).
- **Marginal Loss Price.** Captures the cost of transmission losses along the path to the load, caused by heat dissipation and other factors.

[16] Case 25-E-0239, 2025 Summer Electric System Preparations (issued May 15, 2025)

- **Marginal Congestion Price.** Reflects the cost associated with delivering electricity to a specific location when there are transmission constraints or congestion.

The data reported in Figure 13 illustrates wholesale price trends since 2010 and show a decline over that period, driven largely by declines in the price of natural gas. Also, transmission congestion at the Central East interface results in a difference in prices in Zone E and Zone F that is driven by a larger transmission congestion component of the LBMP in Zone F. However, these historical trends are not necessarily indicative of how wholesale prices may evolve in the future.

	A	B	C	D	E	F	G	H	I	J	K	NYS
2010	$40.43	$43.13	$44.17	$41.19	$46.27	$51.88	$54.43	$55.57	$55.25	$58.63	$64.77	$53.35
2011	$38.80	$41.58	$42.46	$39.36	$44.15	$48.06	$51.94	$52.84	$52.47	$56.07	$64.53	$51.13
2012	$32.38	$33.65	$34.16	$31.21	$35.18	$38.56	$39.88	$40.55	$40.42	$41.25	$53.56	$39.90
2013	$39.49	$39.33	$40.87	$35.79	$42.03	$53.23	$53.21	$54.29	$53.52	$55.30	$70.33	$51.58
2014	$49.16	$49.95	$52.99	$52.04	$55.41	$65.96	$64.70	$68.32	$63.65	$64.03	$73.14	$61.23
2015	$32.24	$29.52	$31.11	$26.59	$32.43	$40.91	$40.62	$42.05	$40.38	$40.73	$50.02	$38.71
2016	$27.52	$21.93	$23.10	$17.51	$22.97	$30.72	$30.43	$31.00	$30.56	$31.37	$39.98	$29.73
2017	$26.44	$24.58	$25.44	$20.55	$25.76	$32.91	$33.01	$33.87	$33.33	$34.73	$40.03	$31.90
2018	$34.22	$31.70	$32.91	$25.59	$33.26	$40.10	$39.39	$40.73	$39.50	$42.04	$48.96	$39.26
2019	$26.62	$21.67	$22.99	$18.80	$23.75	$29.21	$28.27	$29.07	$28.72	$30.16	$34.96	$28.27
2020	$18.97	$16.81	$17.19	$12.96	$17.17	$22.28	$21.48	$22.16	$21.82	$22.45	$30.54	$21.61
2021	$32.74	$30.61	$31.42	$23.24	$31.66	$46.20	$42.79	$44.08	$43.55	$44.35	$59.38	$41.65
2022	$59.82	$59.77	$61.82	$48.59	$64.50	$100.17	$88.46	$90.06	$88.85	$89.20	$103.13	$81.54
2023	$26.69	$27.50	$28.48	$24.61	$29.46	$38.67	$35.42	$36.16	$35.71	$35.50	$44.45	$34.15
2024	$33.89	$34.86	$36.37	$33.38	$38.35	$41.30	$40.94	$41.91	$41.03	$41.38	$47.88	$40.10

Figure 13: Annual Average Day-Ahead Zonal Electricity Prices (nominal $)

Note: Values were developed using NYISO day-ahead prices, weighted by total load as a proxy.

2.4.2. Wholesale Capacity Price Trends

To ensure resource adequacy, the NYISO administers an Installed Capacity (ICAP) market. Capacity suppliers commit to being available to serve load when called upon. The NYISO requires sufficient seasonal capacity to serve peak-load reliably. To accomplish this, LSEs, i.e., utility affiliates and ESCOs that supply electricity to end-use customers, are required to acquire capacity at least equal to their forecast peak load plus a required reserve margin (established annually) to ensure that sufficient resources exist to serve peak load. The current statewide minimum capacity requirement from May 2025 through April 2026 is 124.4 percent of forecasted peak load. Due to transmission constraints that limit the ability of upstate generation to serve downstate load, LSEs serving New York City, Long Island, and the Lower Hudson Valley must acquire a portion of their capacity from local generation. The current minimum locational requirements from May 2025 through April 2026 for New York City, Long Island, and the Lower Hudson Valley are 78.5 percent, 106.5 percent, and 78.8 percent of forecast peak load, respectively.[17]

Market participants can choose to buy or sell the required capacity either through bilateral contracts or through voluntary strip, monthly, or spot auctions. The strip auctions are held biannually and cover all six

[17] NYISO, "Locational Minimum Installed Capacity Requirements Study for the 2025-2026 Capability Year," accessed July 1, 2025, https://www.nyiso.com/documents/20142/49410485/2025-2026-LCR-Report-Clean.pdf/c8c65acd-0979-a67a-9fa8-f322536fc156.

months of the capability period. The monthly auctions allow for trading in any of the future months of that capability period. To enforce the purchase requirements, LSEs that do not procure enough capacity voluntarily through the strip or monthly auctions, or via bilateral transactions, must purchase the rest at a price determined in the spot auction, which is held at the end of each month, for the upcoming month's capacity.

Figure 14 depicts the trends in the overall annual cost of energy and capacity. These trends reflect the volatility of wholesale market prices and show that, since 2005, energy and capacity costs have decreased significantly overall.

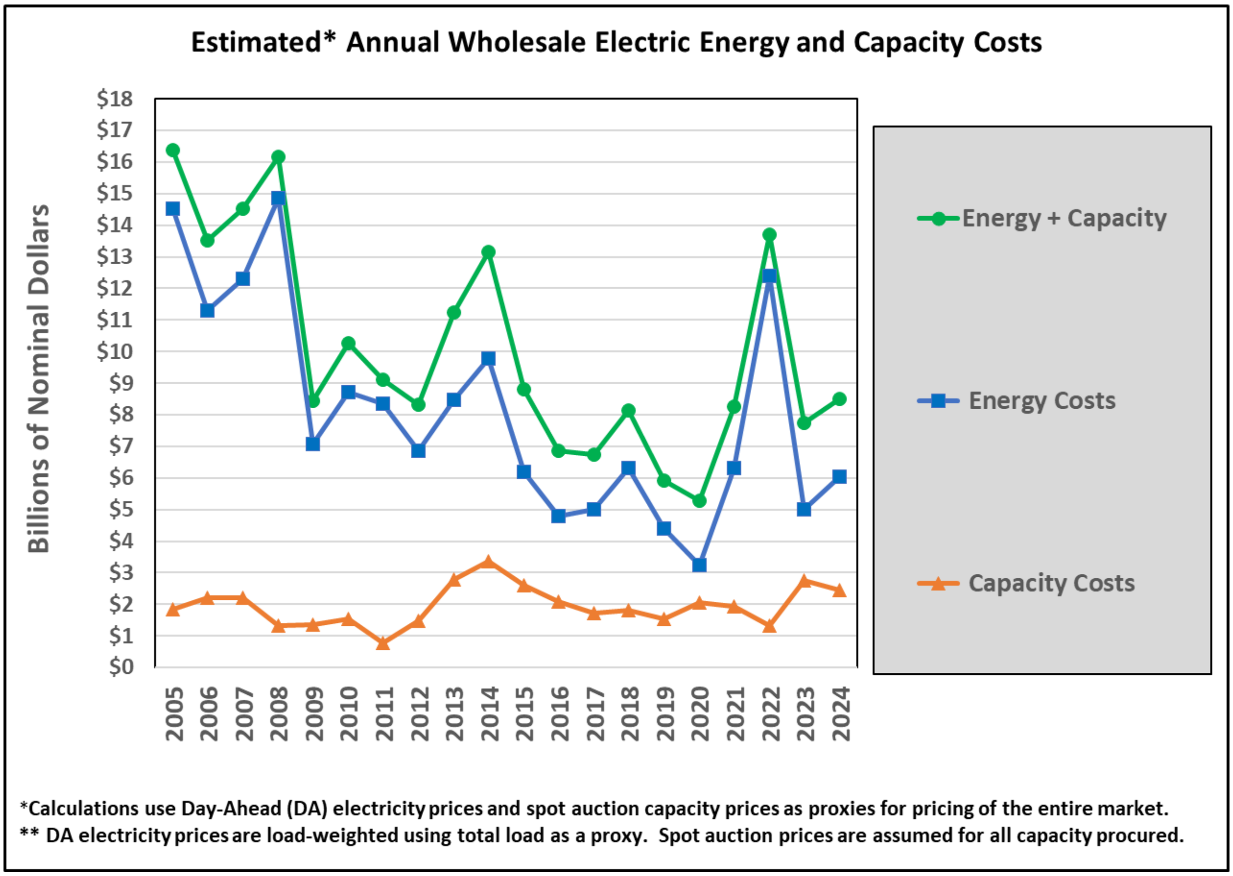

Figure 14: Estimated Annual Wholesale Electric Energy and Capacity Costs

Source: NYISO

2.4.3. Retail Electricity Cost Trends

Wholesale prices are a component of customers' total electric bills. To get insight into customers' total electric bill at the retail level, the New York utilities are required to report on what the average annual bill was for a typical customer within each of the three major rate classes/components. The typical bill is broken down into the three major components: Delivery, Commodity (or Supply), and Surcharges. This information is updated and provided each year and includes the most recent historic year as well as the nine preceding years.

DPS provides direct links to each utility's website page that contains the ten-year historic average monthly bill data for typical customers receiving service under the Residential, Small Commercial / Industrial, and Large Commercial / Industrial classes.[18]

While retail bills do differ from utility to utility, it is informative to look at the trends for a downstate utility and an upstate utility, specifically for residential customers. For example, bills for residential customers in Con Edison (CECONY) and Niagara Mohawk Power Corporation d/b/a National Grid (National Grid), respectively, are shown below in Figure 15 and Figure 16.

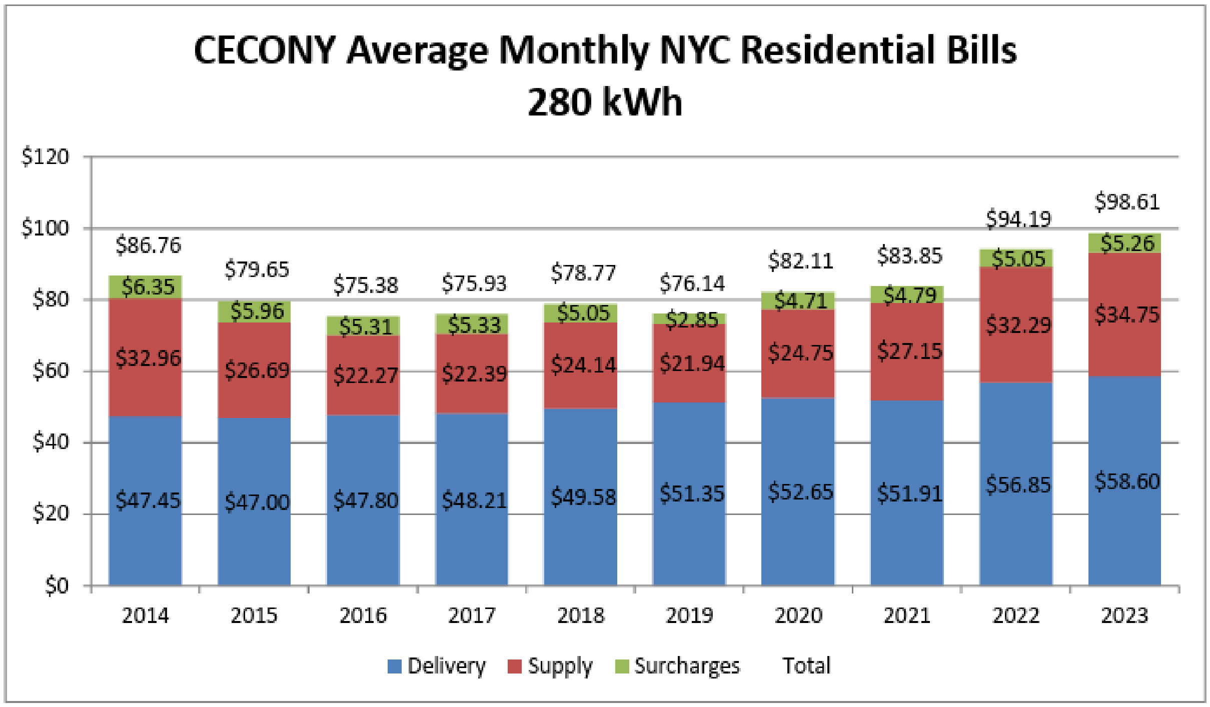

Figure 15: Average Monthly Residential Bill - Con Edison (280 kWh monthly usage)

Source: DPS, Electric Utility Ten Year Historic Average Monthly Bill Data for Typical Customers

[18] DPS, "Electric Utility Ten Year Historic Average Monthly Bill Data for Typical Customers," accessed July 1, 2025, https://dps.ny.gov/electric-utility-ten-year-historic-average-monthly-bill-data-typical-customers.

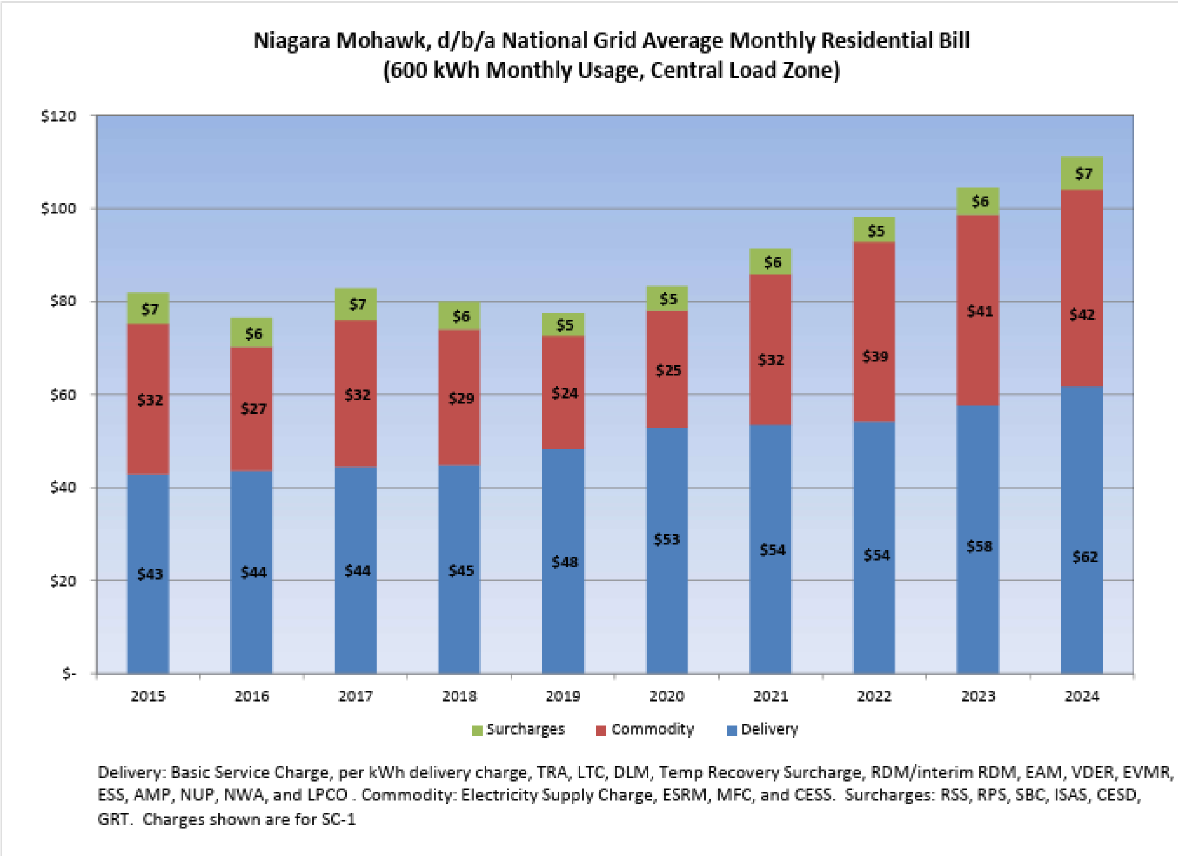

Figure 16: Average Monthly Residential Bill – Niagara Mohawk d/b/a National Grid (600 kWh monthly usage)

Source: DPS, Electric Utility Ten Year Historic Average Monthly Bill Data for Typical Customers

2.5. Key Electricity Sector Requirements and Targets

2.5.1. Public Service Law Requirements

Efforts to develop, maintain, and operate the electric system are driven by longstanding requirements codified in the Public Service Law and in the PSC's regulations. These rules and regulations govern the PSC's regulatory oversight of the utilities, independent power producers, energy service companies, and other market participants to ensure safe, reliable, and affordable electric service.

Several goals for the electricity sector are codified in the Public Service Law as explained further in this section. PSL §65(1) grants the PSC authority to ensure that "every electric corporation and every municipality shall furnish and provide such service, instrumentalities and facilities as shall be safe and adequate and, in all respects, just and reasonable." The same section also requires that charges for electric service "shall be just and reasonable and not more than allowed … by order of the [PSC]." The PSC has further authority under PSL §66(5) to "prescribe the safe, efficient and adequate property, equipment and appliances thereafter to be used, maintained and operated for the security and accommodation of the public" whenever the PSC determines that the utility's existing equipment is "unsafe, inefficient or inadequate."

2.5.2. Reliability Requirements

A comprehensive system of reliability rules established by NERC, NPCC, the NYSRC, and the PSC govern the planning and operation of the electric system, including the operations of generators. These rules drive the characteristics of the system in several ways. For instance, the rules require the New York State bulk power system to meet a "loss of load expectation" (LOLE) that is less than or equal to an involuntary load disconnection (i.e., insufficient capacity to meet customer demands) that is not more frequent than once in every 10 years, or 0.1 day per year. In this context, a system is considered adequate if the probability of having insufficient transmission and generation to meet expected demand is equal to or less than this LOLE of 0.1 day per year. This LOLE requirement is used in specialized computer model simulations to derive the needed minimum installed generation capacity above forecast peak demands, referred to as installed reserve margin. For example, a system with a 10 percent minimum installed reserve margin and a forecast peak load of 1,000 MW would require 1,100 MW of total installed generation capacity to reliably serve the system peak load.

2.5.3. Climate Act Economy-wide and Electricity Sector Targets

New York has been a leader in building clean energy generation for over 20 years, since adoption of the 2002 State Energy Plan. In 2004, the PSC established an incentive program to support new renewable generation projects under the Renewable Portfolio Standard (RPS).

On August 1, 2016, the PSC replaced the RPS Main Tier program with the Clean Energy Standard (CES) through the Order Adopting a Clean Energy Standard (2016 CES Order). The CES includes a Renewable Energy Standard (RES) and a Zero-Emissions Credit (ZEC) requirement. The RES established a Tier 1 program under which NYSERDA was authorized to procure eligible new large-scale renewables projects and a Tier 2 maintenance program to provide financial support for existing renewable facilities. The ZEC program was intended to support certain nuclear power facilities and is also referred to as Tier 3. The PSC has also since authorized a Tier 4 program intended to deliver renewable energy into New York City and an Offshore Wind Program to further supply New York State with renewable energy.

In 2019, the Climate Leadership and Community Protection Act (Climate Act) was signed into law. The Climate Act increased and extended the goals set out in the 2016 CES Order by establishing: (1) the State's LSEs should procure at least 70 percent of New York State electric load from renewable energy resources by 2030; and (2) the "statewide electrical demand system" should "be zero-emissions" by 2040. The Climate Act also includes technology-specific targets for offshore wind, solar, and energy storage resources, specifically a 9-GW target for offshore wind by 2035, a 6 GW by 2025 target for distributed solar, and a 3 GW energy storage resources target by 2030. In addition to the electric-sector specific targets established in the Climate Act, the Climate Act also established economywide targets for New York to reduce economy-wide greenhouse gas emissions by 40 percent by 2030 and 85 percent by 2050 from 1990 levels.

In furtherance of the Climate Act's call for a zero-emission "statewide electrical demand system" by 2040, the PSC initiated a process in 2024 to determine what actions are appropriate to pursue the 2040 target. The DPS decided that the first step in that process should be to develop definitions of key terms not expressly defined in the Climate Act, specifically: "statewide electrical demand system" and "zero emissions." Further steps beyond the adoption of key definitions will include adoption of a methodology for characterizing the potential gap between expected demand and supply eligible to participate in the power sector under the target; designation of particular resources as eligible to participate; and, building on those foundational elements, programmatic measures to facilitate, to the extent necessary, resources not yet deployed or supported by existing infrastructure in New York State.

2.5.4. Energy Efficiency Targets

Energy efficiency is a cornerstone of the State's strategy to promote affordable clean energy solutions for consumers, reduce electricity demand, and address the Climate Act targets. A variety of programs administered by NYSERDA and investor-owned utilities in New York State help New Yorkers make clean energy and energy efficiency upgrades. LIPA and NYPA also implement complementary clean energy and energy efficiency programs.

The New Efficiency New York recommendations, adopted by the PSC in a December 13, 2018 order, established a 2025 energy efficiency target of 185 trillion British thermal units (TBtu) of cumulative annual site energy savings. The Climate Act later adopted this energy efficiency target into the law.

The State has made progress on its energy efficiency targets, described in more detail in the Buildings chapter of this Plan.

2.6. Programs and Policies

This section describes the programs and policies currently in place to support the achievement of New York's clean energy and climate goals in a reliable and cost-effective manner.

2.6.1. Clean Energy Standard

By focusing on low-carbon energy sources, such as solar, wind, and hydropower, the CES brings investment, economic development, and jobs to New York State. The CES features two primary mechanisms – the RES and ZEC Requirement; both the RES and ZEC programs require every LSE in the state to procure Renewable Energy Certificates (RECs) and ZECs.

The CES is currently comprised of the following programs:

- **Tier 1** – Aims to increase new renewable energy development in New York State. Eligible Tier 1 resources include generators of electricity that use the following technologies: solar thermal, solar photovoltaics (PV), land-based and offshore wind, hydroelectric, geothermal electric, geothermal ground source heat, tidal energy, wave energy, ocean thermal, and fuel cells which do not utilize a fossil fuel resource in the process of generating electricity, that entered commercial operation on or after January 1, 2015.
- **Tier 2 Maintenance** – Provides targeted, adequate, and prudent support to New York's existing renewable resources to ensure their continued operations. Eligible Tier 2 maintenance

generators include run-of-river hydroelectric facilities (10 MW or less) and wind resources that entered commercial operation prior to January 1, 2015.

- **Tier 3** – Places a value on New York's upstate nuclear plants which avoid the emission of over 15 million tons of carbon dioxide per year. New York State's LSEs must purchase ZECs from NYSERDA every year. This annual obligation is based on an LSE's proportional amount of statewide load in each compliance year.
- **Tier 4** – Supports combined renewable generation and new transmission infrastructure to increase the delivery of renewable energy into New York City and reduce reliance on fossil fuels.
- **Offshore Wind** – Advances the responsible and cost-effective development of up to 9,000 MW of offshore wind energy by 2035, including investments in ports, manufacturing and supply chains, and workforce training to support the growing offshore wind industry.

Together, these programs support the deployment of renewable electricity generation in New York State. These resources provide benefits that go beyond their environmental impacts. For instance, offshore wind could provide energy where it is needed in New York City while helping to avoid congestion and reduce the need for new transmission, while solar helps to meet summer peak energy needs.

Procurements

The Climate Act Dashboard[19] is designed to keep New Yorkers apprised of the State's progress toward the Climate Act targets with metrics updated regularly throughout the year. As of June 6, 2025, the Climate Act Dashboard as depicted in Figure 17 indicates the State's current operating renewables meet 25 percent of the projected 2030 statewide load. Adding renewable generation under development to that figure indicates a combined potential to meet 50 percent of the projected load, which equates to 71 percent of the 2030 target. This total incorporates all renewable generation in the State, including distributed solar and baseline renewables.

Figure shows New York's operating renewables (left) for installed renewable generation that include operating plus pipeline projects, both contracted and under development, alongside projections of statewide load and generation mix (right). Data to report progress is assembled from multiple sources and a data source summary is available from the Climate Act Dashboard. Though there are some exceptions, operating renewables generally reflect the latest New York Generation Attributes Tracking System (NYGATS) compliance year while pipeline values generally reflect NYSERDA contracts as published in the Large-Scale Renewable Projects Open NY dataset.[20]

[19] "Climate Act Dashboard," accessed July 1, 2025, https://climate.ny.gov/dashboard.
[20] NYSERDA. "Large-Scale Renewable Projects Reported by NYSERDA: Beginning 2004" https://data.ny.gov/Energy-Environment/Large-scale-Renewable-Projects-Reported-by-NYSERDA/dprp-55ye/about_data

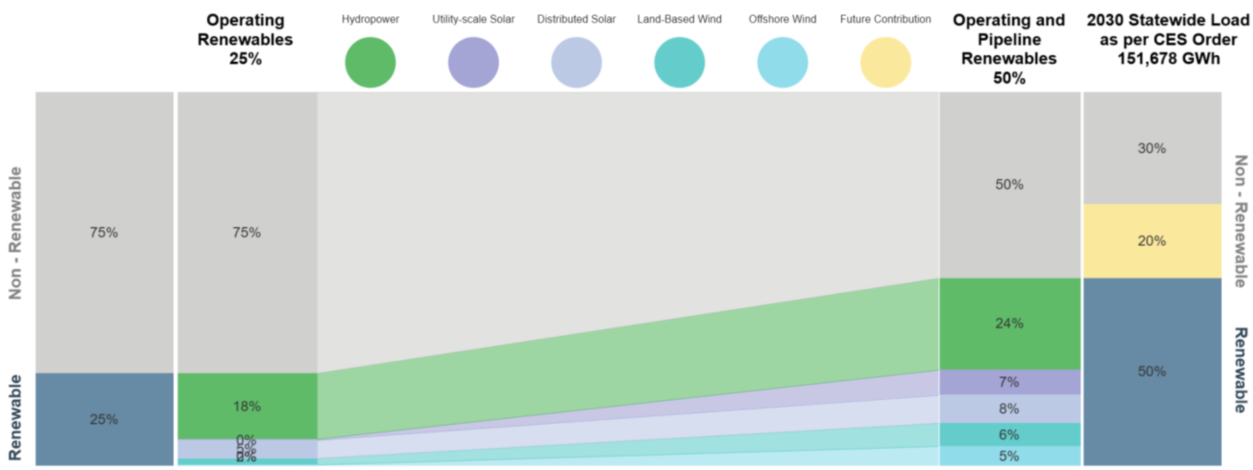

Figure 17: New York State Operating and Pipeline Renewable Electricity Generation (June 2025)

Source: Climate Act Dashboard

Tier 4 of the Clean Energy Standard

Tier 4 RECs were established by the PSC on October 15, 2020, as part of the CES.[21] As discussed in Section 2.6.1, Tier 4 RECs are specifically targeted to increase renewable energy delivery into New York City (Zone J). Eligible projects must either be located within the city or deliver renewable energy to a Zone J delivery point via a new transmission interconnection established after the October 15, 2020 CES Order was promulgated. The Champlain Hudson Power Express (CHPE) transmission line that will deliver hydropower into New York City is currently under construction and anticipated to enter commercial operation in 2026.

2.6.2. Zero Emissions Target: Department of Public Service White Paper

In November 2024, DPS Staff issued a white paper proposing definitions of the key terms discussed above. As DPS explained, that white paper reflects legal analysis of the terms and their context. It aims to lay the foundation for further action with respect to "zero emissions by 2040" by clarifying the statutory language.

The white paper first examines issues related to the scope of application for the 2040 target, specifically "the statewide electric demand system." and its relationship to the PSC's jurisdiction over participants in the power sector. The analysis focuses on how that scope applies to resources located outside of New York or "behind the meter." DPS concludes that emissions attributable to electric imports must be considered and recommends that some but not all behind the meter resources come within the scope of the target's application.

The white paper then addresses issues related to the "zero emissions" target itself, considering the types of emissions regulated under the 2040 target and finds that they are GHGs only, not other pollutants. It

[21] NYSERDA, "Tier 4 New York City Renewable Energy" accessed July 2, 2025, https://www.nyserda.ny.gov/All-Programs/Large-Scale-Renewables/Tier-Four.

considers which emissions-related activities should be considered under the target and recommends that the PSC consider the GHG emissions associated with fuel production and resource operation but not other activities, such as resource construction. The paper also considers the interpretation of the term "zero," recommending that it be understood as distinct from "net zero" and interpreted as prohibiting any generation resource that emits GHGs. Finally, it examines whether fuel cells that do not consume fossil fuels qualify as "zero emissions" resources and recommends that they be included in that definition.

The white paper also acknowledges the limiting implications of its proposed definitions and advises the PSC to regularly assess progress toward the 2040 zero-emissions target. In line with the need to characterize any potential reliability gap between future electricity demand and eligible supply of zero-emissions resources, the paper recommends ongoing evaluation to ensure alignment between policy goals and capabilities.

Technoeconomic Study of Candidate Resources

NYSERDA and DPS are conducting a technoeconomic study of various dispatchable, emissions-free resources (clean firm) that could help in one way or another to reduce the potential gap between electricity demand and supply in 2040 and beyond. That study examines key features of each technology considered and identifies various aspects of their potential and limitations that are relevant to consider in New York State's context. The following is the list of technologies being studied:

- Hydrogen
- Biofuels, including renewable natural gas and renewable diesel
- Advanced nuclear
- Geothermal
- Carbon capture and sequestration
- Long duration energy storage
- Virtual Power Plants (VPP)

2.6.3. Energy Efficiency

Energy efficiency is central to promoting affordable clean energy solutions for consumers, reducing electricity demand, and advancing the State's energy goals. To manage the impacts of widespread electrification on the State's electric grid, it will be essential that buildings make significant investments in energy efficiency. Related State initiatives are discussed in the Buildings chapter of this Plan.

2.6.4. Clean Heat Program

The New York State Clean Heat Program, which launched on April 1, 2020, provides customers, contractors, and other heat pump solution providers with a consistent experience and business environment throughout New York State. The New York State Clean Heat Program supports a consistent statewide heat pump program designed to achieve the State's ambitious heat pump goals and build the market infrastructure for a low-carbon future. Since the program's launch, there have been 58,992 projects with over 4,527,000 million British thermal units (MMBtu) of savings.[22] See the Buildings chapter of this Plan for additional information on the New York State Clean Heat Program.

2.6.5. Clean Transportation Program

In New York State, transportation accounts for about one-third of statewide greenhouse gas emissions. Creating a transportation system that reduces emissions while increasing connectivity and access to jobs, schools, and services requires scaling up existing solutions, such as zero-emission vehicles (ZEVs), while developing innovative technologies for hard-to-electrify modes of transit. New York State has several programs to support electric vehicle adoption including the EV Make Ready Program, the NYSERDA Clean Transportation Program, EVolve NY, the Drive Clean Rebate, and the New York Truck Voucher Incentive Program (NYTVIP). For example, NYSERDA's Clean Transportation program provides incentives, funding opportunities, and technical assistance to advance several low-carbon modes of transportation, including public transit, biking, walking, and light-, medium-, and heavy-duty ZEVs, such as battery electric and hydrogen fuel cell vehicles. The transition to ZEVs is underway, supported by increasing vehicle choice and public charging infrastructure availability. Converting to ZEVs isn't just good for the environment – it also reduces the total cost of vehicle ownership through lower fuel and vehicle maintenance costs. All of New York State's transportation-related initiatives are discussed in greater detail in the Transportation chapter of this Plan.

2.6.6. Energy Storage

Energy storage plays a crucial role in advancing the State's climate targets and cost-effectively managing grid resources. As renewable power sources like wind and solar provide a larger portion of New York's electricity, storage will allow clean energy to be available when and where it is most needed.

On December 28, 2022, in compliance with the periodic review requirements of the PSC's Order Establishing Energy Storage Goal and Deployment Policy and to consider an expanded 6 GW energy storage target, DPS and NYSERDA jointly filed New York's Energy Storage Roadmap: Policy Options for Continued Growth in Energy Storage (Roadmap). The Roadmap made recommendations aimed at achieving a 6 GW target and concluded that updating the target was necessary to ensure that the pace of energy storage development is sufficient to meet the State's energy needs. After re-examining proposed program costs and budgets detailed in the Roadmap, DPS and NYSERDA filed an updated Roadmap in March of 2024 to reflect the new cost estimates and proposed budgets.

In June of 2024, the PSC issued an Order increasing the Climate Act target of 3,000 MW by 2030 to 6,000 MW in that same time frame and established an interim target of 1,500 MW by 2025. The Order also directed NYSERDA to establish new incentive programs for energy storage installations at all levels of the electric system: residential, retail, and bulk. NYSERDA has filed Implementation Plans and is in the process of launching these new incentive programs.

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[22] "New York State Clean Heat Program 2023 Annual Report," accessed July 1, 2025, https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7BC02EAA8E-0000-C931-8097-B36618C0FE15%7D.

On February 14, 2025, the PSC approved, with modifications, NYSERDA's Retail and Residential Energy Storage Program Implementation Plan. The Implementation Plan specifies how 200 MW of residential storage will be supported with $100 million in incentives, and 1,500 MW of retail storage will be supported with $675 million in incentives.

The PSC then approved, with modifications, the draft Bulk Energy Storage Program Implementation Plan on March 21, 2025. NYSERDA will support the development of 3,000 MWs of new bulk energy storage facilities in New York. The Bulk Energy Storage Program will use an innovative Index Storage Credit incentive modeled in part on the REC and Offshore Wind Renewable Energy Credit (OREC) utilized in other NYSERDA programs. NYSERDA will launch the first solicitation for bulk storage awards in 2025.

There are currently more than 1,400 MW of operational, contracted, or awarded energy storage in New York, including 80 MW of bulk energy storage installed as of March 2025. NYSERDA expects the pipeline of projects in development to increase as the new incentive programs open and begin issuing awards.

In line with State policy, the Residential, Retail, and Bulk programs will direct benefits to the State's disadvantaged communities (DACs). A minimum of 35 percent of program funding for energy storage projects will be located in areas of the state to benefit DACs by reducing reliance on high-emitting peaking plants, and a minimum of 35 percent of procurements for bulk and off-site retail energy storage projects be located in NYISO capacity Zones G through K.

2.7. Siting and Permitting

Jurisdiction over siting energy infrastructure facilities is shared among federal, State, and local governments. The siting of electric generation is primarily a state and local responsibility. The siting of electric transmission facilities is also primarily the responsibility of the State, although federal law gives FERC backstop siting authority under limited circumstances.[23]

2.7.1. RAPID Act

Signed into law on April 20, 2024, the Renewable Action through Project Interconnection and Deployment (RAPID) Act[24] repealed the prior generation siting regime established in Executive Law §94-c, repealed Public Service Law article VIII, and enacted a new Public Service Law article VIII entitled "Siting of Renewable Energy and Electric Transmission" (Article VIII). The RAPID Act transferred the Office of Renewable Energy Siting (ORES) from the Department of State (DOS) to the DPS, adding new functions, powers, duties, and obligations related to major electric transmission siting. The RAPID Act ensures that ORES is now the one-stop-shop for reviewing, permitting, and enforcing permit requirements for both major renewable energy generation and transmission facilities. The overarching objective of the RAPID Act and the accompanying regulations at 16 NYCRR Part 1100 is to avoid, minimize, or mitigate, to the maximum extent practicable, the potentially significant adverse environmental impacts related to the construction and operation of those facilities.

[23] Federal Power Act Section 216
[24] The RAPID Act will become effective upon the promulgation of the implementing regulations.

The RAPID Act also prioritizes early, ongoing consultation with local agencies and enables host communities to engage in the permitting process through intervenor funding. Specifically, the Act requires developers to provide proof of consultation with local governments before submitting an application to ORES and funds to support municipalities, local agencies, and community intervenors to participate in the process.

2.7.1. Consideration of Disproportionate Pollution Burden

Signed into law in December 2022, the Environmental Justice Siting Law addresses the siting of certain environmental facilities with the aim of ensuring that no community bears a disproportionate pollution burden. The Environmental Justice Siting Law requires consideration of whether an action may cause or increase a disproportionate pollution burden on a DAC as part of the State Environmental Quality Review process. This law complements already existing processes under Public Service Law, under Article VIII (described above) and Article 10, which govern the siting and permitting of energy generating facilities with a capacity of 25 megawatts or more. Public Service Law requires comprehensive evaluation of environmental and public health impacts.

2.8. Distributed Energy Resources

Distributed energy resources (DERs) are energy generation and storage facilities located on the distribution network. They are generally subject to the requirements of the Standardized Interconnection Requirements (SIR) and capped at 5 MW per project. Deployment of clean DERs complements the State's efforts to deploy large-scale renewables and provides value to the electric grid by providing electricity generation close to end users, increasing efficiency, assisting with enhancing grid resiliency, and potentially reducing the need for costly transmission investments. From 2010 through 2024, the capacity of DERs interconnected to the electric grid increased by 4,640 percent, from 107 MW to 5,086 MW.[25]

2.8.1. Value of Distributed Energy Resources

DERs receive compensation for their energy production through the value of distributed energy resources methodology (VDER, or the Value Stack), introduced in 2017 as a replacement compensation methodology to the existing Net Metering and Remote Net Metering laws. A 2019 Order further reformed the Value Stack. The Value Stack provides temporal and locational price signals, compensating distributed energy resources based on when and where they inject energy to the distribution network. Developers see price signals and target installations in areas that provide the greatest benefits to the grid and therefore price signals are highest. The elements of the Value Stack include:

- **Energy (LBMP)**, representing a project's contribution for providing energy to the grid. It is calculated based on the NYISO's day-ahead hourly price for the project's zone, adjusted for transmission and distribution losses.

[25] NYISO 2025 Power Trends Report. https://www.nyiso.com/power-trends

- **Capacity (ICAP)**, representing a project's contribution to reducing the State's peak hour of load. It is calculated based on the NYISO's monthly auction prices for the applicable area of the state.

- **Environmental Value (E-Value)**, representing the clean energy attributes (RECs) of a renewable project. By default, the distribution utility claims the environmental attributes of a VDER project's generation, and compensates the project owner with the Environmental Value, currently set at $31.03/MWh. Projects have the option to permanently opt out of receiving the Environmental Value and instead receive non-transferable RECs which can be retired in NYGATS.

- **Demand Reduction Value (DRV)**, representing a project's contribution to preventing or deferring upgrades to the local distribution network. DRV rates are set by utility based on Marginal Cost of Service studies. Individual VDER generators lock in their DRV rate for ten years and are compensated based on their grid exports during a utility-defined peaking window.

- **Locational System Relief Value (LSRV)**, similar to DRV, representing a project's contribution to preventing or deferring local upgrades to the local distribution network in utility-defined areas. VDER generators in LSRV zones lock in their LSRV rate for ten years and are compensated for their grid exports during utility call events.

- **Market Transition Credit (MTC)** and **Community Credit (CC)** are a utility-administered subsidy for early-adopter community distributed generation projects. Each utility provided several tranches of MTC and CC capacity with declining incentive rates, where eligible projects would lock in a per-kWh rate for all generation over a 25-year term. The MTC and CC allocations have been fully subscribed and are no longer available for new projects.

As of the end of 2024, there were 2,373 MWac of solar and 231 MW of energy storage systems operational and receiving compensation under VDER.[26]

2.8.2. Distributed Solar

The NY-Sun program was launched in 2012 as an initiative to significantly increase the amount of customer-sited solar power installed annually in New York. As of December 2024, the NY-Sun program has provided $1.97 billion in incentives to support the installation of 6,587 megawatts (MWdc)[27] of distributed solar statewide, leveraging over $9.98 billion in private investment (see Figure 18 below)[28]. The NY-Sun incentive varies by market segment (residential / small commercial / commercial / industrial / community), and by region. The NY-Sun incentive is structured as a declining MW block, where incentives gradually step down as the market grows. The Long Island incentive blocks closed out for residential projects in 2016 and for non-residential projects in 2019.

[26] SIR Inventories, https://dps.ny.gov/distributed-generation-information
[27] Distributed solar figures in this section are all provided in direct current (DC) Megawatts or Kilowatts.
[28] Statewide Solar Dashboard: https://www.nyserda.ny.gov/All-Programs/NY-Sun/Solar-Data-Maps/Statewide-Distributed-Solar-Projects

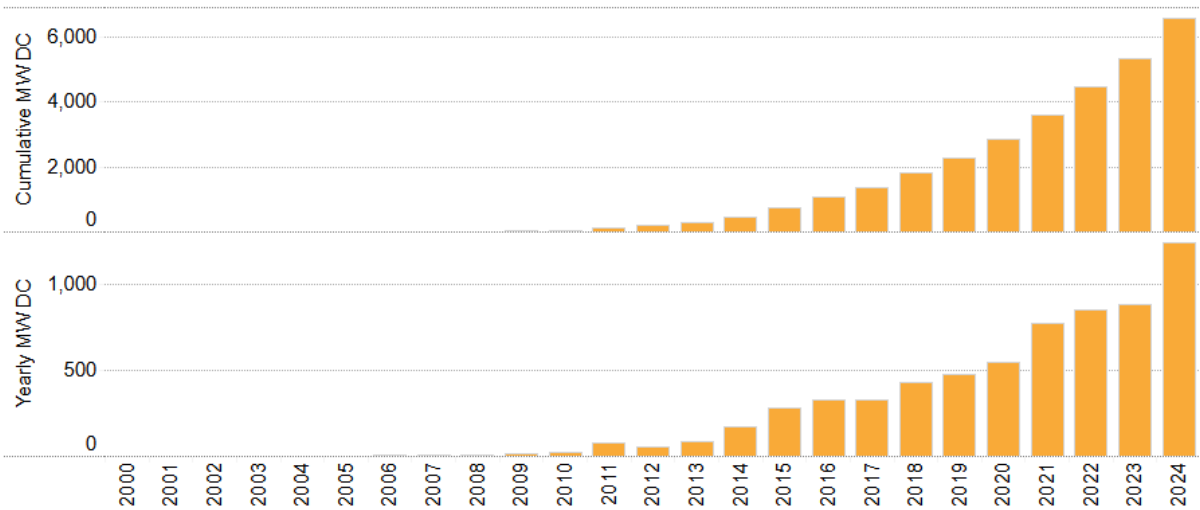

Figure 18: Cumulative and Annual Distributed Solar Capacity Additions (MW)

Source: Statewide Solar Dashboard

NY-Sun offers incentives for solar projects for homes and businesses, community solar projects, projects built on brownfields or landfills, and for solar projects that use prevailing wage labor or provide benefits to low- to moderate-income (LMI) households as well as DACs. NY-Sun is supported by a robust quality assurance/quality control program, including vetting of contractors and field and photo inspections of a representative sample of projects.

The Climate Act set a statewide target of installing 6,000 MW of distributed solar by 2025. This was codified by the May 2020 PSC Order Extending and Expanding Distributed Solar Incentives. The target was later expanded to 10,000 MW of distributed solar by 2030, by the PSC's Order Expanding NY-Sun Program, issued in April 2022. Both Orders were preceded by roadmaps and analysis filed by NYSERDA with consultation from DPS.

In October 2024, NYSERDA announced that NY-Sun had achieved the 6,000 MW target over one year ahead of schedule.[29] An additional 3,200 MW of projects are currently at an advanced stage of development with NYSERDA incentives awarded.

The overall budget for NY-Sun is $3.267 billion. On April 24, 2025, the Commission recognized the NY-Sun Program's success in establishing a mature and self-sustaining distributed solar market and adopted the phase-out of the ratepayer-funded up-front incentives currently provided by NY-Sun following the achievement of the 10 GW target. [30] The Commission also directed that surplus NY-Sun program funding

[29] NYSERDA, "New York State Has Achieved Major Solar Milestone A Year Early," October 17, 2024, https://www.nyserda.ny.gov/About/Newsroom/2024-Announcements/2024-10-17-Governor-Hochul-Announces-New-York-State-Has-Achieved-Major-Solar-Milestone.

[30] Case 21-E-0629, In the Matter of the Advancement of Distributed Solar, Order Approving NY-Sun Program Modifications (issued April 24, 2025).

be utilized to procure an estimated additional 500 MW beyond the 10 GW target for the benefit of low-income customers.

Distributed Solar contributes meaningfully to New York State's energy targets with over 1,220 MW installed in 2024 alone. The cumulative installed capacity is composed of

- 1,870 MW of residential-scale projects (defined as projects up to 25 kW),
- 638 MW of small commercial scale projects (defined as projects above 25 kW and below 750 kW), and
- 4,080 MW of commercial/industrial/community scale projects (defined as projects >750 kW).

New York has become the nation's largest community solar market,[31] and now has over 3,182 MW of installed and operational community solar.[32] New York State continues to support the growth of distributed solar energy through a combination of policy directives, regulatory actions, and market-based reforms aimed at increasing deployment and lowering project costs.

In 2024, the PSC adopted the Statewide Solar for All program to further accelerate the development of distributed solar and energy storage projects. The Statewide Solar for All program is administered by each of the investor-owned utilities that serve electric customers participating in the PSC's energy affordability policy (EAP) program, which provides utility bill discounts to low-income households. This program provides an additional electric bill credit to EAP customers who reside in a DAC with the ultimate goal of delivering a minimum of $40 in annual bill credits to more than 800,000 households once the program reaches full maturity.

Statewide Solar for All is a community solar model that negates the need for expensive and time-consuming customer acquisition on the behalf of the project developer. This allows projects to provide a greater discount to project subscribers.

Statewide Solar for All builds on lessons learned from the NYSERDA and National Grid Expanded Solar for All pilot program. Expanded Solar for All solicited two rounds of project applications, with 300 MW of community solar projects participating. Many Expanded Solar for All projects are currently under construction and will provide bill discounts to approximately 160,000 National Grid EAP customers.

Additionally, regulatory changes approved by the PSC under Case 24-E-0621 aim to streamline interconnection timelines, improve utility cost estimates, and address permitting-related delays. These changes allow solar developers to satisfy financial assurance requirements for distribution upgrades using Letters of Credit or Surety Bonds in place of cash deposits, lowering upfront capital requirements. In addition, a PSC ruling in 2024 upheld cost certainty for developers by denying a utility request to retroactively assign $11 million in upgrade expenses to previously approved projects. Collectively, these

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[31] Wood Mackenzie, "Power & Renewables Quarterly Partnership Reports," accessed July 1, 2025, https://www.woodmac.com/industry/power-and-renewables/quarterly-partnership-reports/.

[32] NYSERDA, "Statewide Distributed Solar Projects: Beginning 2000," accessed July 1, 2025, https://data.ny.gov/Energy-Environment/Statewide-Distributed-Solar-Projects-Beginning-200/wgsj-jt5f/about_data.

measures help stabilize the solar development environment while advancing the State's climate and clean energy goals; and, furthermore, these measures created a launch pad for a robust, healthy, and self-supporting solar industry.

2.8.3. Distributed Energy Storage

Distributed energy storage (behind the meter) is a growing market segment. As of the end of 2024, there were approximately 349 MW of distributed energy storage installed in New York State, composed of a mix of commercial scale and residential projects.[33]

Commercial projects receive compensation through the Value Stack, utility demand response programs, and/or utility Non-Wires Alternatives programs. Many commercial energy storage systems are paired with solar, especially upstate, although a growing number of "standalone" storage systems are being developed downstate. Approximately 215 commercial-scale storage systems (297 MW) were installed as of the end of 2024.

Residential energy storage is an emerging market. By the end of 2024, there were 5,978 residential-scale (25kW and smaller) storage projects installed in New York. PSEG-Long Island and Con Edison have residential dynamic load management programs that provide compensation for residential storage that discharges during utility peak events, but many customers purchase storage for the ability to maintain power during grid disruptions.

In June 2024, the PSC approved an Order Establishing Updated Energy Storage Goal and Development Policy,[34] which established an energy storage target of 6 GW by 2030. The Order included $775 million in funding for distributed storage incentives to be administered by NYSERDA.

2.8.4. Other Distributed Energy Resources

As of the end of 2024, the following additional DERs were interconnected to the distribution network of the IOUs[35]:

- 9.3 MW of distributed wind, located primarily upstate
- 13.0 MW of combined heat and power (CHP) installations, located primarily upstate
- 21.8 MW of distributed hydroelectric generation, located primarily upstate

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[33] NYSERDA, "Statewide Energy Storage Projects," accessed July 1, 2025, https://www.nyserda.ny.gov/All-Programs/Energy-Storage-Program/Storage-Data-Maps/Statewide-Energy-Storage-Projects.

[34] DPS, "Petition In the Matter of Energy Storage Deployment Program," accessed July 2, 2025, https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterSeq=55960.

[35] Utility Interconnection Queue Data, available https://dps.ny.gov/distributed-generation-information

- 43.2 MW of distributed fuel cells, located primarily in Con Edison service territory

Due to technical and economic market barriers, these technologies have not seen the same level of deployment as solar and battery energy storage.

2.9. Transmission System Planning

Significant investments in New York's transmission and distribution infrastructure will be necessary to ensure reliability, accommodate growing demand, and deliver renewable resources to loads. This section provides an overview of the processes underway to proactively plan for these system needs. More complete details about New York's transmission and distribution system planning processed can be found in the New York State Transmission and Distribution Systems Reliability Study and Report.[36]

2.9.1. State Coordinated Grid Planning Process

In 2020, the New York State Legislature passed the Accelerated Renewable Energy Growth and Community Benefits Act (Accelerated Renewables Act), which includes a requirement to plan for the bulk and local transmission and distribution upgrades that will be required to facilitate achievement of the renewable energy targets set forth in the Climate Act.[37]

In response to the Accelerated Renewables Act, the PSC directed the utilities to develop a Coordinated Grid Planning Process (CGPP) as a mechanism for statewide, long-term transmission planning. The modeling and studies contemplated for the CGPP are intended to provide a comprehensive view of electricity system needs, with a focus on the impacts of decarbonization but not limited to them, and to identify the upgrades required to address the evolution of the energy system. The process is intended to repeat on a three-year cycle. The first cycle of the CGPP is on schedule to conclude at the end of 2025 and will provide a portfolio of transmission and distribution upgrade proposals for the PSC's review. The initial set of projects will primarily address anticipated needs arising in the 2030–2035 time frame. The second cycle of CGPP will extend the study horizon further into the future.

2.9.2. NYISO Comprehensive System Planning Process

The NYISO implements a suite of transmission planning processes known as the Comprehensive System Planning Process. The Comprehensive System Planning Process has four components including the Local Transmission Planning Process (LTPP), the Reliability Planning Process (RPP), the Economic Planning Process, and the Public Policy Transmission Planning Process (PPTPP).

2.9.3. Local Transmission Planning Process (LTPP)

Each transmission owner (TO) in New York State is required to plan for the needs of its local transmission system through the LTPP.[38] As part of their planning obligation, the TOs perform transmission security studies for the facilities in their transmission areas according to all applicable criteria. Links to the TO's

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[36] New York State, New York State Transmission and Distribution Systems Reliability Study and Report, July 2025.

[37] NYSERDA, "Accelerated Renewable Energy Growth and Community Benefit Act" https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/Fact-Sheets/Accelerated-Renewables-Fact-Sheet.pdf

[38] NYISO, Local Transmission Owner Planning Process (LTPP), https://www.nyiso.com/documents/20142/3632262/Local-Transmission-Owner-Planning-Process-LTPP.pdf.

LTPPs can be found on the NYISO's website. The LTPP provides inputs for the NYISO's reliability planning studies.

2.9.4. Reliability Planning

The NYISO conducts reliability planning on both a near-term and long-term basis to ensure that the system is designed to maintain reliability, using both resource adequacy and transmission security modeling to identify any future system needs. The NYISO has three primary reliability planning studies including:

- Short-Term Assessment of Reliability (STARS): This study examines future electricity system needs over a five-year future, focused on addressing needs arising in the first three years, and is conducted quarterly in direct collaboration with transmission owners.
- Reliability Needs Assessment (RNA): This biennial study examines long-term reliability needs occurring four to ten years into the future, incorporating transmission owner long-term plans, and is conducted biennially. If the RNA identifies a need, the NYISO issues competitive solicitations for projects to address reliability needs and requires transmission owners to propose backstop transmission solutions.
- Comprehensive Reliability Plan (CRP): This study is also conducted biennially and reports on the results of the RNA and the STARS interim assessments. The CRP includes the appropriate solutions to any reliability needs identified in the RNA.

2.9.5. Economic Planning

In parallel to reliability planning studies, the NYISO has had responsibility for performing the Congestion Assessment and Resource Integration Study (CARIS), an assessment of economic congestion for future resource portfolios based primarily on planned additions and retirements and long-term changes in demand, fuel prices, and other economic factors.

The CARIS process has been superseded by the System and Resource Outlook, which builds on the former CARIS process by conducting capacity expansion modeling to examine a broader set of potential futures.

Capacity expansion modeling consists of least-cost optimization to select future resource portfolios that minimize total investment and operating costs, while meeting reserve margin and local capacity requirements, as well as any policy targets. The resource portfolios selected in the capacity expansion model are then assessed using a nodal production cost model, which simulates the operational costs of the generation portfolio at a higher level of temporal and spatial granularity, representing security-constrained economic dispatch across the entire transmission network. This two-pronged modeling process is used to identify areas of future congestion where there may be economic opportunities for new transmission, under varying economic and policy scenarios.

2.9.6. Public Policy Transmission Planning Process (PPTPP)

The PPTPP is the process by which the NYISO evaluates and selects transmission solutions to satisfy a transmission need driven by public policy requirements. The process was developed in consultation with

NYISO stakeholders and the PSC and approved by FERC under Order No. 1000. The NYISO is responsible for administering the PPTPP and the PSC has responsibility for identifying the transmission needs that require solutions. Both incumbent and independent transmission developers may propose projects in response to an identified need.

The NYISO conducts the PPTPP on a two-year cycle. Additionally, the PSC may declare a Public Policy Transmission Need (PPTN) and trigger a solicitation for transmission solutions at any time, independent of the NYISO's biennial planning process.

Under the PPTPP, the NYISO Board of Directors has selected four projects for cost allocation through the NYISO's tariff:

- Western New York (Empire State Line) – In service
- AC Transmission Segment A (Central East Energy Connect) – In service
- AC Transmission Segment B (Segment B Knickerbocker-PV) – In service
- Long Island Need (Propel Alternate Solution 5 Early-stage development) – in-service date: May 2030

2.9.7. Transmission System Planning for Clean Energy Development

As outlined above, transmission planning in New York falls into two general categories: reliability and economic / long-term planning. This section discusses several key initiatives underway to support the buildout of transmission system to support clean energy development in New York State.

Following the passage of the Accelerated Renewables Act, the PSC took several steps to implement forward-looking transmission planning. In addition to establishing the CGPP, these include the publication of the 2021 Power Grid Study, which included scenarios for transmission needed to facilitate achievement of near-term Climate Act targets, long term decarbonization, and the integration of offshore wind.

The Power Grid Study informed further PSC actions and identified key areas for near term transmission development. The PSC addressed the Power Grid Study's recommendations for transmission investments through a number of actions that include: (1) approval of Phase 1 Projects proposed by the utilities that bring reliability benefits with ancillary climate benefits; (2) approval of Climate Act transmission projects (Phase 2 projects) needed to unbottle renewable energy in three targeted regions of the State; (3) adoption of the Tier 4 program and authorization for development of two Tier 4 transmission lines to deliver clean, firm energy into New York City; (4) authorization for Con Edison's development of a Clean Energy Hub in Brooklyn to support both reliability needs and the interconnection of future offshore wind resources; (5) the creation of the CGPP described above; (6) initiating a PPTN solicitation to identify upgrades to the Long Island system that would integrate at least 3 GW of offshore wind with the mainland grid; and (7) launching a second PPTN solicitation for transmission infrastructure to deliver up to 8 GW of offshore wind generation to New York City.

Many of these approved investments unlock renewable generation pockets to enable the integration of renewable energy where it is currently limited or being curtailed due to transmission constraints. These locations have been identified by the NYISO's System Resource Outlook economic planning process. Figure 19 outlines these renewable generation pockets and indicates likely areas of future constraints on the local and bulk transmission systems.[39] The approved projects include a project led by NYPA, the Northern New York Project (also known as Smart Path Connect), and many of the Phase 1 and Phase 2 projects across New York. The total estimated value of these approved investments is approximately $8 billion. These enhancements, which substantially improve the State's transmission system capability, are progressing through design and construction and are scheduled to enter operation between 2030 and 2033.

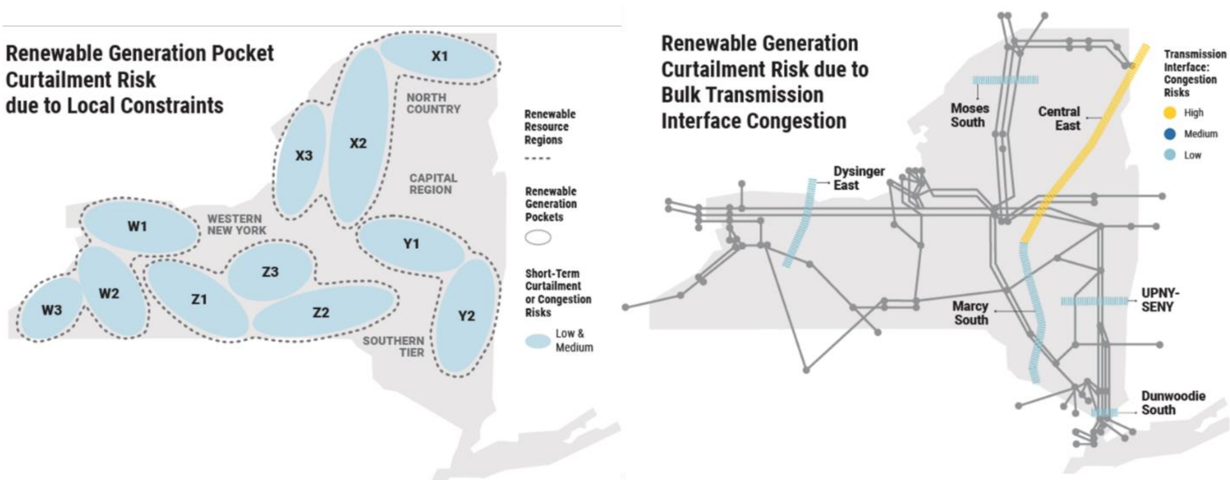

Figure 19: Renewable Generation Pockets and Local and Bulk System Constraints

Source: NYISO 2023-2042 System and Resource Outlook

As noted above, the second cycle of CGPP will produce transmission investment proposals considering a 2035–2040 timeframe horizon.

2.9.8. Interconnection

The NYISO interconnection process ensures open access to the transmission grid for new generators, transmission projects, and certain large loads seeking to connect. Most proposed new projects must adhere to the NYISO interconnection process.[40] The process determines, among other things, what system upgrades are needed to permit new projects to connect to the transmission system and to ensure deliverability of their energy output.

[39] NYISO, *2023-2042 System and Resource Outlook*, https://www.nyiso.com/documents/20142/46037414/2023-2042-System-Resource-Outlook.pdf.

[40] NYISO, *The NYISO Interconnection Process Independent System Operator Maintaining Reliability for a Grid in Transition*, January 2023, https://www.nyiso.com/documents/20142/35688159/2023-NYISO-Interconnection-Process-Report.pdf/300e1077-93ff-6e37-d920-2b7bfe19099e?t=1683560946199.

Applicants undergo a series of engineering studies to assess potential transmission system impacts and identify any necessary system upgrades and their associated costs. If a project seeks Capacity Resource Interconnection Service (CRIS) rights, the studies also evaluate how much capacity it can reliably deliver. Both the length of time needed to study a project's impacts, and the costs of the resulting system upgrades, have been and continue to impact the pace at which new renewable resources are added to the portfolio.

In August 2024, the NYISO implemented a new "Cluster Study" process to help expedite the interconnection process for applicants, consistent with the regulatory reforms by FERC under its Order 2023.[41] Under this new Cluster Study process, the NYISO will evaluate groups of interconnection requests collectively rather than individually, to reduce the time for NYISO, utilities, and developers as compared to the NYISO's former procedures.[42]

2.9.9. Advanced Technology Working Group

The PSC's Order on Power Grid Study Recommendations also directed the creation of the Advanced Technology Working Group, which is a DPS-overseen working group that explores the role of additional transmission and distribution system solutions in parallel to the CGPP proceeding. Utilities may be able to lower their costs by implementing cost-effective advanced transmission technologies (ATTs). Technologies under consideration include but are not limited to those outlined in Figure 20.

Hardware: Equipment and infrastructure that can increase efficiency, capacity, or reliability of the transmission system	**Grid-forming inverters**: An inverter that controls its output voltage, allowing it to contribute to maintaining system frequency
	Synchronous condensers: Use of generator equipment to provide inertia and voltage support, without providing power
	Advanced conductors and tower designs: Conductors with lower thermal expansion rate allowing for higher power flow
	Dynamic line rating systems: integration of sensors and/or additional monitoring and controls software to calculate the safe operating capacity of a transmission element in real time
	Storage-as-transmission: utilization of battery storage to provide transmission system services, such as congestion relief, curtailment reductions, and/or grid stability/voltage support
	Power flow controllers: Power electronics that vary reactance on the line to enhance control of power flow
Software and Operations: Programs and procedures that be applied to operations to improve transmission and distribution system efficiency	**Topology optimization**: Finds optimal re-routing of power flows to minimize system congestion, leveraging switching of circuit breakers
	Distributed energy resource management systems (DERMS): centralized platform to monitor, forecast, and control grid-connected distributed energy resources in real-time
	Volt/VAR optimization (VVO): optimization process for managing voltage levels and reactive power to increase grid efficiency
	Remedial action schemes (RAS): Set of operational measures designed to take corrective actions in response to a detection of predetermined system conditions

[41] FERC Order 2023: https://www.ferc.gov/explainer-interconnection-final-rule

[42] FERC largely accepted the cluster study rules in a recent order. See Order on Compliance 191 FERC ¶ 61,049 (April 17. 2025).

Figure 20: Examples of Advanced Transmission Technologies

2.10. Distribution System Planning

Electric distribution utilities maintain local distribution systems to ensure the reliable operation of the grid. Key considerations in distribution planning include replacing aging systems, upgrading infrastructure to serve expected load growth, and preparing for and responding to extreme weather events.

Recent changes in the drivers of distribution system needs have prompted the PSC and the utilities to make changes in distribution planning practices.

2.10.1. Proactive Planning Process

Specifically, in 2024, the PSC initiated a proceeding to establish a Proactive Planning Process focused on planning for the State's electric distribution grid infrastructure needs, driven by the increasing electrification of buildings and vehicles.[43] The PSC directed the investor-owned utilities to develop a framework for timely and cost-effective grid upgrades in anticipation of rapid load growth. This initiative aims to ensure that utilities coordinate across service territories and leverage best practices to support New York's clean energy and climate goals, as outlined in the Climate Act.

As of April 2025, DPS and stakeholders are considering the utilities' proposals for a proactive planning framework, which include recommendations for a process timeline, data needs, and an analysis methodology to account for the growth in new electric loads in the utilities' territories and identify grid infrastructure upgrades that would be required to serve the new load. Soon, the bottom-up analysis proposed for the framework will be integrated with the broader, top-down analysis occurring in the CGPP to produce results that allow the PSC to consider all grid upgrade needs simultaneously.

In the context of this effort, the utilities proposed near-term investments addressing emerging loads not accounted for in earlier planning exercises. These proposals are slated to be reviewed by the PSC in the second quarter of 2025 and would be targeted for construction by 2030.

2.11. Flexibility and Demand Response

2.11.1. Wholesale Demand Response Programs at the NYISO

At the wholesale level, the NYISO administers a variety of demand response programs. The Emergency Demand Response Program (EDRP) and the Installed Capacity – Special Case Resource (ICAP/SCR) program—support the reliability of the New York Control Area (NYCA). Both programs are designed to reduce power consumption by directing demand-side resources to reduce load or to use qualified local generators to remove load from the system during grid emergencies or when reserve shortages are anticipated or actually occur. All NYCA Loads are eligible to take part in these programs. Aggregators enroll Demand Side Resources and coordinate with the NYISO to notify Resources when the NYISO

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[43] DPS, "Commission Announces New Proactive Grid Planning Proceeding to Prepare New York's Electric Grid for Building and Vehicle Electrification," Auust 15, 2024, https://dps.ny.gov/news/commission-announces-new-proactive-grid-planning-proceeding-prepare-new-yorks-electric-grid.

deploys demand response. The NYISO also offers the following economic demand response programs: the Day-Ahead Demand Response Program (DADRP) in the Energy market, and the Demand-Side Ancillary Services Program (DSASP) in the Ancillary Services market. The DADRP allows NYCA Loads to offer their load reductions into the Day-Ahead Market (DAM) to supply Energy. This program allows flexible loads to effectively increase the amount of supply in the market and moderate Energy prices. The DSASP provides program participants with an opportunity to offer their load curtailment capability into the DAM and/or Real-Time Market (RTM) to provide Operating Reserves and Regulation Service.

Progress related to the NYISO demand response programs can be found in the NYISO 2024 Annual Report on Demand Response Programs.[44]

2.11.2. Utility Demand Response Programs

In New York State, utility demand response programs are administered by the State's investor-owned utilities with DPS oversight. These programs, collectively referred to as Dynamic Load Management (DLM), are designed to reduce peak electricity demand, in turn lowering energy and capacity costs, reducing infrastructure investments and enhancing grid resiliency and reliability. There are four DLM programs predominantly designed to engage commercial and industrial customers: the Commercial System Relief Program (CSRP), the Distribution Load Relief Program (DLRP), the Term-DLM Program, and Auto-DLM Program.[45] The CSRP and Term-DLM Program provide day-ahead notification to meet the need for reducing peak demands during the highest forecast demand days of the year. The DLRP and Auto-DLM Program are rapid response programs requiring participants to reduce load with significantly shorter notice duration – 2 hours before the beginning of an event for the DLRP, and within 10 minutes of notification for the Auto-DLM Program. The Term-DLM Program and Auto-DLM Program include program features designed to be attractive to energy storage facilities, including multi-year fixed payments to customers who agree to curtail load during forecasted peak periods and premium payments compared to those available through the CSRP and DLRP. The premium payments and longer contract terms available under the Term-DLM Program and Auto-DLM Program come with non-performance penalties, however, whereas the CSRP and DLRP do not. The investor-owned utilities also have programs designed to fit the needs of residential customers, with Bring Your Own Thermostat programs to allow utility control of participating customer smart thermostats. The PSC has also recently issued an order directing the investor-owned utilities to implement new Bring Your Own Battery programs designed to engage the residential energy storage market.

2.11.3. Electric Vehicle Managed Charging Program

In January 2023, the PSC issued the Demand Charge Alternatives Order and directed the Joint Utilities to develop and implement a suite of immediate and near-term solutions to provide operating cost relief to commercial customers with significant EV charging loads. The Order required the development of rates specifically for commercial EV charging, referred to as EV Phase-In Rates. These rates were:

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[44] NYISO, *2024 Annual Report on Demand Response Programs*, https://www.nyiso.com/documents/20142/49931415/NYISO-2024-Annual-Report-on-Demand-Response-Programs.pdf/d0a21acb-eda1-09b6-a7c0-62e627f0b01d

[45] Residential customers with necessary interval demand metering capability, such as through Advanced Metering Infrastructure, are also able to participate in the CSRP, DLRP, Term-DLM Program, Auto-DLM Program through an Aggregator.

- Designed to be available to all commercial customers with a charging ratio greater than or equal to 50 percent, specifically the customer's maximum EV supply equipment charging capacity (in kW) must be equal to or greater than 50 percent of the maximum site demand;
- Designed on a revenue-neutral basis to recover the full embedded cost of each applicable service class; and
- Based on a four-tiered rate structure, based on the customer's load factor, that gradually increases the revenue collected through a demand charge. This rate structure included the development of a Time of Use energy charge, which was required to include an off-peak energy charge component, an on-peak energy charge component, and a seasonal four-hour super-peak energy charge component.

The Joint Utilities filed their EV Phase-In Rates on July 18, 2023. In October 2024, the PSC approved the EV Phase-In Rates proposed by Con Edison, Orange and Rockland Utilities, Inc. (O&R), New York State Electric & Gas Corporation (NYSEG), and Rochester Gas and Electric Corporation (RG&E). The PSC rejected the five-hour super-peak period-based EV Phase-In rates proposed by Central Hudson Gas & Electric Corporation (Central Hudson) and National Grid and directed those utilities to implement four-hour super-peak period-based EV Phase-In Rates. The PSC directed the utilities to implement the EV Phase-In Rates no later than 12 months from the effective date of the Order and directed the utilities to make an implementation filing before the EV Phase-In rates become available to customers. The PSC established a minimum level of outreach for customers participating in the Demand Charge Rebate Program and Commercial Managed Charging Program use-case-specific adder incentives, as these program components will end shortly after full implementation and availability of the EV Phase-In Rates.

2.11.4. Time-Varying Rates

Advanced Metering Infrastructure (AMI), DERs (smart thermostats, connected appliances, and battery storage), and enabling technologies could help customers automatically respond to Time-of-Use (TOU) pricing. These rates are a form of time-varying pricing that reflect the cost of providing electricity during different hours of the day. Under a TOU rate, the cost of electricity during high-demand, or peak, hours is more expensive than low-demand, or off-peak, hours. A simple TOU rate would have separate rates for peak and off-peak periods. TOU rates align rates with the cost of service and send price signals to customers to disincentivize consumption during times of peak demand. TOU may also prompt customers to invest in self-generating technologies. These technologies can reduce system peak demand and avoid utility investments in additional capacity resources. Roughly 2 percent of residential customers are currently enrolled in TOU rates, though Long Island Power Authority is transitioning residential customers to a default TOU rate.[46] Under this time-varying rate, they charge different rates for electricity based on the time of day and the season, with peak rates during weekday afternoons (3-7 p.m.) and lower off-peak rates during evenings, weekends, and holidays.

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[46] Brattle Group, New York's Grid Flexibility Potential - Volume I: Summary Report https://www.brattle.com/wp-content/uploads/2025/02/New-Yorks-Grid-Flexibility-Potential-Volume-I-Summary-Report.pdf

2.12. Grid of the Future Proceeding

The PSC initiated the Grid of the Future (GOTF) proceeding on April 18, 2024, to identify and make use of opportunities to draw on as-yet untapped flexibility of demand available from various types of resources and technologies. As part of this proceeding, Staff will conduct a Grid Flexibility Study and thereafter develop the first New York Grid of the Future Plan that lays out actionable near-term and long-term roadmaps for grid evolution. On March 31, 2025, DPS filed The First Iteration of the Grid of the Future Plan with the PSC. The Plan will serve as an important step towards building out the programs, policies, local and bulk system digital infrastructure, grid infrastructure, and operating practices needed to efficiently meet the State's clean energy and climate goals.

2.13. Consumer Protection Measures and Consumer Complaints

The Home Energy Fair Practices Act (HEFPA), enacted in 1981 and amended in 2002, provides residential energy customers, including electric customers, protections for applications for service, billing and payments, and disconnections.[47]

If a customer fails to pay overdue bills, the utility may turn off the customer's service after it has given the customer notice in writing that it plans to shut off service and has waited 15 days to allow the customer an opportunity to pay the overdue bill or make a payment agreement on the overdue amount. If the customer has not paid a bill, payment agreement installment or deposit payment, the utility must send a Final Termination Notice before it can turn off service. This Notice can be sent 20 days after the date payment was due. After the notice has been sent, the utility must allow 15 days to resolve the problem before it can shut off the customer's service. If the customer makes a payment by a check that is rejected by the bank, the utility can shut off service without sending another notice. Utilities can shut off service only between the hours of 8 a.m. and 4 p.m. Monday through Thursday.

There are situations where a customer may not have paid a bill, but where the utility cannot shut off service, including during the cold weather period between November 1 and April 15. More detail on consumer protections for residential and non-residential customers can be found on the PSC website.[48]

During the COVID-19 pandemic, legislation was enacted to provide temporary protections for essential utility and municipal services.[49] Under this law, if a utility customer experienced a change of financial circumstances due to the pandemic, utilities and municipalities could not shut off the customer's service for nonpayment, must reconnect service within 48 hours, and must offer the customer a deferred payment agreement to pay any balance due. In January 2021, legislation was passed that extended the moratorium on utility termination of services 180 days after the COVID-19 state of emergency was lifted or until December 31, 2021, whichever was later.[50]

[47] HEFPA is codified in Article 2 of the Public Service Law.
[48] DPS, "Consumer Guide: Your Rights as a Residential Gas, Electric or Steam Customer under HEFPA," accessed July 2, 2025, https://dps.ny.gov/consumer-guide-your-rights-residential-gas-electric-or-steam-customer-under-hefpa.
[49] Public Service Law §§32, 89-b, 89-l and 91 (Chapter 108 of the Laws of 2020)
[50] Chapter 108 of the Laws of 2020

While these temporary protections provided crucial relief for millions of households, utility arrears have continued to grow from the start of the pandemic. From 2020 to 2024, the total residential customers in arrears greater than 60 days grew from approximately 1.03 million to approximately 1.37 million and the amount of arrears grew from approximately $900 million to approximately $1.8 billion. Customers and amounts in arrears vary year over year depending on a multitude of factors, including accruals related to the COVID-19 pandemic, on-budget relief from one-time State funding and/or other State programs, access to federal programs, and seasonal weather impacts. Monthly arrears reports are posted by the utilities under Case 91-M-0744.[51]

As authorized by HEFPA, the PSC provides a process to handle consumer complaints about utility service.[52] DPS staff work with customers and utilities to intake, investigate, and resolve complaints and advise and support the PSC.

2.14. Environmental Regulations

The following is a partial list of environmental regulations and policies that impact the electricity system directly or indirectly. In addition to Regional Greenhouse Gas Initiative (RGGI) and the DEC Peaking Unit rule described below, the Transmission and Distribution Systems Reliability Study and Report[36] provides a summary of all regulations that impact the electricity sector in New York, representing a range of federal, State, and local policies affecting air emissions, permitting, and alignment with the State's clean energy targets.

2.14.1. Regional Greenhouse Gas Initiative (RGGI)

The Regional Greenhouse Gas Initiative – a coalition of states that now includes Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont – was the first mandatory market-based emissions trading program in the U.S. to reduce CO_2 emissions, and the first anywhere to use the cap-and-invest model to reduce greenhouse gas emissions from electric power generation and result in savings for electricity customers. In New York State, RGGI is implemented by DEC through 6 NYCRR Part 242, CO_2 Budget Trading Program. The administration and implementation of CO_2 allowance auctions and programs provided for in 6 NYCRR Part 242 is implemented by NYSERDA through 21 NYCRR Part 507, CO_2 Allowance Auction Program.

Figure 21 shows the change in CO_2 emissions from the power sector since RGGI's inception in the ten fully participating RGGI states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey,[53] New York, Rhode Island, and Vermont). CO_2 emissions from these states have fallen by 46 percent compared to a 2006-2008 baseline, faster than the emissions reduction across the U.S. as a whole.

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[51] Case 91-M-0744 https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=91-m-0744&CaseSearch=Search

[52] PSL §43.

[53] While New Jersey emissions are included in the above chart, New Jersey was not a participating RGGI state from 2011 through 2020. In addition, Virginia participated in RGGI from 2020 through 2023, but its emissions are not included here.

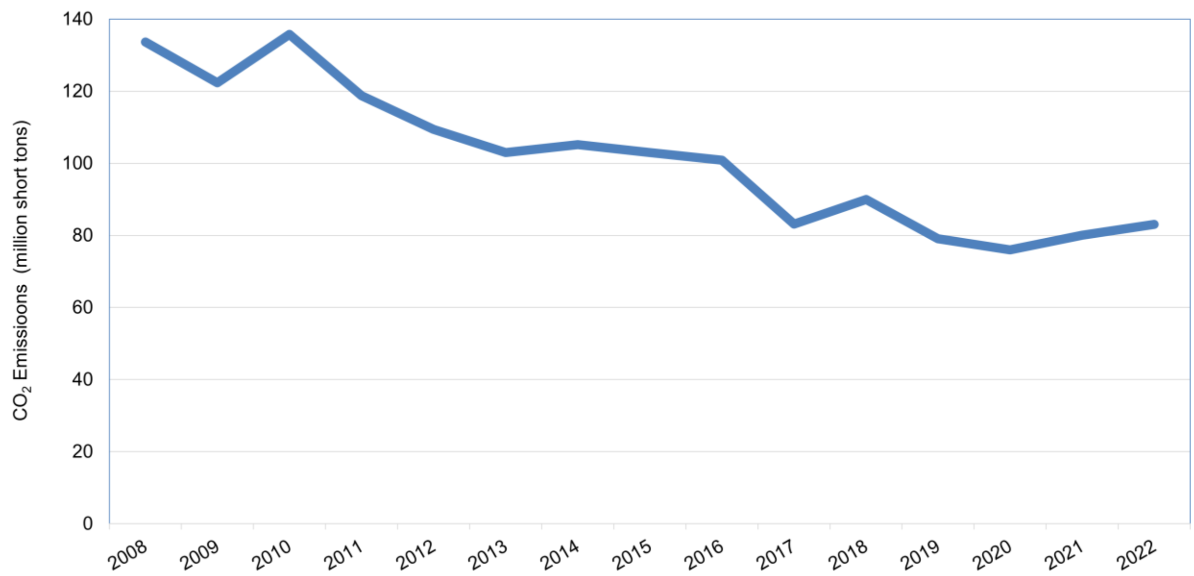

Figure 21: CO_2 Emissions in the RGGI 10 States

Source: Regional Greenhouse Gas Initiative, Inc. https://www.rggi.org/allowance-tracking/emissions

States participating in the RGGI conduct periodic, comprehensive program reviews to evaluate its impacts, set future program goals, and consider updates to evolve the program. This review process is critical to RGGI's ongoing success. Each program review includes consideration of state-specific emission reduction requirements, public meetings to gather input on program design, and technical analysis and modeling of the region's economy and electricity sector. The First and Second Program Reviews, completed in 2012 and 2017, respectively, resulted in changes that have strengthened and improved RGGI's market-based system, providing emissions and health benefits to the region while keeping electricity prices stable and contributing jobs and economic growth.

The 10 states participating in the Regional Greenhouse Gas Initiative (RGGI) released the results of their Third Program Review on July 3, 2025.[54] States agreed to strengthen their regional carbon dioxide (CO2) emissions cap through 2037, starting in 2027, and establish new mechanisms to protect energy affordability.

[54] RGGI, Inc., "RGGI States Announce Results of Third Program Review," July 3, 2025, https://www.rggi.org/sites/default/files/Uploads/Press-Releases/Press_Release_Program_Review_Announcement.pdf.

2.14.2. DEC Peaking Unit Rule

On December 11, 2019, DEC adopted a regulation (6 NYCRR Subpart 227-3) to reduce NOx emissions from Simple Cycle Combustion and Regenerative Combustion Turbines. These turbines are often referred to as "peaking units" because they are electricity generating units that tend to operate during periods of high electricity demand to maintain grid stability. The regulation includes a reliability provision that allows the NYISO, the local transmission/distribution owner, or the PSC to designate a unit as a reliability resource. Being designated a reliability resource allows the unit operational flexibility if it is unable to meet certain implementation deadline requirements while a solution to the reliability concern is put in place. As of May 1, 2025, 37 "peaking" units have retired. The retired peaking units represent one gigawatt of older fossil-fuel-fired generation and a significant reduction of pollution. In addition to shutdowns, additional emission controls were installed on units, totaling 466.8 MW.[55]

2.15. New York Greenhouse Gas Emissions Trend

Greenhouse gas emissions from the electricity sector are developed each year and reflect updated emissions from the previous year in the New York State Greenhouse Gas Emissions Report. Emissions from fuel combustion are generally estimated by applying standard emission factors to the volume or energy content (BTUs) of fuels. Emissions data is reported by facilities as required by New York State regulations. For this report, annual BTUs of fuel consumed and emission factors for CO_2, CH_4, and N_2O were utilized to develop annual emissions[56] (see Figure 22). Overall electricity sector greenhouse gas emissions have trended down to less than half of the emissions generated in 2005 with a notable decrease in residual fuel and coal use.

Emission Category	1990	2005	2017	2018	2019	2020	2021	2022
Coal	25.04	20.60	0.61	0.68	0.46	0.16	no	no
Distillate Fuel	0.47	0.69	0.11	0.34	0.16	0.08	0.09	0.45
Natural Gas	12.59	16.52	21.09	22.72	20.73	23.19	24.50	26.04
Petroleum Coke	no	1.33	no	no	no	no	no	no
Residual Fuel	25.45	16.59	0.30	0.76	0.17	0.10	0.40	0.77
Wood	0.07	0.49	0.83	0.67	0.60	0.61	0.58	0.53
Gross Total	63.63	56.22	22.94	25.17	22.12	24.13	25.57	27.79

Figure 22: New York Electricity Emissions by Fuel Type, 1990-2022 (mmt CO2e GWP20)

Source: DEC, 2023 Greenhouse Gas Emissions Report, Sectoral Report #1

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[55] A full list of all generation facilities that have been retired, including peaker facilities, can be found in monthly updates that are available in the Generator Status Updates folder on the NYISO's NY Power System Information & Outlook page: https://www.nyiso.com/ny-power-system-information-outlook

[56] DEC, *2023 NYS Greenhouse Gas Emissions Report, Sectoral Report #1*, accessed July 2, 2025, https://dec.ny.gov/sites/default/files/2023-12/sr1energynysghgemissionsreport2023.pdf.

2.16. Cybersecurity

Cyberattacks on the energy sector have increased substantially in the past twenty years, and they continue to grow in frequency and sophistication. The energy sector (particularly the electric grid) is one of the sectors most frequently targeted by malicious cyber actors. The U.S. Department of Energy (DOE) reports attacks and threats against the electric grid doubled in 2023 and, as 2024 unfolded, the Intelligence Community warned that state-sponsored threat actors have been strategically pre-positioning themselves for years to disrupt operations across critical infrastructure sectors in the event of a geopolitical or military conflict.[57]

In the context of cybersecurity, DPS oversees utilities through its Office of Resilience, Utility Security, Nuclear Affairs, and Emergency Preparedness (OREP). OREP has specific personnel assigned to the Utility Security Section (USS) with cybersecurity oversight responsibilities. The core mission of the USS is to ensure that the critical facilities of regulated utilities are protected from possible malicious threats and manageable risks. USS has deemed approximately 285 utility facilities as “critical” to reliable operation of electric, gas, water, and telecommunication services in the state based on predefined criteria. There are over 1,000 additional sites and facilities recorded in the USS catalog, which is updated twice a year at minimum. USS staff regularly conducts thorough inspections and audits of the physical and operational technology cybersecurity postures of regulated utility facilities, sites, and assets. USS also annually audits the protection of Personally Identifiable Information (PII) at eight electric, gas, and water utilities. The USS oversees both cyber and physical security preparedness and conducts inspections and audits of cybersecurity posture for those facilities, sites, and other assets. For more information on these efforts, see the Energy Security Planning and Emergency Preparedness chapter of this Plan.

In 2022, the New York State Legislature passed, and Governor Hochul signed into law, a bill that became Public Service Law § 66(30). That legislation expanded the PSC’s authority to further regulate cybersecurity via the promulgation of rules and regulations directing gas or electric corporations to develop cybersecurity tools for their industrial control systems. As the PSC develops a regulatory framework, the ever-evolving and varied threats underscore the need for cybersecurity regulations that balance several important goals—they must be strong enough to ensure the resilience of the gas and electric distribution systems of the State and to provide for the protection of PII; they must be agile enough to grow and adapt to new threats; and they must ensure compliance does not jeopardize New York’s progress towards achieving its clean energy targets.

3. Outlook (2025–2040)

This section describes scenarios for how the electric grid may evolve over the next 15 years, based on assumptions related to future electricity demand and insights into the current and emerging resources that may be deployed to meet the anticipated demand. As is typical for studies of this kind, a scenario

[57] In 2015 and 2016, for example, Ukrainian critical infrastructure was by attacked by a Russia-linked APT. See CISA, ICS Alert: Cyber-Attack Against Ukrainian Critical Infrastructure, https://www.cisa.gov/news-events/icsalerts/ir-alert-h-16-056-01

approach is useful because it bounds the various possible futures, providing directional information to system planners since the precise configuration of the actual future system is uncertain.

The primary source of the information reported here in these projections is electric system modeling conducted by NYSERDA, hereafter referred to as the Pathways Analysis. For more detailed information see the Pathways analysis of this Plan. In addition, this discussion also leverages information from similar studies, such as the modeling performed for the first cycle of the CGPP.

This section highlights findings from key components of the Pathways Analysis and reviews the barriers and challenges associated with the accomplishment of these future outcomes. More details about this analysis can be found in the Pathways analysis of this Plan.

3.1. Modeling the Future

Electrification coupled with clean electricity is expected to be a central pillar of addressing the ambitious economy-wide greenhouse gas reductions targets by 2050. The objective of the Pathways Analysis is to develop scenarios for the State Energy Plan that capture and account for how various strategies interact across sectors. The various scenarios help inform the impact of differing levels of policy action on New York energy needs.

To address the many uncertainties inherent in predicting the future energy system, the Pathways Analysis examines scenarios representing a range of state policy actions. An overview of all scenarios examined is provided below:

Table 1: Pathways Analysis Scenarios

Scenario	Description
No Action	Includes federal incentives (as of Q1 2025) and legacy New York State policies but excludes the Climate Act and more recent additional State and local policies.
Current Policies	Current progress toward achievement of enacted State and local policies (e.g., Clean Energy Standard, building code updates, Advanced Clean Cars/Trucks).
Additional Action	All actions included under Current Policies scenario plus additional progress toward adoption of clean technologies through a mix of future programs and investments aligned with recommendations in the State Energy Plan.
Net Zero A and B	Accelerates adoption of clean energy technologies in all sectors toward achievement of economywide net zero by 2050. Net Zero A emphasizes all electric space heating while Net Zero B assumes greater use of supplementary gas heating systems.

This document focuses primarily on the Additional Action scenario, with brief coverage of the No Action and Current Policies scenarios. Together, these three scenarios illustrate the incremental impacts of State and local policies and programs. No Action provides a baseline; while the future of federal clean energy and emissions programs remains uncertain, this analysis includes federal policy as of the first quarter of 2025. The impacts of federal rollback of the IRA are not included in the modeling for this draft but will be explored in the final State Energy Plan. Current Policies is meant to illustrate the impact of current market characteristics and enacted New York State policies, while Additional Action shows the impact of current and future State action to promote consistent, gradual improvement in market penetration of clean energy technologies. This is meant to describe an ambitious but attainable level of achievement. Components of the load forecasts associated with those scenarios are discussed in the next section, and information related to the supply mix that resulted from the capacity expansion analysis is in the subsequent section. See the Pathways analysis of this Plan for more information.

3.2. Electricity Demand

The Pathways Analysis generates load forecasts using a bottom-up stock rollover methodology that simulates the gradual turnover of energy-consuming equipment across sectors such as buildings, transportation, and industry. The model tracks the existing stock of technologies by vintage and fuel type, accounting for their efficiency and expected lifetimes. It calculates annual retirements based on these lifetimes and introduces new sales to replace retiring units and meet additional demand. The energy demand for each year is determined by combining the number of devices in operation with their respective efficiencies, reflecting both legacy and newly adopted technologies. This approach captures the lag between new technology adoption and its full impact on energy consumption, providing a realistic projection of load growth over time.

In addition to modeling energy demand through stock rollover in sectors like buildings and transportation, the model addresses non-stock loads, such as those in the industrial sector. For these sectors, the model utilizes activity-based projections, where energy demand is calculated based on expected levels of industrial activity. This allows the model to account for energy consumption in industries where equipment lifespans are variable or data on equipment stocks are limited, ensuring a comprehensive representation of energy demand across all sectors.

New York is expected to experience a significant increase in demand over the next decade, driven by both electrification and the interconnection of new large loads. These large loads include data centers, semiconductor manufacturing plants, and green hydrogen production plants. The 2025 Gold Book indicated that large load facilities could contribute up to 19,200 GWh of additional annual energy consumption, 2,567 MW of summer peak demand, and 2,600 MW of winter peak demand in New York State by 2035; the Pathways analysis includes the impacts of these incremental large loads across all modeled scenarios.[58]

Multiple studies have examined the potential impacts of warming temperatures on electricity demand, including NYISO's Climate Change Impact Study and NYSERDA's Climate Impacts Assessment.[59,60] Climate change is projected to lead to increases in both the frequency and magnitude of extreme summer temperatures, which will in turn drive an increase in summer peak demand. The NYSERDA Climate Impacts Assessment also concluded that the resulting impacts on the New York energy system will be highly dependent on the extent of New York State's investments in building decarbonization. In addition to reducing greenhouse gas emissions, investments in energy efficiency and the adoption of efficient heat pumps will also mitigate the impacts of extreme summer warming on cooling demand in buildings.

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[58] NYISO, 2025 Load and Capacity Data: Gold Book, April 2025, https://www.nyiso.com/documents/20142/2226333/2025-Gold-Book-Public.pdf/088438e1-02f1-5316-211b-dbca17c01b4b?t=1745932590307

[59] NYISO, Climate Change Impact Study, Phase 1: Long-Term Load Impact, December 2019, available at: https://www.nyiso.com/documents/20142/10773574/NYISO-Climate-Impact-Study-Phase1-Report.pdf.

[60] NYSERDA, Impacts of Climate Change on the New York Energy System, December 2023, available at: https://www.nyserda.ny.gov/About/Publications/Energy-Analysis-Reports-and-Studies/Greenhouse-Gas-Emissions

Climate change and extreme weather events present reliability challenges in both winter and summer. In the winter, although climate change is projected to increase ambient temperatures, the electric system must grow to meet electrified end uses in buildings and addressing winter reliability needs will remain a priority. This reliability need is acute given the limited availability of certain resources during times of high heating demand. During extreme cold weather events, natural gas is prioritized for residential and commercial heating, which can restrict the fuel supply to a significant portion of the state's natural gas-fired power plants. While many downstate generators have dual-fuel capability (the ability to switch to oil), this still presents a logistical and environmental challenge. Furthermore, periods of high heating demand often coincide with reduced output from renewable resources; solar power is unavailable during early morning, evening, and overnight heating peaks, and wind power can be variable and experience lulls. There is also still significant uncertainty associated with how climate change may impact extreme cold weather events such as polar vortices. The Pathways Analysis aligns with the NYSERDA Climate Impacts Assessment in capturing load impacts of increased warming during summers in the 2040 through 2050 period, but this impact is relatively muted in the time frame of the State Energy Plan, which is focused on energy infrastructure through 2040.

Figure 23 and Figure 24 show annual electric loads and peak demand across the No Action, Current Policies, and Additional Action scenarios, through 2040. All scenarios see significant load growth in the near term, driven primarily by large loads, while both Current Policies and Additional Action see continued load growth driven primarily by transportation electrification. Similarly, all of these scenarios see increased peak demands through 2040. Note all scenarios remain summer peaking through 2040.

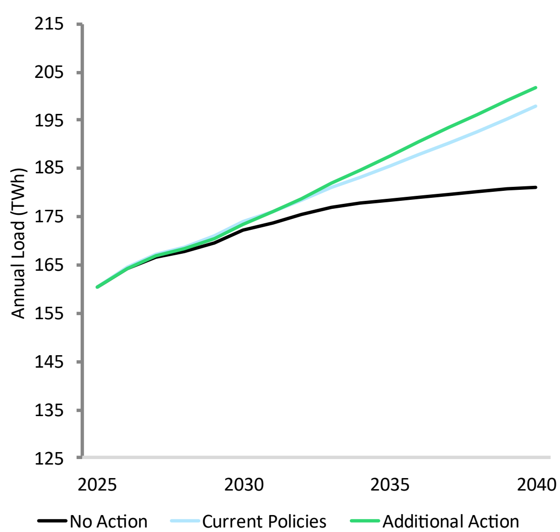

Figure 23: Annual Electric Load

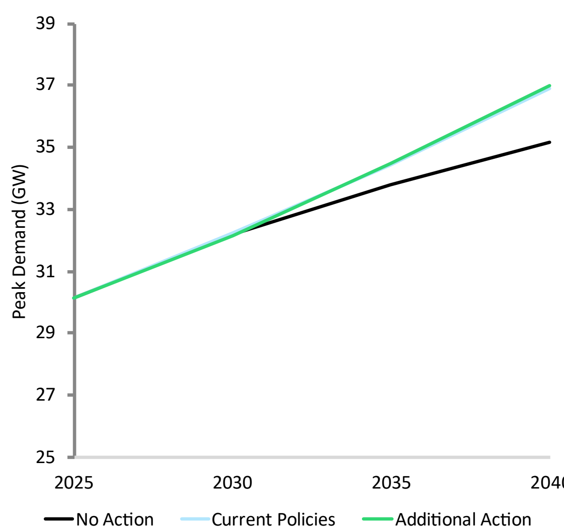

Figure 24: Peak Electric Demand

Source: Pathways Analysis chapter of this Plan

3.3. Electricity Supply

The RESOLVE model used within the Pathways analytical process is a linear optimization tool designed to inform long-term electricity resource planning. It co-optimizes generation, energy storage, and transmission investments alongside system operations to identify least-cost portfolios that meet specified policy and reliability constraints over a multi-year horizon. The model simulates operations on a representative subset of days to capture key system dynamics while maintaining computational efficiency. It incorporates detailed representations of candidate resources, including their costs, performance characteristics, and development potential, allowing for comprehensive analysis of various investment strategies.

In modeling New York's energy future, the RESOLVE model incorporates a set of near-term constraints and long-term options to reflect policy mandates and system realities. Through 2028/2029, planned resource additions are fixed. The modeling assumptions also include the achievement of the following State targets: 10 GW of distributed generation photovoltaic by 2030, 6 GW of energy storage by 2030, and 9 GW of offshore wind by 2035. The model also includes key transmission projects such as the CHPE and the Propel NY Energy project selected in response to the Long Island Public Policy Transmission Need. Licenses for existing nuclear facilities are assumed to be extendable through 2050. Considering resource build limitations and increased loads, the model aligns with the CES Biennial Review, projecting the potential achievement of 70 percent renewable electricity by 2033. All existing thermal units are represented, specified by type, expected heat rate, and prime fuel. All announced retirements as well as those impacted by the DEC NO_x rule retire in accordance with projections in the NYISO Gold Book. All other existing units are given a 60-year total operating lifetime, after which they must retire, though units can also be retired economically earlier than 60 years. When thermal units retire, the model can choose how best to replace that capacity with available new-build resources. In some cases, thermal sites are repowered with new combustion turbines (CT) or combined cycle gas turbine (CCGT) plants (if this repowering occurs in 2040 it is with hydrogen, as discussed below), in other cases their energy, capacity, and ancillary services are met by mix of other resources.

Beyond 2028/2029, RESOLVE allows for the construction of new resources, including in-state solar, onshore wind, offshore wind, and transmission lines within the State to alleviate intra-zonal constraints. The availability of in-State renewable resources is limited and aligned with supply curve analysis developed by NYSERDA. This analysis contains estimates and projections on resource availability, site locations, and site and technology characteristics for a range of large-scale renewable energy technologies. The resources captured in this analysis are utility-scale solar photovoltaics (UPV), land-based wind (LBW), and offshore wind (OSW). The supply curve identified the statewide technical potential for more than 75 GW of UPV, 15 GW of LBW and approximately 20 GW of OSW. The OSW capacity only considers the existing lease areas from the Bureau of Ocean Management (BOEM).[61] The Supply Curve analysis is focused on technical potential and does not account for evolving state or federal policies, market dynamics or public acceptance that would impact the ability to develop these resources.

To facilitate meeting the 0x40 emissions target, the model assumes the availability of firm, zero-emissions power from CTs and CCGTs operating on hydrogen. The model assumes that natural gas turbines which would have been online in 2040 (meaning they have not yet reached the end of their

[61] Bureau of Ocean Energy Management, *New York Bight,* accessed July 2, 2025, https://www.boem.gov/renewable-energy/state-activities/new-york-bight.

operating lifetime) can be converted to hydrogen units in the 2035–2040 time frame, at a cost of 25 percent of the capex of a new unit. The model also has the option to purchase new turbines which can burn hydrogen, again at a cost premium of 25 percent higher than the cost of a natural gas equivalent alternative. While the majority of the hydrogen zero-emissions firm power in 2040 is from conversions of existing units, there are a small number of new units also built in the 2040-time frame. It is assumed that 50 percent of the hydrogen is produced via in-state electrolysis, while the remaining 50 percent is imported from green hydrogen plants, with associated costs accounting for necessary pipeline and storage infrastructure.

Furthermore, the model incorporates demand-side flexibility by assuming a certain degree of load flexibility in light-duty vehicles and water heating, consistent with the levels of ambition outlined in New York's Grid Flexibility Study.[62] This flexibility allows for more efficient integration of renewable resources and enhances the overall reliability of the energy system.

The model selects to build additional transmission capacity between Zones I and J, enhancing upstate to downstate zonal interties by 1,130 MW by 2040. These transmission additions and upgrades enable more power to flow from upstate and relieve some of the local capacity requirements in Zone J. Note that the transmission results in this analysis are meant to be illustrative and are not meant to represent a precise number in the context of a long-term transmission planning study or provide a specific, detailed solution for a specific transmission upgrade path. Nevertheless, the results do provide an indication of the economic and reliability benefits that transmission can provide the bulk system, especially in the constrained downstate zones.

Table 2: Total Installed Capacity (MW): Additional Action through 2040

Fuel Type	2025	2030	2035	2040
Nuclear	3,305	3,305	3,305	3,305
Gas & Fuel Oil (FO)	25,099	21,763	15,369	-
Zero-Carbon Firm	-	-	-	17,241
Biomass	330	330	330	-
In-State Hydro	4,280	4,280	4,280	4,621
Hydro Imports (Existing)	1,432	1,432	1,432	1,432
Hydro Imports (New)	-	1,250	1,250	1,250
Wind	3,168	4,280	4,915	8,866
Wind Imports	-	-	-	-
Offshore Wind	132	1,870	9,000	9,000
Solar	7,294	14,355	24,728	35,419
Battery Storage	1,500	6,000	8,244	9,356
Pumped Storage	1,407	1,407	1,407	1,407

*Under a Zero GHG target, all Gas capacity is assumed to be able to run on Hydrogen. FO Capacity is not allowed to run or provide reserves, so only units which operate on natural gas or dual-fuel can be converted; FO-only units are assumed to retire by 2040.

[62] Hledik, Ryan, Akhilesh Ramakrishnan, Kate Peters, Sophie Edelman, Alison Savage Brooks. *New York's Grid Flexibility Potential, Volume I: Summary Report*. January 2025. https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={70ECBD94-0000-CB2A-BCB1-EB2D260FED0B}.

Table 3: Annual Fuel Mix (GWh): Additional Action through 2040

Fuel Type	2025	2030	2035	2040
Nuclear	26,053	26,053	26,025	25,956
Gas & Fuel Oil	64,083	52,026	25,087	-
Zero-Carbon Firm*	-	-	-	100
Biomass	2,744	2,744	2,676	-
In-State Hydro	27,420	27,420	27,420	29,686
Hydro Imports (Existing)	10,161	10,161	10,161	10,189
Hydro Imports (New)	-	10,403	10,403	10,431
Wind	8,598	12,147	14,390	27,565
Wind Imports	-	-	-	-
Offshore Wind	578	8,191	39,420	39,528
Solar	10,822	22,507	41,005	59,815
Battery Storage*	(48)	(168)	(930)	(1,249)
Pumped Storage*	(0)	(1)	(126)	(333)
Imports**	17,115	8,322	5,271	21,464
Exports	(10,475)	(9,714)	(15,659)	(21,464)
Load	157,051	170,092	185,142	201,687

*Battery and pumped storage values here are net; due to parasitic losses this results in below-zero annual fuel mix results, but these resources' availability during hours of low renewable availability are key to meet resource adequacy and reliability
**Hydro Imports from Canada are included in the generation mix table and are therefore not included in the Imports row.

3.3.1. Role of Renewables in Decarbonization of Electricity Sector

The role of renewable electricity continues to grow throughout the study period, with renewable energy growing from providing 37 percent of annual load in 2025 to providing 88 percent of annual loads in 2040 (note that zero carbon electricity grows from 53 percent in 2025 to 100 percent in 2040). Meeting growing loads and peaks while working towards achieving 2040 emissions constraints and maintaining reliability requires a significant buildout of a diverse set of resources. Distributed solar is built out in line with achievement of the 10 GW by 2030 target (note that target is set in DC terms while the table above is in AC). Between 2030 and 2040 the model chooses to continue building a significant quantity of solar, most of which is utility-scale solar (26 GW by 2040) as the economics for utility-scale are more advantageous than that of distributed. Similarly, the model assumes the achievement of 9 GW of offshore wind target by 2040 and builds a similar quantity of onshore wind by 2040 as well, although the significantly higher capacity factor of offshore wind shows in it providing nearly 30 percent more energy than the onshore wind in 2040.

3.3.2. Reliable Integration of Renewable Resources

To reliably integrate large quantities of intermittent resources into the New York electricity system, wind and solar output must be balanced with customer demand on multiple timescales, with different resources providing contributions to system reliability needs over each timescale.

Role of Flexible Resources

On the intraday timescale, resources such as flexible end-use loads and energy storage play a critical role in providing hourly and sub-hourly ramping capabilities and balancing renewables with customer loads. Batteries can charge during times of high renewable output and discharge during times of lower renewable output or high customer demand, and batteries can also help meet sub-hourly ramping needs and reserve requirements. Dynamic end-use flexibility also has similar potential to help meet hourly balancing needs if customers are incentivized to shift their demand to times of highest renewable output. As seen in the capacity mix, the model meets the State's 6 GW energy storage target by 2030 and continues to build further capacity beyond, achieving a penetration of over 9 GW of battery storage by 2040. Flexible loads also play an important role in helping reduce the need for additional peaking resources as flexible vehicle electrification, heating, ventilation, and air conditioning, and water heating end users can delay or shift their charging/usage to avoid system peak hours. While flexible loads contribute hundreds of MW of peak load reductions in the Additional Action scenario by 2040, the significantly higher capacity from batteries provides greater peaking capacity than those provided by flexible loads.

Role of Firm Capacity

In addition to increased system flexibility, analyses have consistently identified a need for clean firm capacity – in addition to the State's existing hydro and nuclear facilities – to maintain system reliability while achieving a zero-emissions grid. These resources are needed during prolonged periods of low renewable output, when short-duration energy storage resources can be quickly depleted. For example, during cold winter weeks, electricity demand will be high as a result of the electrification of building heating needs, and winter months also often coincide with extended periods of low renewable output. During a week with persistently low solar and wind generation, additional clean firm capacity is needed to avoid a significant shortfall.

The clean firm capacity in the core analyses is assumed to be provided by hydrogen CTs and/or CCGTs. While the capacity for these resources is significant, with a need of 17.2 GW of zero-carbon firm generation in 2040, the annual energy output from these units is much lower, due to the significantly more expensive fuel (green hydrogen) that those clean firm resources use.[63] Nevertheless, they are critical to meet grid reliability, especially in extended periods of high load and low renewables generation.

3.4. Greenhouse Gas Emissions

Due to the significant growth in renewable energy and clean firm resources in line with progressing towards achievement of 0x40 electric sector targets, the Additional Action and Current Policies scenarios assume achievement of significant power sector decarbonization, as seen Figure 25, below. This graph depicts the CO_2 emissions from in-state generation resources through 2040 for these scenarios.

[63] While the capacity factor of these units is likely to be low, it is anticipated that the Pathways modeling probably underestimates the GWh that would be produced by these units. More explanation is provided in the Electric Supply and Resource Mix Section of the Pathways Chapter.

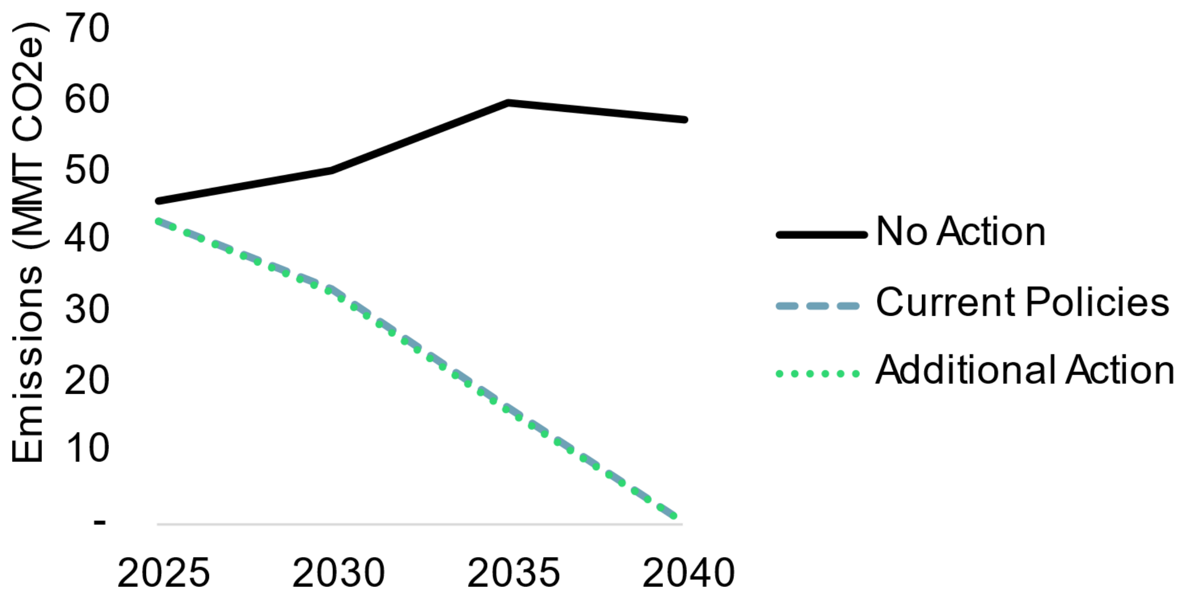

Figure 25: Annual In-State Power Sector Emissions

Source: Source: Pathways Analysis chapter of this Plan

3.4.1. Protections for Disadvantaged Communities

Under the Climate Act, the Climate Justice Working Group (CJWG) was tasked with defining what constitutes a DAC in New York State. Based on criteria that were adopted by the CJWG on March 27, 2023, 35 percent of census tracts in the State are defined as DACs. The CJWG is required to convene at least annually to review and, if necessary, adjust the criteria based on new data and scientific findings. The CJWG voted in February 2025 to update the data sources for the DAC criteria; as a result, an updated map is expected to be released in the latter part of 2025. The Climate Act requires New York to prioritize reductions of greenhouse gas emissions and co-pollutants in DACs.[64]

3.5. Impacts of Climate Change on Electric Supply

Warming temperatures may also impact the availability and performance of generating resources, including solar PV generators and thermal generators.[65] The available power output of a solar panel declines as a function of panel temperature, thus leading to reduced performance during heat waves.

[64] Section 7(3) of the Climate Leadership and Community Protection Act, Laws of 2019, Chapter 106.
[65] NYSERDA, Impacts of Climate Change on the New York Energy System, December 2023, available at: https://www.nyserda.ny.gov/About/Publications/Energy-Analysis-Reports-and-Studies/Greenhouse-Gas-Emissions.

The available power output of combustion turbines declines as a function of ambient temperature, and thermal generators are also historically more prone to outages during extreme cold and extreme heat conditions. The impact of warming temperatures on electricity generation is a factor to consider through mid-century and beyond, but in the planning horizon of the State Energy Plan (through 2040) the impacts are likely to be relatively muted and not a core driver of electric sector supply build or dispatch.

3.6. Key Findings from Pathways and Related Studies

A number of key learnings from the Pathways analysis are consistent with key findings from other recent studies, including the forthcoming NYSERDA/GE Holistic Grid Reliability Study (HGRS) and the State Scenario examined under the first cycle of the CGPP.[66]

1) **Each of these scenarios include on the order of 45-55 GW of solar and land-based wind and significant levels of transmission additions are needed to support it.**

For instance, the Stage 1 analysis of the current CGPP cycle on the State Scenario estimated that approximately 20 GW of additional local transmission headroom could be needed upstate by 2040 to achieve this level of buildout. More insights about this will come from the upcoming stages of the current CGPP cycle. As further described below, analysis from the three studies indicates that additional bulk transmission would also likely be necessary in order to deliver zero emissions energy to downstate New York.

2) **The system will need on the order of 20-25 GW of firm clean capacity to replace the existing fossil fleet**

The Pathways Additional Action case builds approximately 20 GW of clean firm capacity (consisting of a combination of thermal generation using hydrogen and energy storage, after considering the Effective Load Carrying Capability of energy storage) to replace the existing fossil fleet. The annual load and peak demand including energy storage charging for this scenario in 2040 is 202 TWh and 37 GW, respectively.

Comparable results were observed in the HGRS. In the resource adequacy analysis, this study found that approximately 25 GW of firm capacity is needed to replace the existing fossil fleet. This analysis included a forecasted 2040 annual load and peak demand including energy storage charging of 247 TWh and 44 GW, respectively.

The State Scenario under the CGPP had similar outcomes with approximately 25 GW of firm capacity needed to replace the existing fossil fleet (consisting of a combination of thermal generation using hydrogen and energy storage, after considering the Effective Load Carrying Capacity of energy storage). This scenario included a forecasted 2040 annual load and peak demand including energy storage charging of 253 TWh and 45 GW, respectively.

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[66] NYSISO, “State Scenario Results,” June 17, 2024. https://dps.ny.gov/system/files/documents/2024/06/capacity-expansion-results-for-eppac_nyiso.pdf

3) Additional transmission between upstate and downstate is observed to be beneficial

Another finding that is consistent among the three studies is that additional upstate-downstate transmission is likely to have value. These studies identified notable uncertainty related to the addition of clean firm capacity downstate and that transmission could help mitigate this risk. In the Additional Action scenario, the value of transmission is demonstrated by the model's economic deployment of approximately 1,100 MW of new transmission between Zones I and J. The results aren't reflective of a detailed investment-level analysis, but they are indicative of the potential opportunity for additional bulk transmission to play an important role.

3.7. Limited Build Rate Sensitivity Run

To account for potential delays caused by economic and political uncertainty, a limited build rate sensitivity was analyzed. In this sensitivity, the annual construction rate of new renewable energy projects was limited and interim targets for 2033 and 2035 were removed, while still aiming for a zero-emissions grid by 2040.

A slowdown in renewable energy deployment creates significant obstacles to achieving long term policy goals in the electricity sector. In 2035, modeling suggests the need to maintain an additional 1.9 GW of gas generation compared to the underlying scenario and New York also increases its reliance on imported power.

By the 2040 deadline, the renewable energy deployment shortfall would make it impossible to reliably meet New York State electricity needs when depending on green hydrogen. The system is unable to support in-state green hydrogen production, since there would need to be a considerable amount of additional renewable energy generation built to produce green hydrogen above what is projected to be built to meet demand. Consequently, the system would have to continue reliance on natural gas plants to provide 15 TWh of energy in 2040, producing over 7 million metric tons of greenhouse gas emissions. To avoid this outcome, the energy gap could be filled by other reliable sources like new nuclear power or generation using renewable natural gas.

Even with these delays, the analysis shows that if renewable development continues apace past 2040, a zero-emission system could still be achieved by 2045, provided loads remain consistent with Additional Action case. Full capacity and dispatch results from this sensitivity are provided in the Pathways Analysis chapter of this Plan.

3.8. Transmission and Distribution

As the energy supply portfolio changes and as electrification proceeds, New York's transmission and distribution grid will need to be expanded to ensure that energy is delivered to customers across the State with the necessary level of reliability.

3.8.1. Near-Term Outlook

New York State has already begun investing in its transmission and distribution infrastructure in response to climate policy. In 2020, the State passed the Accelerated Renewables Act, which mandated new efforts to identify system upgrades needed to meet Climate Act targets and provided authority to expedite certain upgrades. To implement these directives, the PSC opened a proceeding that to date has led to action on both near and long-term transmission infrastructure needs. While the CGPP will identify long-term transmission system needs, the PSC has also approved approximately $8 billion in transmission investments that are designed to support the integration of renewable energy sources, discussed in more detail in Section 0 below.

FERC Order 2023 and Interconnection Reform

In July 2023, FERC issued Order 2023 to address delays in renewable generation deployment caused by historically backlogged interconnection queues.[67] Key reforms introduced in this Order include shifting from a "first come, first served" approach to a "first ready, first served" process, where generators must demonstrate commercial readiness to advance through the interconnection process. The order also mandates a cluster study approach, evaluating multiple generators together rather than individually, and implementing standardized, transparent, and timely interconnection procedures. Other provisions include allowing co-located resources like batteries and renewables to share an interconnection request and considering grid-enhancing technologies (GETs) in transmission planning. On April 17, 2025 FERC largely accepted the NYISO's tariff modifications implementing Order 2023, and the first cluster study is underway. These changes are expected to accelerate the deployment of new generation and shape future grid development.

In addition to FERC Order 2023, other recent interconnection developments have focused on addressing the reliability of inverter-based resources. NYSRC's Reliability Rule B.5, effective as of June 2023, establishes interconnection standards for large inverter-based resources, requiring compliance with Institute of Electrical and Electronics Engineers 2800-2022 standards to ensure reliable performance in New York's grid.[68] This rule responds to issues seen in other states, where inverter-based resources failed to maintain reliable operation. FERC's Order 901, first established in 2021, further emphasizes the need to address gaps in existing reliability standards for inverter-based resources, directing NERC to develop new or modified standards in areas like data sharing, model validation, and performance requirements.[69] These actions aim to enhance the reliability of inverter-based resources as they become a larger part of the energy mix, ensuring that the grid can integrate them safely and efficiently.

Phase 1 and Phase 2 Transmission Projects

In 2020–2021, the PSC and NYSERDA conducted the Power Grid Study, which assessed the State's transmission system and its capacity to meet renewable energy targets under the Climate Act. The study found that the existing transmission infrastructure is well-equipped to support the State's 2030 target of 70 percent renewable electricity generation. The study also highlighted that longer-term clean energy and climate targets of the Climate Act present new transmission needs, necessitating proactive planning. DPS has distinguished between Phase 1 and Phase 2 transmission projects and directed efforts to ensure that the State transmission system is prepared to meet Climate Act targets in 2030 and beyond.

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67 FERC Order 2023: https://www.ferc.gov/explainer-interconnection-final-rule
68 NYSRC Reliability Rule B.5: https://www.nysrc.org/wp-content/uploads/2024/02/RR-151-Procedure-Document-2-9-2024.pdf
69 FERC Order 901: https://www.ferc.gov/media/e-1-rm22-12-000

Phase 1 projects encompass critical upgrades to the transmission system that are already planned to maintain grid reliability, resilience, and to accommodate expected renewable energy growth through 2030. These projects are focused on strengthening existing infrastructure to handle current needs and to meet 2030 targets. Phase 2 projects are driven by the broader requirements of the Climate Act after 2030. These projects aim to accommodate the influx of large-scale renewable energy generation, in particular offshore wind.

Distribution investments

Utility investments and expenditures play a crucial role in maintaining and enhancing the reliability of transmission and distribution systems while balancing affordability for customers and enabling economic development. Utilities are also required to publish Distributed System Implementation Plans and five-year capital investment plans that detail ongoing and future efforts to modernize the grid, improve system performance, and prepare for extreme weather. The five-year capital investment forecasts submitted by New York's major utilities—NYSEG, RG&E, Central Hudson, National Grid, Con Edison, and O&R—show substantial planned spending on reliability and resiliency projects, including breaker replacements, system hardening, automation, substation upgrades, and storm response measures. Further details on these plans and specific projects are provided in the 2025 Transmission and Distribution Reliability Study.[36]

3.8.2. Long-term Outlook

Transmission System Planning

CGPP

New York has initiated changes to the utilities' planning in response to decarbonization policies. The first statewide long-term CGPP cycle is underway. Staff expects the utilities to complete the work and file their report by December 31, 2025. The CGPP report will include proposals for local transmission investment and may recommend bulk system solutions. A second CGPP cycle will commence after the PSC reviews the results of the first, which will produce an updated portfolio of needs and solutions.

FERC Order 1920

Issued in May and November of 2024, FERC Orders 1920 and 1920-A mark the first major update to regional transmission policy in over a decade.[70,71] These orders respond to rising electricity demand forecasts and unresolved issues from previous efforts, such as Order 1000. The goal is to increase planning efficiency, reduce fragmentation, and align cost allocation to encourage transmission investment. Key requirements include five-year planning cycles, scenario-based planning for a 20-year horizon, and the evaluation of transmission portfolios rather than individual projects. Additionally, planners must consider right-sizing projects, coordinate with state entities, and incorporate emerging technologies like grid-enhancing tools.

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[70] FERC Order 1920: https://www.ferc.gov/media/e1-rm21-17-000
[71] FERC Order 1920-A: https://www.ferc.gov/media/e-1-rm-21-17-001

Order 1920-A further refines these processes by requiring transmission providers to include State input in scenario planning and cost allocation. It allows providers to create additional scenarios as needed, ensuring robust and transparent planning. Together, these orders aim to improve transmission system planning, facilitate interregional coordination, and support the clean energy transition while maintaining just and reasonable electricity rates. The NYISO's deadline for filing its compliance tariff covering the regional requirements is April 30, 2026, and for interregional requirements, it is June 14, 2027.

Northeast States Collaborative on Interregional Transmission

New York participates in other grid planning activities with an interregional and even national focus. These include exercises with DOE, processes at the Independent System Operator/Regional Transmission Organization (ISO/RTO) Council, and multi-state discussions under the Northeast States Collaborative on Interregional Transmission.

Initiated in June 2023, the Northeast States Collaborative on Interregional Transmission is a coalition of representatives from ten states focused on improving coordination in interregional transmission planning.[72] The collaboration aims to lower costs for ratepayers, enhance system reliability, and support State energy policies. The member states signed a memorandum of understanding on July 9, 2024, formalizing their commitment to work together on these objectives.

On October 1, 2024, the Collaborative published a white paper on HVDC (High Voltage Direct Current) Equipment Standardization and Supply Chain Considerations for Offshore Wind Transmission.[73] The paper outlines four key benefits of standardizing HVDC equipment: minimizing supply chain challenges by enabling manufacturers to focus on a single standard, maximizing the potential for future networking of offshore wind lines, accelerating domestic supply chain investment, and encouraging the adoption of global HVDC standards for more efficient and cost-effective projects.

In April 2025, the Collaborative issued a Strategic Action Plan that identifies specific steps that state, regional, and federal policymakers can take to pursue interregional transmission solutions to reduce costs for consumers and make energy systems more secure. The plan outlines a range of actions to improve interregional transmission planning processes across three different grid planning regions in the Northeast. Key near-term actions include issuance of a Request for Information (RFI) for potential interregional transmission projects that provide reliability benefits and cost savings for consumers. The plan also identifies transmission equipment standardization efforts to support a unified and comprehensive approach to transmission investments.[74]

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[72] Northeast States Collaborative on Interregional Transmission: https://energyinstitute.jhu.edu/northeast-states-collaborative-on-interregional-transmission/

[73] Northeast States Collaborative on Interregional Transmission White Paper: https://energyinstitute.jhu.edu/wp-content/uploads/2024/10/2024-Whitepaper-on-Transmission-Standards-NE-States-Collaborative-Oct-1-2024.pdf

[74] Northeast States Collaborative on Interregional Transmission Strategic Action Plan: https://energyinstitute.jhu.edu/wp-content/uploads/2025/04/Strategic-Action-Plan-Final.pdf

Distribution System Planning

Building and vehicle electrification is a large driver of anticipated load growth in the State. To keep pace with the infrastructure additions in line with the Additional Action scenario, it is anticipated that electrification will drive over 7 GW of electrification load growth through 2040

Proactive Planning Proceeding

In the Proactive Planning proceeding, the PSC directed investor-owned utilities to develop a framework for timely and cost-effective grid upgrades in anticipation of the rapid electrification of buildings and transportation in New York State. The proactive planning process will integrate with the CGPP to address anticipated load increases from sectors like transportation and heating, facilitating a comprehensive approach to grid modernization.

3.8.3. Impacts of Climate Change on Transmission and Distribution Infrastructure

As discussed in the Climate Change Adaptation and Resiliency chapter of this Plan, extreme heat, changes in precipitation, and other climate hazards are stressing the State's energy infrastructure and will only increase with the changing climate. In response to these impacts, in February 2022, Governor Hochul signed into law an act that added a new subdivision 29 to PSL §66, requiring the major utility corporations to submit a Climate Change Vulnerability Study (CCVS) and a Climate Change Resilience Plan (CCRP) to the PSC.

The utilities' CCVSs each analyzed a common core set of climate hazards (high temperature, flooding, wind, and ice) to their service area geography and system. All utilities also considered extreme events in their CCVSs, such as extreme snow and ice accumulation, heat waves, extreme winds, or deluge rainfall. The CCVSs then used planning scenarios to inform their resilience investments, as well as qualitative and quantitative assessments to map climate exposure and vulnerability to different hazards. The CCVSs informed the CCRPs later filed with the PSC.

The utilities' CCRPs contained various programs and projects to address adaptation and resiliency. For example, to address extreme heat impacts, the CCRPs proposed testing emerging technologies to mitigate heat-related illnesses among utility workers and requiring the purchase of transformers using increased ambient temperature specifications. For flooding and precipitation impacts, the CCRPs proposed installing higher flood walls at substations in high-risk areas, and relocating or rebuilding substations located in an area with a history of flooding. To protect against wind and ice impacts, the CCRPs proposed strengthening overhead lines with the use of spacer cable systems, trimming around overhead lines, and targeted undergrounding of overhead distribution lines susceptible to tree, wind, and ice damage. Lastly, the CCRPs sought to address extreme events by hardening overhead circuits that supply critical facilities, creating storm response facilities to serve as central staging areas, and accelerated smart grid distribution automation.

In December 2024, the PSC acted on the first iteration of the utilities CCVSs and CCRPs and recognized, in alignment with the law, that utility climate adaptation and resilience would be an iterative process requiring plan updates every five years and ongoing engagement with stakeholders.[75]

4. Themes and Recommended Actions

4.1. Accelerate the Deployment of Clean Energy Resources

The Pathways analysis and other studies indicate that the State should procure and deploy significant large-scale clean energy resources to meet demand and preserve reliability in a decarbonized future. As outlined below, there are several challenges and opportunities that must be considered to achieve the level of clean supply that will be necessary to advance the State's clean energy and climate goals and support grid reliability, safety, and affordability in tandem.

4.1.1. Key Considerations

Supply Chain Trends and Workforce Needs

Like most industries, clean and renewable energy generation has been impacted by significant macroeconomic pressures over the last several years—including the effects of COVID-19, inflation, high interest rates, supply chain disruptions, and more recently, tariff uncertainty. These pressures have reversed the trend of decreasing costs of the preceding years.

In addition to competing in a global supply market, New York needs to attract an adequate labor pool to support the pace of clean energy development statewide. However, there are indications that the domestic supply of skilled workers will be constrained. New York State—namely NYSERDA, NYPA, and the New York State Department of Labor (DOL)—have developed and/or funded training programs to strengthen the skilled workforce. See the Clean Energy Jobs and a Just Transition chapter of this Plan for more detail on the State's workforce development initiatives to support clean energy jobs.

Cost, Permitting, and Federal Regulation

High upfront costs, siting and permitting challenges, and federal regulatory uncertainty affect the pace of clean energy resource deployment, slowing it down relative to the pace needed to meet the State's clean energy and climate goals on the schedule established by statute. Recent federal policy developments underscore the fact that the State's progress is inextricably linked to federal government positions on energy infrastructure siting, tax credits, and international trade policy.

Community Acceptance and Land Use Issues

New York State is tasked with balancing renewable energy project development with the protection and enhancement of its agricultural lands and forests. To support and advance the future project development of renewable energy projects that are compatible with agricultural lands and forests, it is important to engage regularly with relevant stakeholders and facilitate the integration of smart siting practices. This necessitates adopting siting strategies and project procurement practices aimed at

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[75] Case 22-E-0222, Proceeding on Motion of the Commission Concerning Electric Utility Climate Vulnerability Studies and Plans, Order Regarding Electric Utility Climate Change Resilience Plans (issued December 19, 2024).

mitigating adverse effects on these key natural resources. Simultaneously, there is a need to maximize the co-benefits and synergies that can be derived from integrating these land uses. See the Buildings chapter of this Plan for more information on synergistic land use strategies.

Recommendations

- **Support the Large-Scale Renewables (LSR) industry and increase clean energy supply by continuing CES solicitations and leveraging additional recommendations from the CES Biennial Review process.** As part of the CES Biennial Review, DPS should continue to evaluate ways to reduce the cost of developing large-scale renewable projects in procurements. The biennial review process established in the PSL provides transparency into renewable energy development in New York and the State's progress toward meeting Climate Act targets. As presented in the Biennial Review, numerous factors, including inflation, transmission constraints, and interconnection and siting delays, have frustrated renewable development and impacted the trajectory towards achieving the 2030 targets. Moreover, expected increases in statewide electric load will continue to increase the level of operational renewable resources necessary to meet the State's supply objectives. Taking all this into consideration, the Biennial Review sets forth recommendations to modify the CES solicitations to maintain progress towards meeting Climate Act targets as expeditiously and cost effectively as possible.[76]
- **Continue to build-out distributed solar through NY-Sun to achieve the 10 GW target and leverage Statewide Solar for All as a cost-effective way to drive additional development while maximizing LMI benefits.** New York's distributed solar market has evolved into a self-sustaining industry through long-term programs like NY-Sun, which gradually scaled down incentives while expanding deployment. In April 2025, the PSC directed $150 million in surplus funding to support 500 MW of solar projects serving low-income customers and allocated remaining funds to reduce ratepayer impacts and support broader clean energy goals. NY-Sun will also utilize $250 million in federal Solar for All funding to expand access in DACs, complementing programs like Statewide Solar for All and the VDER tariff.
- **Monitor the effectiveness of the RAPID Act with respect to the pace of additions and local community engagement.** New York has implemented significant improvements to permitting processes that are critical to the development of new renewable energy facilities. However, the State should continue to engage with communities—through effective communication and public outreach—to support the siting and acceptance of these facilities, including strong communication and public outreach. The RAPID Act included a requirement for ORES to file annual reports that details, among other things, the number of applications received, and permits approved for each type of major renewable energy facility or major electric transmission facility. The report specifically includes the amount of fees collected and awarded to community

[76] Case 15-E-0302, Order Adopting Clean Energy Standard Biennial Review as Final and Making Other Findings (issued May 15, 2025) (CES Biennial Review Order).

intervenors by project type. ORES should continue to work with communities to ensure the timely and efficient siting of renewable energy facilities.

- **Support strategies that expedite and streamline development including advancing Clean Energy Zones and leveraging NYPA's authority to build renewables.** New York State should continue to leverage NYPA's capabilities under their expanded authority to build renewable energy generation resources. The State may also consider allowing utility ownership of clean energy resources in discrete arrangements, where there is evidence that utility ownership can expedite the pace and cost-effectiveness of clean energy investments.

  Additionally, to enable the deployment of the clean energy resources at the scale needed to meet our energy transition goals and unlock economic growth, the State should encourage the development of regional concentrations of clean electric generation paired with transmission. The PSC directed DPS to explore the concept of Clean Energy Zones in a May 2025 order.[77] Proactively coordinating generation and transmission development in a Clean Energy Zones can reduce developers' construction and interconnection risks and costs, thereby lowering costs paid by electric customers. This approach also has the co-benefits of allowing for greater community engagement and ensuring that economic development and power sector initiatives are aligned to advance the State's clean energy and climate goals.

- **Continue to support workforce development by directing efforts to those in DACs and fossil fuel workers transitioning to clean energy jobs.** In addition to competing in a global supply market, New York will need to attract an adequate labor pool to meet its 70 percent renewable energy target. However, there are indications that the domestic supply of skilled workers will be constrained as New York and other states continue to ramp up their renewable energy programs. Trends in the clean energy workforce and future anticipated labor needs are further discussed in the Clean Energy Jobs and a Just Transition chapter of this Plan.

  New York State—namely NYSERDA, NYPA, and DOL—have developed and/or funded training programs to strengthen the skilled workforce, including targeted efforts in DACs. However, the ultimate success of these initiatives is hard to predict, and therefore the availability of skilled workers may impact project development well into the future. For more information on workforce training initiatives see the Clean Energy Jobs and a Just Transition chapter of this Plan.

  Moving forward, strong coordination between NYSERDA, DOL (in particular, DOL's Office of Just Energy Transition), and other State entities will be essential to ensuring the necessary financial support for workforce development. In addition, such coordination can ensure that new and existing worker-support related to the transition away from fossil fuel electric generation sources is well-executed and supports a just transition for the State's energy workforce. For example, the State should focus on training and support services for the workforce at existing fossil fuel power plants that are slated for retirement or may be in the near-term.

[77] CES Biennial Review, pp. 67-68.

- **Continue to evaluate the State's existing clean firm capacity resources since they will be critical to achieving a zero-emissions grid.** Clean firm technologies will be necessary to maintain reliability as the State progresses towards its 2040 "zero emissions" target for the electric system. New York's existing nuclear and hydroelectric baseload units provided 44 percent of New York's in-state electricity in 2023. And as mentioned earlier, New York's existing nuclear facilities had the highest aggregate capacity factor (94 percent) of all fuel types in 2023. Ensuring these facilities continue to operate in a cost-effective manner is critical not only to progressing towards the 2040 "zero emissions" target, but to fuel diversity and the State's economic development goals as well. Therefore, as described in greater detail in the Nuclear chapter of this Plan, the State should continue to evaluate extension of the ZEC program and conclude this evaluation in a timely manner, prior to any federal relicensing application deadlines for nuclear facilities.

  In October 2024, the PSC created a new "H-Value" set at 75 percent of the current "E-Value" available under the VDER tariff for distributed generation projects for hydroelectric generation facilities in service before January 1, 2015, sized up to and including 5 MWs in capacity, and that operate and register with the local utility as a Community Distributed Generation project.[78] In May 2025, the PSC made further modifications to the CES by providing hydroelectric facilities participating in the CES Tier 2 Maintenance Program longer ten-year contract terms to allow these facilities to access better financing options to address repair expenses.[79] The State should continue evaluating what policies may be necessary to ensure the continued operation, and deliverability of electricity into the State, of both small- and large-scale hydroelectric facilities through the Large-Scale Renewable Energy Program and Clean Energy Standard and Value of Distributed Energy Resources proceedings, respectively.[80] An example of a policy fit for reevaluation would be the PSC's directive to DPS in the May 2025 CES Biennial Review Order to revisit repowering requirements under CES Tier 1, including potential removal of the 15 percent increase in generation for hydroelectric facilities requirement.

- **The State will need to be strategic about the pace of combustion unit retirements and/or replacements as it works to pursue achievement of its clean energy targets.** New York's generation fleet is aging, the rate of renewable deployment is uncertain, reliability margins are shrinking, and significant levels of large loads are being added. Due to these factors, the State

78 Case 15-E-0751, Order Approving Compensation for Hydroelectric Baseline Generating Facilities (issued October 17, 2024) (H-Value Order).
79 CES Biennial Review Order.
80 Cases 15-E-0302 and 15-E-0751.

will need to be strategic about the pace of combustion unit retirements and/or replacements as it works towards its clean energy goals and to meet reliability needs as quickly and cost-effectively as possible. Combustion generating units will remain essential parts of electric grid reliability and affordability. Retirement of these units will not be able to occur until resources that provide the same grid reliability attributes are put in place.

Additionally, there are specific considerations with respect to the small clean power plants, or "peaking units", owned and operated by NYPA. By 2030, NYPA will cease production of electricity at its peaking units unless the closure of any specific facility would result in increased emissions in a DAC or the facility is needed for reliability.[81]

With these strategic and statutory considerations, New York will seek to carefully manage the retirement of existing assets and evaluate whether there is need for new generation that is compatible with long-term policy targets. To do so, the State will continue its efforts under the 0x40 Proceeding and CGPP. These processes will not only help to evaluate whether there will be sufficient clean firm resources available by 2040 that meet the proposed definition in the DPS white paper defining key terms in PSL §66-p, but also consider what approaches would promote emissions reductions, affordability, and reliability.

4.2. Advance Demand-Side Solutions and Flexible Resources

The transformation of New York's electricity sector will require carefully balancing the variety of generation resources and changing patterns of demand to maintain system reliability. The State will continue to leverage and expand the deployment of distributed solar and demand-side resources, including energy efficiency measures and flexible technologies, to lower the cost of the clean energy transition and enhance the reliability of the grid.

4.2.1. Key Considerations

Value of Demand Response and Flexible Resources in Reducing Infrastructure Needs

Leveraging demand response and harnessing the ability of flexible resources to lower energy demand can provide a unique opportunity to potentially reduce the scope and costs of infrastructure buildout. The PSC initiated the GOTF proceeding in April 2024 to unlock innovation and investment to deploy flexible resources—such as DERs and VPPs—to achieve the State's clean energy and climate goals at a manageable cost and at the highest levels of reliability. The objectives of the proceeding are to develop and maintain a plan that encourages investment in flexible resources to reduce infrastructure and operational costs, improve system reliability, and increase customer benefits and bill savings.

Market/Technical Potential of Demand-Side Solutions and Flexible Resources

The first major deliverable of the GOTF proceeding was the New York Grid Flexibility Potential study submitted January 31, 2025.[82] The study concluded that New York's 2040 grid flexibility potential is more

[81] Public Authorities Law Section 1005(27-c)(a)
[82] https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={70ECBD94-0000-CB2A-BCB1-EB2D260FED0B}

than six times the State's current capability and equates to around 25 percent of the 2040 net system peak demand.

In looking at the cost, the study noted that all modeled grid flexibility options will be cost-effective by 2040 due to their value in a highly decarbonized power system. On the benefits side, the study found that by 2040, grid flexibility could avoid nearly $3 billion per year in power system costs, much of which could be used to compensate participants, with a portion retained as cost savings for all ratepayers. These benefits come in several forms, one being the distribution deferral value which is significant in locations with potential capacity constraints due to load growth. In addition, default dynamic pricing could result in 700 MW to 1,800 MW of demand reduction and provide all customers with an opportunity to save money.

The opportunities for grid flexibility come in several forms as well; for example, EV charging represents the single largest opportunity for grid flexibility, while over 200 MW of behind-the-meter battery flexibility could be unlocked in New York City when the permitting process is finalized. The report also noted that heat pump flexibility could play an important role in addressing winter resource adequacy concerns, though further technical development and experimentation is needed.

Although all New York utilities have significant grid flexibility potential, there are barriers that need to be addressed to reach the scale of grid flexibility expansion discussed in the report.

Value of Energy Efficiency and Managed Electrification Measures

Investing in energy efficiency and managed electrification measures, such as heat pump installations and building shell improvements, are important considerations to manage overall system costs, avoid capital investments in the grid, and ultimately reduce customers' monthly bills. These measures have the co-benefits of improving comfort and health at home (see the Buildings chapter of this Plan for more information).

Recommendations

- **Improve integration of flexible resources into grid planning and grid operations.** The State should continue progress through the GOTF proceeding to evaluate how aggregating DERs and VPPs can provide additional value for grid management and flexibility. Through this proceeding, the State should consider the potential role of regulation and financing mechanisms to advance the development of flexible resources.

- **Continue to evaluate the contributions of longer duration energy storage to enhance the reliability of the electric grid.** The Energy Storage Roadmap demonstrated that energy storage with a duration of eight hours or longer provides additional reliability and renewable integration value, particularly as the State gets closer to achievement of a zero-emissions electricity system. In recognition of this value for longer duration resources, the Bulk Storage Implementing Order[83] directed NYSERDA to include a 20 percent target for energy storage resources with durations of

[83] "Order Approving Bulk Implementation Plan with Modifications," March 21, 2025, https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={10ACB995-0000-CC17-A62E-1F3CEDDE8A1F}

eight hours or longer. The State should continue to evaluate this target and the resulting deployment of longer-duration resources as projections for future system needs evolve in the coming years.

- **Investigate opportunities for flexible resources to provide grid-forming capabilities.** In 2023, NERC recommended that all new battery storage installations have grid-forming capabilities, which can contribute to system stability when needed by providing voltage control in response to system disturbances in a manner similar to traditional generators. MISO has recently proposed a framework that would eventually establish equipment standards for new battery storage systems in the region to be equipped with grid-forming inverters.[84] New York should continue to investigate the current capabilities of today's technologies and should consider whether a similar framework is warranted.

- **Identify opportunities to enhance energy efficiency and managed electrification measures and other building upgrades.** Energy efficiency and managed electrification are important measures to help manage overall system costs. These measures help reduce peak demand on the electric grid and will ensure that the State does not build excess capacity of renewable generation assets to meet a higher peak demand and increase the risk of those assets being underutilized. Energy efficiency and enhanced building load management can also help businesses reduce costs through energy use reduction and assist in reducing the frequency of dual-fuel fossil fuel generation facilities from having to switch to oil during periods of peak demand—thereby reducing greenhouse gas emissions. The Transportation and Buildings chapters of this Plan elaborate further on these opportunities.

- **The State needs to continue to lead the nation in energy storage safety.** Following fire incidents at energy storage facilities in Jefferson, Orange, and Suffolk Counties, Governor Hochul announced the creation of a nation-leading Inter-Agency Fire Safety Working Group in 2023 to ensure the safety and security of facilities across the state and directed the Division of Homeland Security and Emergency Services, Office of Fire Prevention and Control, NYSERDA, DEC, DPS, and DOS to lead the Working Group to independently examine energy storage facility fires and safety standards.[85] The Working Group gathered information from incidents and advice from experts to help prevent fires and ensure emergency responders have the necessary training and information to prepare and deploy resources in the event of a fire. Additionally, the Working Group has been collaborating with national labs and other nation-leading subject matter experts to review all existing codes and testing procedures pertinent to the development and electrification of battery energy storage systems.

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[84] MISO Grid-Forming Battery Energy Storage Capabilities, Performance, and Simulation Test Requirements Proposal, Draft Whitepaper, https://cdn.misoenergy.org/20240723%20IPWG%20Item%2004b%20DRAFT%20GFM%20BESS%20Performance%20Requirements%20Whitepaper%20(PAC-2024-2)_REDLINE639677.pdf

[85] NYSERDA, "New York's Inter-Agency Fire Safety Working Group," accessed July 2, 2025, https://www.nyserda.ny.gov/All-Programs/Energy-Storage-Program/New-York-Inter-Agency-Fire-Safety-Working-Group.

NYSERDA worked with subject matter experts and a variety of interested stakeholders to provide feedback on a draft Fire Code Recommendations Report produced by the Working Group, which provided a final report to the New York State Fire Prevention and Building Code Council and DOS staff; the latter released a Notice of Proposed Rule Making in March 2025 containing proposed code language intended to reflect the recommendations.

4.3. Support Investments in New Clean Firm Technologies

The deployment of clean firm technologies will be necessary to maintain reliability as the State progresses towards its 2040 “zero emissions” target for the electric system. NYSERDA and DPS are conducting a technoeconomic study to identify clean firm resources that could help reduce the expected gap between electricity demand and supply in 2040 and beyond. The study is evaluating and comparing potential resources across a number of criteria, including technological and commercial readiness, cost and performance characteristics, geographic suitability and scalability for 2040, and emissions and other stakeholder considerations. It will provide a resource for the State’s ongoing assessment of viable clean firm technologies, to be conducted in conjunction with multiple State agencies.

Recommendations

- **The State will need to be strategic in identifying and integrating clean firm technologies that have the attributes necessary to support the achievement of a zero emissions electric grid by 2040.** Results from the study described in Section 4.3 will be leveraged to identify and propose pathways for the deployment of those technologies that have the greatest potential to solve the reliability needs expected to arise with the energy transition. The State will also pursue continued support for innovation and demonstration projects, as appropriate. These efforts will be critical, as many of the technologies under consideration to meet system needs for firm, dispatchable capacity (e.g., combustion of alternative fuels, nuclear, long-duration energy storage, etc.) are not commercially available at scale today.

4.4. Continue to upgrade and modernize the State’s transmission and distribution infrastructure.

4.4.1. Key Considerations

As the energy supply portfolio changes and as electrification proceeds, New York’s transmission and distribution systems will need to be modified to ensure that energy is delivered to customers across the State with high levels of reliability and resilience. Meeting that challenge will require focused long-term planning to produce cost-effective grid upgrades and expansion. New York must complete the first cycle of CGPP and consider reforms for deployment in future cycles that will support the cost-effective expansion of the system.

Recommendations

- **Continue to ensure the State’s planning processes provide actionable information for decision-makers regarding future system needs and cost-effective solutions.** It is essential that electric system planning delivers sound recommendations for system investment. There are several avenues that could be explored, discussed below.

- **Continue to strengthen collaboration between NYISO and Utilities to enhance CGPP process.** The NYISO and the utilities have different but complementary roles in planning for the grid. In general, the NYISO has responsibility under its FERC tariffs for the bulk system while the utilities manage their local transmission and distribution systems. A regulatory jurisdiction-based approach risks misalignment of planning results. Rather, the roles of the utilities and the NYISO must be synchronized to ensure that transmission investments represent overall cost-effective solutions for New York ratepayers. Future cycles of the CGPP should improve the level of collaboration and exchange between NYISO and utility planners.

- **Improve coordination of distribution and transmission planning under CGPP.** As envisioned by the PSC, the CGPP is intended to assess system needs at all levels, including distribution. The Proactive Planning proceeding focuses specifically on improvements to distribution planning. These recommendations will be passed into the CGPP as they are developed and vetted and future CGPP cycles will provide improved insight into distribution system needs.

- **Continue progress towards adoption of cost-saving advanced transmission technologies.** The State should continue to support the efforts of the Advanced Technologies Working Group and integrate effective solutions with the CGPP planning process and in rate cases. At the federal level, FERC Order 1920 imposes similar requirements on the NYISO for the consideration of ATTs alongside conventional transmission solutions. These important efforts should be harmonized and to ensure that transmission solutions are designed to capture the cost benefits of ATTs.

- **Enhance interregional coordination.** Planners should consider what potential efficiencies may be gained through enhanced interregional planning and collaboration on multi-state projects. In the same vein, partnerships with interested federal agencies should be focused on streamlining the permitting processes for projects that have a federal component, such as offshore transmission, to reduce project risk and cost. Similarly, enhanced inter-state and federal collaboration, like the efforts of the Northeast States Collaborative on Interregional Transmission (see Section 0) could lead to proactive approaches to supply chain management.

- **Continue collaborative efforts to address distribution interconnection costs and process.** Both the costs of interconnection and the efficiency of the interconnection process are challenges to DER deployment. Most of the interconnection reforms initiated to date, including the measures described above, were developed through collaborative stakeholder processes. DPS and NYSERDA should continue their commitment to identifying solutions in these forums. In addition, DPS should consider the results of the PSC's metrics proceeding, which specifically focuses on recent cost and utility performance concerns and propose changes to solve obstacles identified there**.** [86]

- **Consider new cost allocation options for transmission and distribution system infrastructure.**

[86] Case 19-M-0463, In the Matter of Consolidated Billing for Distributed Energy Resources.

- Transmission Cost Allocation: New York ratepayers bear the costs of both maintaining the electric transmission system and the costs of expansion of the system for both reliability and decarbonization. As the State invests in transmission build out accounting for any cost exposure to ratepayers, the State should also consider new approaches to funding and cost-allocating the infrastructure that is needed to meet climate objectives to limit increased cost to ratepayers for funding these investments.

- Distribution Cost Allocation: The PSC, based on results of the CGPP and the Proactive Planning proceeding, should identify and consider alternative cost allocation options for funding distribution system capacity upgrades. For example, over the last few years, the PSC took action to update the rules for sharing the costs of infrastructure upgrades required to interconnect DERs, referred to as Cost Sharing 2.0. The new rules significantly reduce up-front cost to developers for all projects that share in the need for an upgrade and improve the time for upgrades to be completed.[87] In conjunction with the upcoming review of Cost Sharing 2.0, the PSC should consider whether to introduce new options for funding the distribution system expansion that is needed to support the State's goals for electrification and DERs to balance costs to developers, users, and ratepayers for funding these system investments.

- **Pursue integrated electricity and natural gas system planning.** Proactive long-term and integrated planning are needed to ensure efficient investment in the electric and natural gas system and reduce the stranded asset risk given the projected decline in gas system usage. Longer planning horizons, closer coordination with electric utilities, prioritization of non-pipeline alternatives, and more proactive demand management especially in extreme conditions are all needed to reduce gas system capital investment safely and strategically. Planning and investment standards need to be evaluated to ensure that they remain suitable as the climate and patterns of consumer demand change. See the Natural Gas chapter of this Plan for more detail on Integrated Electricity and Natural Gas System Planning.

- **Consider ways to coordinate transmission deployment and the strategic use of energy storage.** The State should continue to evaluate ways to further coordinate energy storage and transmission solutions through the CGPP and other planning processes. In addition, the State should support the NYISO completing its Storage as Transmission Project in 2025[88], calling for a new Market Design allowing energy storage to meet a transmission need arising from an N-1-1 contingency event.

[87] More information on the SIR process and other interconnection resources can be found here: https://dps.ny.gov/distributed-generation-information.

[88] https://www.nyiso.com/documents/20142/51501157/Storage%20as%20Transmission%20052025%20icap.pdf/03ddda46-18a4-bf92-d04e-5191d17771bc

4.5. Evolve Electricity Markets to Meet the Future Needs of a Clean Electricity System.

4.5.1. Key Considerations - Wholesale

There are currently numerous market structures and related planning processes that provide market signals related to energy, capacity, and ancillary services. However, there is a need to review and evolve current markets and rules to ensure they maintain reliability, foster energy affordability, and support the advancement of clean energy objectives.

The Climate Act targets 70 percent of electricity supply to be comprised of renewable resources by 2030, and that by 2040, electricity supply be comprised entirely of zero-emitting resources. These significant changes in the composition of electricity supply warrant consideration of how wholesale electricity energy, capacity, and ancillary service markets can attract and retain an economically efficient portfolio of resources to continue to meet all system reliability needs, particularly in 2040 and beyond.

Recommendations

- **The State should continue to work with the NYISO and market participants to further investigate the opportunities described below and any other ideas to evolve current markets and rules to ensure they maintain reliability, promote energy affordability, and achieve clean energy objectives.**

- **The State should examine what incentives are needed to attract and retain the portfolio of technologies needed to support resource adequacy as the State transitions to a zero-emissions electric system.** New York should assess whether the current NYISO capacity market construct sends the proper incentives for the portfolio of resources that will be needed in the transition and to support a reliable, fully decarbonized grid. The State should also evaluate whether/how to support a glide-path to a fully decarbonized grid, such that technologies with the attributes needed to maintain reliability in 2040 are incentivized to be online and operational in the years leading up to 2040.

- **The State should examine the potential need to identify additional market attributes, and provide the proper related incentives, to attract needed grid flexibility and other system services.** As the installed capacity in New York is increasingly comprised of intermittent and limited-duration resources, New York should evaluate incentives to ensure that the system maintains sufficient grid flexibility and other system services (i.e., from resources like energy storage, flexible demand, dispatchable emission free resources). This can include an assessment of whether the current mix of ancillary services (and future planned changes from NYISO, i.e., Dynamic Reserves and Uncertainty Reserves) are adequate through 2040 and beyond, or whether adjustments to existing products will be needed and/or whether additional services and market products will need to be defined.

  The State may also examine additional reliability attributes that are not currently compensated through competitive market products and identify a pathway for ensuring that future portfolios maintain these attributes, either through adaptation of administrative procedures and/or regulated backstops, new market products, or some combination of market and administrative mechanisms. Within the identified pathway(s), this evaluation should ensure that advanced transmission technologies can be considered and evaluated on a level playing field with generation and energy storage technologies.

- **The State should Identify additional planning or operational rules that should be further examined and potentially adjusted in order to support a zero emissions electric system.** New York State should continue to identify additional planning or operational rules to support a zero emissions electric system. An example of this would be to examine the "Loss of Source" limitations that constrain the sizing of offshore wind transmission networks. Currently, grid operators in the United States typically do not allow for connection of projects of greater than 1,200 MW in New England, with slightly larger projects allowed in New York and PJM, known as the "Loss of Source" or "Single Largest Contingency" limit. As part of its involvement in the Northeast States Collaborative on Interregional Transmission, New York is evaluating modifying this "Loss of Source" limit to allow for integration of a new offshore wind construction technology, a 525 kV platform design. This new platform design would allow for larger wind farms (2,000–2,400 MW) reducing the number of shore crossings necessary to bring offshore wind onshore, thereby reducing the environmental impact of offshore wind projects. New York State should also address other regulatory barriers to interregional transmission as identified in the Northeast States Collaborative on Interregional Transmission Strategic Action Plan.

4.5.2. Key Considerations - Retail

Significant investments in the electricity system will be made in the coming decades, across electricity supply, demand, and transmission and distribution infrastructure. The other themes in this section discuss strategies and actions the State can take to ensure that these investments are cost-effective for existing customers. As noted, the PSC and DPS work to ensure access to safe, reliable utility service at just and reasonable rates. New York State also is advancing energy affordability through consumer protection efforts at DOS, including the Utility Intervention Unit's work to represent consumer concerns in utility rate cases, and through the PSC's Energy Affordability Policy and Enhanced Energy Affordability Policy and a range of State and utility-administered incentive programs that help households and businesses adopt clean energy choices.

In addition, new compensation structures and retail rates can better incentivize active participation of load in markets, including flexible resources that provide grid resiliency, improve grid reliability, and drive down costs. It is critical that retail rates allocate costs to customers in a way that avoids an inequitable cost shift to any non-participating customers while enabling adoption of DERs.

Rate Design

Rate design can have a significant impact on a customer's decision to adopt a DER. DPS should ensure the efficient and effective rollout of the three-part rate design (customer charge, contract demand charge, daily as-used demand charge) adopted by the PSC under the standby rate proceeding. This includes the development and availability of tools necessary to evaluate the impact of such rates on various use cases. Evaluation of the LIPA default time of use program should be examined to determine if such an approach should be applied statewide to encourage DER deployment and usage.

DPS should continue to evaluate the VDER compensation method to ensure it accurately reflects the value provided by DERs and that it reflects the avoided costs of the local utility that is paying for the credits. This includes the setting of the Demand Reduction Value (DRV) and Local System Relief Value (LSRV) using a revised methodology based on the latest marginal cost of service study.

Incentives

Future DER program incentives should continue to be leveraged to stimulate high-benefit DER projects, including those that serve LMI and DACs. The GOTF proceeding will be the forum for the development of additional incentive mechanisms.

Recommendations

- **Examine the role of electricity rates and program incentives to enable deployment of DERs and flexible resources.**

4.6. Increase system resilience to climate change and extreme weather.

4.6.1. Key Considerations

Reliability Metrics

Establishing criteria for metrics like expected unserved energy (EUE) may help supplement traditional LOLE metrics by providing information about risks of long-duration outages. ISO-New England is currently exploring the development of a Regional Energy Shortfall Threshold to identify risks during extreme weather events, particular over prolonged winter periods. ERCOT has recently adopted a multi-criteria reliability standard that captures frequency, duration, and magnitude of expected outages.

Additionally, current requirements for reducing energy shortfall risk in New York are defined administratively by the NYISO (e.g. New York City and Long Island's fuel oil requirements[89]). Supplemental criteria for metrics like EUE could be used to determine whether the same level of reliability is maintained even as those specific requirements may be adjusted as the resource mix evolves. Fuel availability will also be incorporated into the NYISO's capacity accreditation framework in future cycles. Capacity accreditation aligns capacity market compensation and participation eligibility with regional marginal contribution to specific reliability needs based on the performance and availability of resources.

Utility Climate Change Vulnerability Studies

As discussed in Section 3.8.3, the utilities are required to file CCRPs and CCVSs with the PSC. The CCRPs and CCVSs include planning scenarios to inform resilience investments and assessments to map climate exposure and vulnerabilities to different hazards. DPS will continue to work closely with the utilities to evaluate performance and periodically update their plans, and the CCRPs and CCVSs will continue to be considered by the PSC to determine the necessary investments needed to enhance electric system resiliency.

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[89] NYISO 2025 Power Trends Report, https://www.nyiso.com/power-trends

Recommendations

- **Consider whether the current reliability-related metrics should be supplemented given the evolving nature of the grid and increased risks of high-impact reliability events.** New York should consider whether the current reliability-related metrics (i.e. loss of load expectation) should be supplemented given the evolving nature of the grid and the increased risks of high-impact reliability events. Establishing criteria for metrics like expected unserved energy (EUE) may help supplement traditional LOLE-based criteria by providing information about risks of long-duration outages. As fuel availability will be incorporated into the NYISO's capacity accreditation framework, additional consideration should be given to whether this adjustment to capacity accreditation provides sufficient incentives and compensation to resources for attributes needed to ensure energy adequacy and resilience to extreme weather events from both a planning and operational perspective (e.g. compensation for fuel storage capabilities).

- **Continue to incorporate the impacts of climate change into future planning scenarios.** The Reliability Needs Assessment is already moving towards a scenario-based approach to reliability planning and contains an analysis of higher and lower demand scenarios for informative purposes. However, climate-driven changes in demand are not currently incorporated into these scenarios and potentially could be an additional layer to these scenarios in the future. For example, if temperatures continue to rise, that could put additional upward pressure on summer peak demand, which could lead to additional reliability challenges or an identified shortfall materializing more quickly than projected. The State should continue to pursue the incorporation of the impacts of climate change into future scenario planning to ensure that investments in energy system infrastructure are robust to a broad range of plausible futures.