SUPREME COURT OF THE STATE OF NEW YORK
APPELLATE DIVISION : FOURTH DEPARTMENT

COALITION OF CONCERNED CITIZENS, and DENNIS GAFFIN, as its President,

Petitioners,

-vs-

NEW YORK STATE BOARD ON ELECTRIC GENERATION SITING AND THE ENVIRONMENT, and

ALLE-CATT WIND ENERGY LLC,

Respondents.

NOTICE OF MOTION FOR LEAVE TO REARGUE OR LEAVE TO APPEAL

Appellate Division
Fourth Department
Docket No.:
OP 20-01405

Public Service
Commission Case No.:
17-F-0282

PLEASE TAKE NOTICE that upon the annexed affirmation of Gary A. Abraham, sworn to on the 12th day of December, 2021, together with the exhibits annexed thereto, the undersigned will move this Court at a term thereof to be held at the Court House located at 50 East Avenue, Rochester, New York 14604 on Monday, January 10, 2022 at 10:00 a.m. EST or as soon thereafter as counsel can be heard, for an Order pursuant to C.P.L.R. 2221 and 5602 and 22 NYCRR 1250.16(d) granting Petitioners-Appellants Coalition of Concerned Citizens and Dennis Gaffin ("Appellants") leave to reargue the November 12, 2021 Memorandum and Order of this Court (the "November 12 Order"), and upon such reargument, reversing or remanding the Order of the Board on Electric Generation

Siting and the Environment granting a Certificate of Environmental Compatibility and Public Need to Alle-Catt Wind Energy, LLC, or alternatively, granting Appellants leave to appeal the November 12 Order to the Court of Appeals, together with such other and further relief that this Court may deem just, proper, and equitable.

PLEASE TAKE FURTHER NOTICE that, pursuant to C.P.L.R. 2214, answering affidavits, if any, are required to be served upon the undersigned at least two days before the return date of this motion.

Dated: December 13, 2021

LAW OFFICE OF GARY A. ABRAHAM

By: 

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17-F-0282

AFFIRMATION IN SUPPORT OF MOTION FOR REARGUMENT OR, IN THE ALTERNATIVE, LEAVE TO APPEAL TO THE COURT OF APPEALS

PRELIMINARY STATEMENT

GARY A. ABRAHAM, an attorney admitted to the Courts of the State of New York, affirms the following under penalty of perjury:

1. I am counsel to Plaintiffs-Appellants Coalition of Concerned Citizens and Dennis Gaffin ("Appellants") in the above captioned matter.

2. Appellants respectfully seek leave to reargue this Court's November 12, 2021 Order (the "November 12 Order") on the grounds that the November 12 Order contains a critical error of fact that, when corrected, renders the balance struck by the PSL Article 10 Siting Board, and approved by the Court, so

imbalanced as to be irrational as a matter of law. *Cf.* PSL §§ 168(3)(a), (b). Correcting the error thus requires reconsideration of the Court's Order.

3. In the alternative, on the same grounds, the Appellants respectfully seek leave to appeal to the Court of Appeals on the question, whether the balance struck by the Siting Board comports with the findings required pursuant to PSL §§ 168(3)(a), (b).

ARGUMENT

4. The Court mistakenly finds that "Alle-Catt introduced evidence regarding . . . the proposed transmission facilities [that would deliver its energy] and the ability to connect energy generated by the project with New York City, where it is most needed", and that this evidence was weighed by the Board. November 12 Order, 3. It was not, because neither the Siting Board nor Alle-Catt offered any evidence on these subjects. The only evidence in the record shows that Alle-Catt could not deliver its energy to New York City.

5. The inability to deliver Alle-Catt's energy downstate, owing to the absence of adequate transmission capacity, is central to the Coalition's case that the "complex balance of competing interests that must be made in generation siting cases" struck by the Siting Board, (R.399-1, 79), lacks substantial evidence in the record and is therefore arbitrary and capricious.

6. The Coalition demonstrated that the transmission facilities to be utilized by the project are unable to reach New York City. R.374-1, at 34-37 (Coalition "Brief on Exceptions"). As the Siting Board notes, DPS trial staff and Alle-Catt agreed, and the Siting Board agreed. R.399-1 (Siting Board Order), at 82-83. *Cf. also* R.358-1, at 19 (hearing examiners' report).

7. Even today, according to the New York Independent System Operator, ("NYISO"), the non-profit corporation that operates the transmission system state-wide, the Alle-Catt project site is separated from New York City by several transmission-constrained pockets. *See* NYISO, *Power Trends 2021*, at 39 (attached hereto as Exhibit A). *Cf.* R.322-1, 23:17-19 (official notice is taken of agency reports).

8. There is no evidence, including evidence in the record, that Alle-Catt can deliver its energy to New York City.

9. Alle-Catt's energy would be delivered to NYSIO Zones A, B and C, comprising central and western New York. *See* R.86-16, 6 (Table 8-2); R.99-2 (confidential), at 8 (sec. 3.1.7).

10. Information about transmission capacity to deliver Alle-Catt's energy downstate is not addressed in the Alle-Catt application. Exhibit B hereto (Coalition information request IR-17, Responses to Questions 1 and 2).

11. Alle-Catt declaimed any responsibility for providing information

about the transmission facilities that would deliver its energy. R.295-1, 13.

12. According to DPS Staff, Alle-Catt is not obligated to report where its energy would be delivered, beyond the local point of interconnection to the grid. R.223-24 (Response to Coalition information request, Question 2).

13. The Siting Board foreclosed any opportunity to discuss evidence needed to assess the project's ability to deliver renewable energy to where it is needed. R.374-1, at 36-37. *See also* R.223-6 (Coalition "Statement in Lieu of Direct Testimony").

14. Alle-Catt would deliver its energy to a bottled upstate grid that is already 90% carbon-free, and would do so only by displacing other renewables. R.374-1, at 37 (quoted text at n.142).

Evidence of the emissions benefits of Alle-Catt

15. It should be axiomatic that the potential benefits of renewable energy facilities lie in their ability to reduce greenhouse gas emissions. *Cf.* R.295-1, at 5. *Cf. also* Laws 2001, ch 222, § 1 (the purpose of PSL Article 10 is "to facilitate the expansion of New York State's capacity to provide electricity in a manner which has a beneficial impact on the environment, including reduced emissions of pollutants to the air . . ."). If there is little or no evidence that a particular facility would discernibly reduce emissions, substantial evidence in support of the Siting Board's required findings (at PSL §§ 168(3)(a), (b)) is lacking.

16. The evidence introduced by Alle-Catt regarding energy generated by the project is found in Exhibit 8 of the Alle-Catt Article 10 Application, (R.86-36), and in responses by Alle-Catt and by DPS Staff to five information requests ("IRs") by the Coalition on this subject. See R.223-21, -22, -23, and -24. *See also* R.223-6, at 6-11. A fifth information request that was not included in the record prepared by the State is provided herewith as Exhibit B.

17. The ability to connect energy generated by Alle-Catt with New York City, where it is most needed, is demonstrated nowhere in these documents.

18. The Coalition's IRs ask repeatedly for such information but the responses provide none.

19. An attachment to Exhibit 8 of Alle-Catt's Certificate application, *Electric System Production Modeling Report,* ("Report"), provides the results of a model estimating the amount of energy to be generated by the project in 2023, the first year of a projected 20-30 years of operations, and the emission reductions that would result. R.86-36 (Report, Table 2). No other years were modeled. R.295-1, 7; R.223-21 (Alle-Catt Response to Question 2). *Cf. also* Exhibit A (CCC IR-17, Responses to Questions 3 and 6).

20. Alle-Catt's model predicts the project will reduce CO^2 emissions in New York's power sector in 2023 by 0.01%. R.86-36 (Report, Table 2) (showing that, of 36,078,668 tons of CO_2 emitted by all New York power generators

annually, Alle-Catt could reduce 417,141 tons).

21. Operation of Alle-Catt after 2023 would increasingly force other renewable energy facilities to curtail their operations. R.295-1, at 7; R.374-1, at 31-32, 37.

22. Other zero-emissions generators would be displaced by Alle-Catt, including hydropower generators from Ontario and Quebec, Canada, (R.86-36 (Report, Table 7)), and two wind energy facilities in western New York (in Zone C) (*id.* (Table 6)).

23. The degree of curtailment of other zero-emissions generators in later years is underestimated by Alle-Catt's model. R.295-1, at 7.

24. Exhibit 8 states that the "key assumptions" in Alle-Catt's model regarding how many other generators would be injecting energy into the system were selected by DPS Staff. R.86-36 (Report, 2). DPS Staff selected only generators that had at that time obtained a PSL Article 10 Certificate. R.223-24, 2 (Response to Question 1).

25. The Coalition asked DPS Staff about the basis for that selection, because the assumed generators are a fraction of the renewable capacity that developers requested in 2019 be connected to the grid. While not all proposed renewable generators would ultimately be in service during Alle-Catt's operations, many more than those assumed by Staff would. R.223-24, 1 (Question 1).

26. DPS Staff found that "emissions displaced by the project" are in fact dependent on "the various transmission constraints on the system" among other factors, (Exhibit A, Response to Question 7), and that "[i]t is not infeasible to model the project in years beyond 2023." R.223-24, Response to Question 3; *cf. also id.*, Response to Question 5.

27. Alle-Catt acknowledged that it could model operations over five years. R.247-4, at 4.

28. As a department within the Public Service Commission, DPS is authorized by law to utilize the "modeling capability" and analytic expertise possessed by the New York Independent System Operator. NYISO, Open Access Transmission Tariff, § 3.8.1 ("OATT"). All transmission service in New York State is pursuant to the NYISO OATT, subject to approval by the Federal Energy Regulatory Commission. The NYISO OATT is available at <https://www.nyiso.com/regulatory-viewer>. The NYSIO OATT became effective on September 1, 1999. *Id.*, § 2.1.1.

29. The Siting Board had flexibility to require more information, (PSL §§ 164(1)(m), 165(4), 168(4)(g)), but did not. *Cf.* NYISO OATT, § 3.8.1.

30. The Siting Board applied no expertise whatsoever to support its conclusion that the desired emissions benefits of the Alle-Catt project will be realized in the future. As noted, neither Alle-Catt nor DPS Staff provided any

information on this subject, and both Staff and Alle-Catt agree that New York's bifurcated transmission system prevents the project's energy (and its emissions benefits) from reaching downstate.

31. Against the Coalition's assertion that, in the absence of any indication to the contrary, the upstate grid "will continue to be 'bottled' as renewable generation is added", Alle-Catt's energy systems expert Robert Cleveland asserted that NYISO will require transmission upgrades, but did not indicate the source of NYISO's authority to do so. R.247-4, at 5. Cf. Exhibit A, at 38 ("NYISO solicits market-based solutions" to address transmission needs). Mr. Cleveland added that NYISO "approved the Empire State Line and AC Transmission projects in recent years", (id.), but the Coalition pointed to NYISO's conclusion that these two projects would not avoid jeopardizing the achievement of the state's emission reduction goals, because much more transmission relief is required to unbottle the upstate grid. R.328-1, at 2-3 (discussing Case 15-E-0302, Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard, *Supplemental Comments of NYISO* (July 8, 2016), at 4).

32. The only basis in the record for the Siting Board's reliance on energy storage as a possible resolution of the problem of beneficially utilizing Alle-Catt's energy in the future is a press release by NYSERDA, cited by Alle-Catt's expert. *See* R.399-1, at 84, text at n.194. *Cf.* R.358-1, at 19.n.46 (hearing examiners'

Recommended Decision, relying on Alle-Catt's expert Cleveland). Mr. Cleveland did not identify any evidence that the transmission congestion pockets that prevent upstate renewable energy from reaching New York City, (*cf.* Exhibit A), at 39 will be relieved during the 20-30 years Alle-Catt would operate.

33. To reach its result, the Siting Board turns a serious physical problem with New York's energy system that will likely preclude Alle-Catt from realizing discernible environmental benefits into a policy dispute: "Requiring the resolution of future Statewide transmission issues before individual projects can be sited and approved would be putting the cart before the horse." R.399-1, at 83. *Cf. also* R.419-1, 17 (Order on Rehearing). However, the assertion that generation assets must be sited first, and developing transmission capacity follows, is speculation. Whether generation siting comes "before" transmission siting is not a question that was ever developed on the record.

Upstate ratepayers would benefit, but not downstate ratepayers

34. How to determine whether the project is "a beneficial addition to or substitution for the electric generation capacity of the state", (PSL § 168(3)(a)), is not specified in PSL Article 10.

35. Alle-Catt would not benefit most ratepayers in the state. Beneficial price impacts of Alle-Catt's energy are limited to upstate ratepayers "in and near [Zone A] where the Project is proposed." R.86-36 (Report, at 5).

36. The limited beneficial price impact of Alle-Catt's energy occurs principally because Alle-Catt would bid negative numbers into the state market for energy. R.86-36 (Report, 4 (the model assumes "All wind generation bids into the market at -$35/Mwh.")). The negative bid amount is the value of federal tax credits. *Id.* ("the approximate true-up value of the federal wind production tax credit").

37. Almost all upstate ratepayers would see their rates decrease as a result of Alle-Catt, but downstate ratepayers (Zones I, J and K, comprising about 65 percent of the state's population) would pay more. R.86-36 (Report, Table 4). *Cf.* U.S. Census Bureau, Population Division, *Annual Estimates of the Resident Population for Counties in New York: April 1, 2010 to July 1, 2019* (March 2020), available at <https://www.census.gov/data/datasets/time-series/demo/popest/2010s-counties-total.html>.

38. In addition, although downstate ratepayers would get none of the renewable energy, downstate ratepayers share the cost of Renewable Energy Credits ("RECs") that pay for project components. R.223-21, Alle-Catt Response to Question 10 ("The inter connection line required by the ACWE project will be paid for by ACWE and those costs will be recovered through a combination of ACWE's REC contract revenues and energy and capacity revenues"); R.223-23, Alle-Catt Response to Question 3 ("REC's paid by NYSERDA are distributed

across all Load Serving Entities [i.e., utilities] in the state not just those in Zone A" where the project would be sited); R.169-16, at 27-6.n.1 (RECs paid to Alle-Catt would be $13.6 million per year). According to NYISO, RECs are out-of-market contracts with NYSERDA that "shift[] economic risks and costs from investors to ratepayers." R.348-1, at 12.

CONCLUSION

39. The Court must be assured that the Siting Board's determinations "'are . . . supported by substantial evidence in the record . . . and are not arbitrary, capricious or an abuse of discretion'". November 12 Order, 3 (quoting *Koch v. Dyson*, 85 A.D.2d 346, 364 (2d Dep't 1982)).

40. The Court finds that the record contains "some conflicting evidence" regarding the balance of factors militating for and against the project, and concludes that "room for choice exists" such that the balance struck by the Siting Board is sufficiently "rational". November 12 Order, 3 (quoted citation and other citations omitted).

41. The Siting Board concludes that the record is sufficient to determine the long-term emissions benefits of the project, and therefore it is not necessary to "model[] . . . future intermittent generation facilities as a whole over a long period of time", an endeavor that "would certainly be very time-consuming and expensive, [and] would [not] produce anything other than speculative results."

R.399-1, at 84.

42. This conclusion should be reconsidered in light of the Siting Board's failure to consider a non-speculative, realistic evaluation of the likely environmental benefits of the project based on what is reasonably known about both the present and the future New York electric system, and in light of the undisputed environmental and community degradation the project would cause. *See* R.223-6, at 6; R.374-1, at 39-47.

43. The adverse environmental impacts of Alle-Catt include the killing of at least two species listed as endangered in New York, the Northern Long-Eared Bat and the Bald Eagle, and one species listed as threatened, the Upland Sandpiper. R.399-1, at 28-54. *Cf. also* Coalition Appellate Brief, at 10-11 (listing the findings of environmental degradation of the hearing examiners).

44. By its own account the Board was obligated to balance these competing interests, (R.399-1, at 79), but did not. The balance struck by the Board was therefore unsupported by substantial evidence in the record, and is irrational.

DATED: December 12, 2021
Humphrey, New York

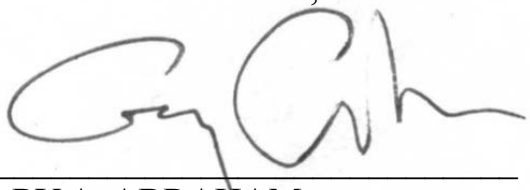

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EXHIBIT A

Power Trends 2021

New York's Clean Energy Grid of the Future

THE NEW YORK ISO
ANNUAL GRID &
MARKETS REPORT

New York ISO

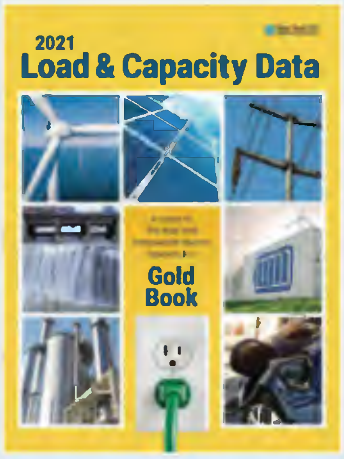
New York ISO

POWER TRENDS 2021 is the NYISO's annual analysis of factors influencing New York State's power grid and wholesale electricity markets. Begun in 2001 as *Power Alert*, the report provides a yearly review of key developments and emerging issues.

POWER TRENDS 2021 DATA is from the 2021 Load & Capacity Data Report (also known as the Gold Book), unless otherwise noted.

Published annually by the NYISO, the Gold Book presents New York Control Area system, transmission and generation data and NYISO load forecasts of peak demand, energy requirements, energy efficiency, and emergency demand response; existing and proposed resource capability; and existing and proposed transmission facilities.

The Gold Book and other NYISO publications are available on the NYISO website, **visit** www.nyiso.com



THE NEW YORK INDEPENDENT SYSTEM OPERATOR, INC. (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.

FOR MORE INFORMATION, VISIT:
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ON THE COVER: Energy storage facility image courtesy of Key Capture Energy

From the CEO

On behalf of everyone at the New York Independent System Operator, welcome to *Power Trends 2021*. We couldn't be more pleased to provide you with our annual flagship publication in keeping with our mission as an authoritative source on New York's electric system.

Last year's *Power Trends* was published during a time of great uncertainty and concern. In 2020 the NYISO, like much of the economy, transitioned to remote work where appropriate. We moved swiftly to ensure that our workforce remained safe but also continued to provide the kind of reliable service that New Yorkers have come to depend on.

A year later, we take stock. Much has changed, of course. We live in a period of unparalleled public health and environmental challenges, where decisions regarding the economy and the environment have critical impacts on the health and well-being of our society.

> **"Through the challenges of the pandemic, and across a 21 year history, the NYISO has always fulfilled our mission of maintaining grid reliability, overseeing efficient wholesale markets, and conducting expert grid system planning. Looking forward, we will continue to do so."**

The electric system is undergoing significant and rapid change. Advances in renewable technology are altering the generation mix. Extreme weather events are more frequent, impacting life and property. Public policies are calling for bold action to achieve renewable investment and decarbonization mandates.

All of us at the NYISO are committed to a strong partnership with lawmakers, policymakers, market participants and industry stakeholders to address the priorities and goals set forth under the state's Climate Leadership and Community Protection Act (CLCPA) of 2019. That initiative has been a game changer and we are honored to serve on the Climate Action Council's (CAC) Power Generation Advisory Panel. The CAC and Advisory Panels created under the CLCPA will provide critical input on the state's plan to get to a zero-carbon economy. We are confident that the information and expertise we are providing on grid operations, system planning and competitive electricity markets will help achieve the important mandates of the CLCPA.

Reliability has been and will continue to be job one for the NYISO. As we move forward, we must remember the degree to which system reliability, economic efficiency, and environmental benefits are interlinked. These attributes can and must coexist in support of our power system, our economy, and consumer interests.

Tragically, California and Texas have struggled recently with delivering power safely and adequately. While the New York bulk power system is held to the strictest reliability standards in the nation, we are always looking for ways to improve the resiliency and reliability of the New York grid.

The NYISO has delivered the co-benefits of reliability and low costs to New York's electricity consumers since our inception in 1999. Since then, our markets have also worked in step with New York State's policies to reduce carbon dioxide emissions rates by 52%, sulfur dioxide by 99%, and nitrogen oxides by 93%. We will build upon that record because much more needs to be done.

The NYISO is an independent organization, with an independent Board of Directors. This independence provides the strong foundation from which we make decisions. Any decision is always based solely on facts, data, information and in-depth analysis, free of influence from outside financial interests or politics.

Our governance process, by which changes to the markets are made, is robust and transparent with representation from a wide array of interests including industry, government, environmental, consumer and environmental justice interests.

In keeping with our mission as an authoritative source of information on the energy industry, this edition of *Power Trends* provides a summary of the challenges and opportunities before us. It discusses recent changes we've made to the markets to support public policies and other proposals underway. It looks at data that shows us changes on the system we all need to be aware of, and discusses long-term solutions that will support the energy transformation.

The NYISO is committed to offering the tools, skills, independent perspectives, and experience necessary to transition to a zero-emission power system by 2040. *Power Trends* shows our dedication to serving the reliability, economic, and environmental needs of all New Yorkers.

With the combination of effective planning, expert insight, and innovative market design, the NYISO is working harder than ever to make the Grid of the Future a reality.

Thank you for reading.

Rich Dewey

Richard Dewey
President and CEO

Watch Now

A four-episode video series on CEO Rich Dewey's Vision for the Grid of the Future. Learn more about the path to New York's 2040 Grid.
www.nyiso.com/2040grid

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Executive Summary

New York's electric grid is undergoing the largest change since the first central generating station was turned on in lower Manhattan in 1882. How New York's power grid serves consumers over the next decade will be dramatically different from today. The electric system is becoming more dynamic, flexible, decentralized and reliant on intermittent generation. The future grid will require new transmission to connect remote renewable resources to major load centers. It will also require new tools to integrate distributed energy resources that blend the roles of supply and consumption.

One thing that will not change is the New York Independent System Operator's (NYISO) commitment to reliability. Another is our view that wholesale electricity markets continue to provide the strongest, most powerful platform from which we can meet the needs of the grid in transition.

New York's grid is evolving to meet the state's 2030 and 2040 clean energy objectives. The Climate Leadership and Community Protection Act (CLCPA), enacted in 2019, requires an economy-wide approach to addressing climate change and decarbonization. Included are sweeping mandates to deliver 70% of New York energy from renewable resources by 2030 and 100% emissions-free electricity supply by 2040 while promoting electrification in other sectors of the economy. Transmission constraints on today's system are being addressed to meet these objectives. However, more needs to be done to deliver emissions-free electricity that is abundant in northern and western New York, such as production from hydro, nuclear, and wind generation resources, to downstate where most of the state's electricity is consumed. This "Tale of Two Grids" must be addressed to meet the objectives of the CLCPA.

Recent NYISO planning studies identified the need for additional investment to expand transmission capabilities and improve access to renewable resources in northern and western New York. **Those efforts have resulted in the greatest levels of investment in New York transmission in decades; however, more needs to be done. Other recent planning studies have focused on what is necessary to achieve the requirements of the CLCPA, finding that more transmission investment will be necessary to meet these requirements.** Working closely with the state, the NYISO is leading a new effort to expand needed transmission in the Long Island region to support offshore wind development.

A Powerful Purpose

We are dedicated to a reliable, sustainable power grid and competitive markets.

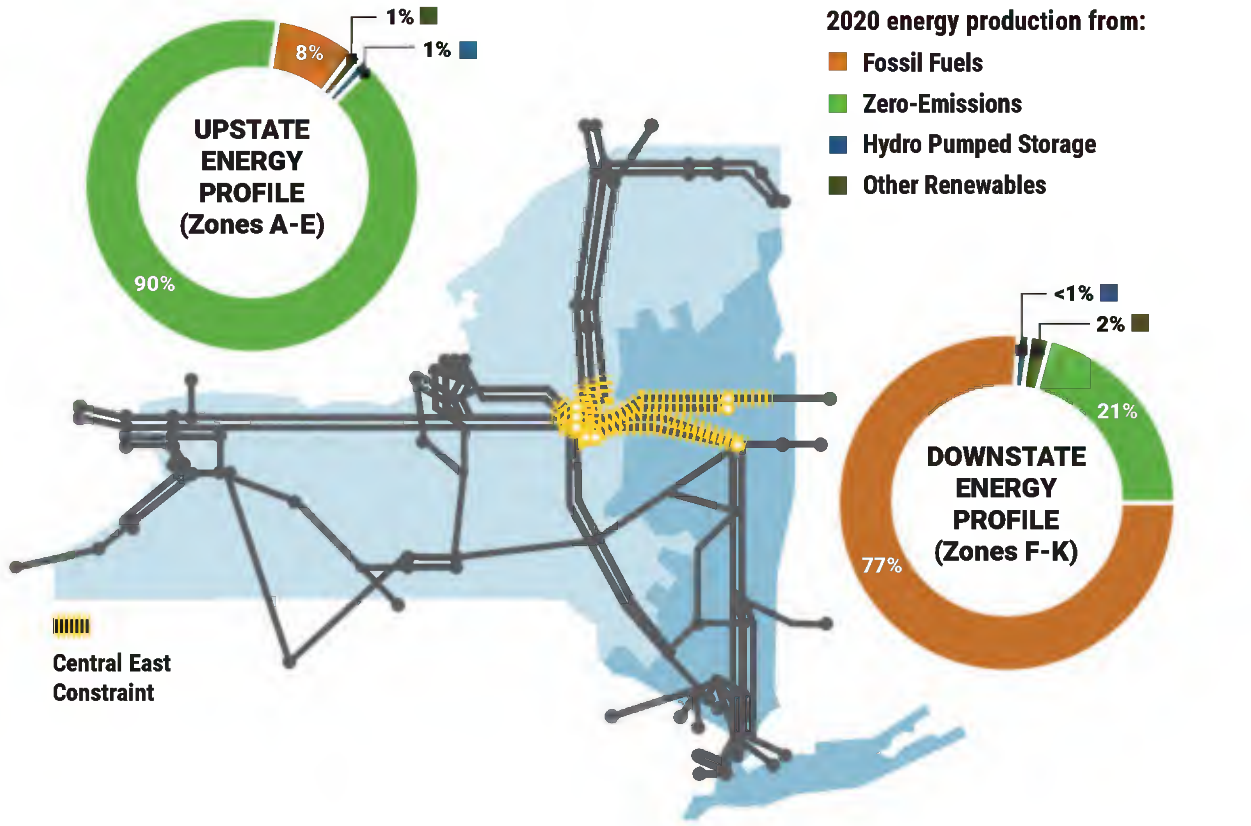
Maintaining
and enhancing regional reliability

Operating
open and fair wholesale electricity markets

Planning
the bulk power system for the future

Providing
factual information to policymakers, stakeholders and investors

▸ Tale of Two Grids



NYISO studies are informing policymaker actions as well as the new market rules needed to support the grid in transition. In the future, weather-dependent intermittent resources, like wind and solar generation, will provide an increasing amount of the electricity supply mix in New York. At the same time, distributed energy resources will change the traditional roles of supply and demand on the system, challenging forecasters and grid operators to account for these resources. Greater amounts of new clean energy technologies will be needed to provide the services necessary to maintain reliability while achieving the emissions objectives of the CLCPA. While the NYISO's innovative wholesale electricity markets are empowering the changes envisioned by the CLCPA, we are engaging stakeholders and policymakers to do more to align markets with the reliability services that will be needed for the future grid.

▸ Download our reports:
Visit www.nyiso.com/library for the RNA, CRP, CARIS, Climate Change Impact and Resilience Study and more.

Market enhancements are underway to meet these challenges. Market rules that incentivize investment in resources that can respond rapidly to changing conditions will be essential for maintaining reliability of the grid of the future. New market rules are underway for energy storage integration, participation in our wholesale electricity markets by distributed energy resources, and new ancillary services products that will support a more dynamic grid.

Additionally, the NYISO is developing new market rules for capacity markets. Robust capacity markets that reflect the objectives of the CLCPA are essential for reliability and market efficiency. Designing the necessary capacity market rules that reflect state policies and incentivize needed reliability services is a key focus of the NYISO, our stakeholders, and policymakers in Albany and Washington. **The NYISO is committed to developing the innovative market rules necessary to meet the objectives of the CLCPA.**

Introduction

System Planning & Competitive Markets Support Public Policy

The NYISO is an independent organization with a robust and transparent governance process. The NYISO serves the energy industry, policymakers, and the public through skilled and experienced grid operation, innovative wholesale electricity market design, and expert system planning. Since our inception in 1999, the NYISO's markets have improved system efficiency and supported a shift toward cleaner sources of generation while adhering to the nation's most stringent reliability rules.

Maintaining system reliability is the cornerstone of the NYISO's mission. We manage the flow of electricity across more than 11,000 miles of high-voltage transmission lines serving New York, balancing supply and demand throughout the state. The NYISO is subject to the oversight of the Federal Energy Regulatory Commission (FERC) and regulated in certain aspects by the New York State Public Service Commission (NYSPSC). The NYISO operates the New York power system to the strictest reliability standards in the nation, and is overseen by the North American Electric Reliability Corporation (NERC) and the Northeast Power Coordinating Council (NPCC). Further, unique to New York, the New York State Reliability Council (NYSRC) establishes state-specific reliability rules that are more stringent than the rest of the United States.

New York's renewable and environmental goals are driving profound changes on the electric system. The CLCPA, which requires a zero-emissions grid by 2040, is creating fundamental shifts in how energy is produced, delivered, and consumed in New York. The NYISO is working hard to support New York's energy and environmental objectives under the CLCPA. Highly skilled grid operations, expert system planning, and innovative wholesale electricity markets are essential to achieving a carbon-free grid.

▸ **The New York Independent System Operator (NYISO)** is at the center of this changing landscape. Working with New York State and federal policymakers and over 400 market participants, the NYISO serves as an independent organization responsible for operating New York's bulk power system and wholesale energy markets, 24 hours a day, every day of the year.

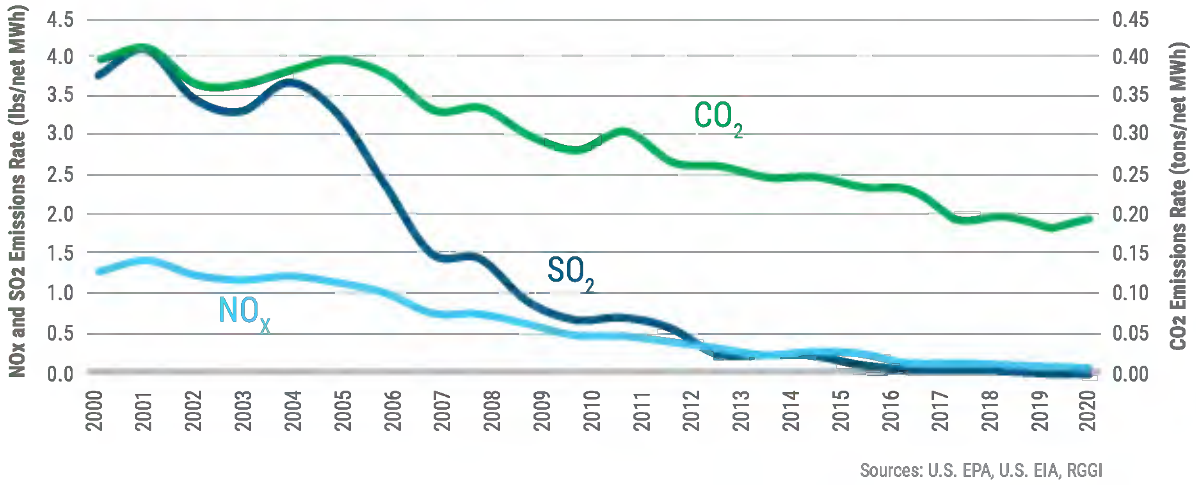
The state's plan to build a green economy[1] outlines deliverables regarding the construction of renewable resources and transmission infrastructure considered central to improving the state's financial situation. Specifically, the plan calls for the development of offshore wind resources off the coast of Long Island. The plan also prioritizes the construction of New York's "Green Energy Transmission Superhighway" to bring "abundant clean energy generated upstate, or existing clean hydropower from Canada, to high-demand downstate areas." The superhighway plan notes that 250 miles of transmission will be under construction in 2021, including projects selected through the NYISO's planning processes.

The new federal administration led by President Biden has also made addressing climate change a top priority. On his first day in office, the President signed an Executive Order to rejoin the Paris Climate Agreement. Additional Executive Orders have been issued to establish the Office of Domestic Climate Policy, a White House Environmental Justice Interagency Council, and a National Climate Task Force that is comprised of 21 federal agencies and departments. Further, a significant number of nominees for leadership positions within the administration have backgrounds in environmental issues, demonstrating an administration-wide approach to addressing climate change.

The Essential Role of the NYISO's Markets

Over two decades ago, public policies at the state and federal levels encouraged the formation of competitive wholesale markets designed to maintain reliability while minimizing costs for consumers. From those policies, the NYISO was formed. The principles that shaped innovative market design at the outset of our wholesale electricity markets remain essential today: effective and competitive wholesale electricity markets must align investment signals with system needs, thereby supporting and enhancing grid reliability. **This alignment rewards investment in services that benefit grid reliability, while also supporting market efficiency, and creating a cleaner and more cost-efficient grid.**

Figure 1: **Emission Rates from Electric Generation in New York: 2000-2020**



Sources: U.S. EPA, U.S. EIA, RGGI

New York power sector emissions rate reductions since the launch of NYISO markets in 1999, according to the US EPA Air Markets Program data

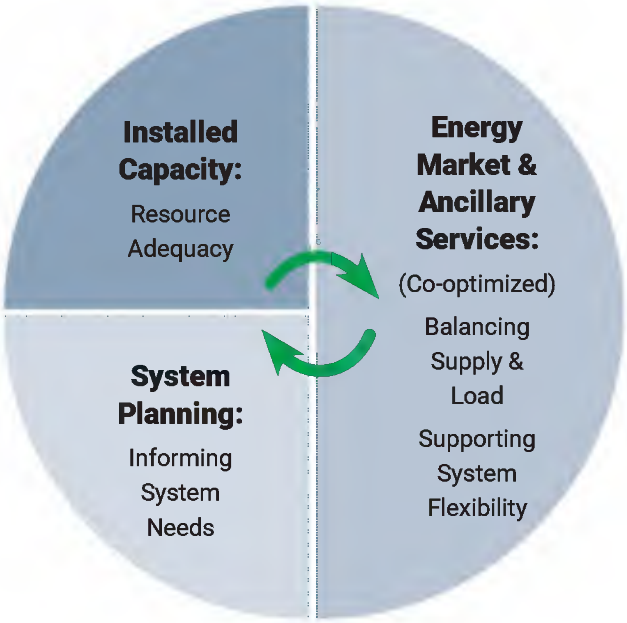
52% Carbon Dioxide CO_2

99% Sulfur Dioxide SO_2

93% Nitrogen Oxides NO_x

Markets encourage suppliers to be as efficient as possible in order to reduce costs and increase the likelihood of being selected to supply the grid in the NYISO's competitive auctions. The CLCPA seeks to eliminate all carbon dioxide emissions associated with power production by 2040. It is clear that an unprecedented level of investment in energy infrastructure is necessary in order to achieve the objectives of the CLCPA. The objective before all of us is to solve this new paradigm by supporting mechanisms that facilitate needed investment, minimize costs to consumers, and achieve the CLCPA mandates while continuing to meet reliability requirements which support the health, safety, and welfare of New Yorkers. **Leveraging wholesale electricity markets, which minimize costs and investment risks to consumers while promoting innovation, is the most powerful means to drive needed energy infrastructure investment to achieve the CLCPA goals.**

The NYISO supports reliability primarily through three complementary markets: energy, ancillary services, and capacity. The design of these markets is informed by robust system planning processes. The NYISO models future conditions, operational needs, and market performance to identify necessary design enhancements. This evaluation cycle is key to maintaining and enhancing the value of wholesale electricity markets for New Yorkers.

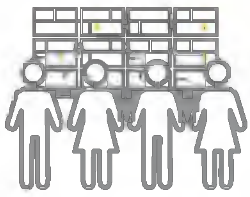


Through competition, wholesale electricity markets incentivize suppliers to minimize costs and maximize their ability to provide the various services needed to keep the grid reliable. The transparency and granularity of market prices inform investment decisions and spur innovation through the introduction of new technologies to the system.

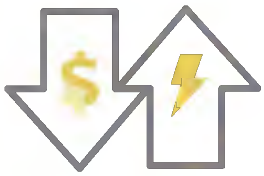
Competitive wholesale electricity markets provide a powerful platform to attract and use new technologies essential to achieving the transformation envisioned by the CLCPA. In doing so, they provide an important benefit to consumers. One of the main drivers behind introducing competitive wholesale electricity markets was to shift the risk and cost consequences of investment decisions from consumers to the owners of generation and other resources. **As the NYISO collaborates with asset owners, stakeholders, and policymakers to take the aggressive actions necessary to build the grid of the future, we must continue to leverage these competitive markets that shield customers from investment risk.**

As technologies change and the resource mix supplying the grid transforms, the NYISO continues to evolve to supply reliable and economically efficient solutions to meet New York's energy needs.

Recent events impacting reliability in other regions of the nation reinforce the core principles of our efforts. The NYISO continues to approach this work with a commitment that:



Grid Reliability
must be maintained at all times.



Competitive Markets
should continue to maximize economic efficiency and minimize the cost of maintaining reliability while supporting the achievement of New York's energy and environmental policies.

Power Trends 2021 details the NYISO's many efforts to build upon the success of competitive markets to support the grid of the future. *Power Trends* features important system planning studies that are informing market design, investment, and policy decisions that will shape the grid for the next two decades. The NYISO's independence is critical as we move forward with operations, planning, and market design work. The NYISO's governance process is open, transparent, and robust, supporting reliability and innovation through engagement and collaboration. This engagement is delivering important benefits to New Yorkers.

Since the publication *of Power Trends 2020*, that commitment to collaboration has led to a number of key project successes, including:

Completing four **key studies** — the *2019 Congestion Assessment and Resource Integration Study* (CARIS) "70 by 30" scenario, the *2020 Climate Change Study,* the *2020 Reliability Needs Assessment* and the *2020 Grid in Transition Study* — to investigate the reliability and market aspects of potential resource mixes to satisfy the CLCPA;

Implementing **Energy Storage Participation Rules** allowing Energy Storage Resources (ESRs), such as batteries, to fully participate in wholesale electricity markets;

Establishing a **Comprehensive Mitigation Review** with stakeholders to examine solutions to the capacity market buyer-side mitigation rules that support entry of new renewable resources into the capacity market while maintaining competitive price signals;

Receiving Federal Energy Regulatory Commission (FERC) acceptance of a **Distributed Energy Resource (DER) Participation Model,** which is the first comprehensive set of rules for integrating DER aggregations into wholesale energy and capacity markets;

Advancing rules to allow co-located energy storage and renewable resources to participate in the wholesale energy and capacity markets under its **Hybrid Co-Located Storage Model** effort;

Developing and gaining FERC acceptance of enhancements to our **Economic Planning Process** to address the rapidly shifting resource landscape driven by the CLCPA and other state clean energy policies;

Completing an extensive stakeholder engagement process and gaining FERC acceptance of revised **Installed Capacity Demand Curves for the 2021-22 through 2024-25 Capability Years;**

Developing a **Solar on Dispatch** participation model to support grid reliability with the expected additions of solar resources envisioned in the CLCPA; and

Completing **Class Year 2019**, which included the largest group of projects seeking grid interconnection on record, the vast majority of which are renewable or other clean energy resources.

State of the Grid

COVID-19 Pandemic Impacts on Demand Levels & Patterns

4,100 GWh

annual energy usage across the state, or approximately 2.6% below expected 2020 forecast levels

2020 will long be remembered for the worldwide impact of the COVID-19 pandemic. New York was at the focal point of the pandemic in the spring of 2020. The health crisis levied a terrible toll on human life and health, and had a dramatic effect on economic activity.

Throughout 2020, the economic changes stemming from the COVID-19 pandemic caused large differences in 2020 demand levels and demand patterns relative to a typical year. Annual energy usage across the state was more than 4,100 GWh, or approximately 2.6% below the expected forecast developed in early 2020. The largest impacts were seen in April and May of 2020, with usage across New York more than 8% below expected levels. Usage levels began to increase again late in the summer and fall, but remained below originally-forecasted levels.

At times, statewide peak demand levels registered roughly 10% below forecasts. As the year progressed, statewide peak demand steadily returned to near-expected levels. Daily peak loads were also most impacted in New York City, with peak demand levels ranging from 4% to 16% below forecasts established prior to the pandemic.

While overall usage and peak demand levels have fallen due to the pandemic, demand patterns have also changed. The NYISO has observed that the reduction in electric demand from commercial customers is a leading driver of overall reduced electricity consumption during the pandemic. The NYISO has also observed an increase in residential usage, especially during the midday period. These usage patterns reflect lower economic activity and a shift in usage from New York City to the suburban areas of Long Island and the lower Hudson Valley during the pandemic.

Figure 2: **2020-2021 Electric Energy Usage**

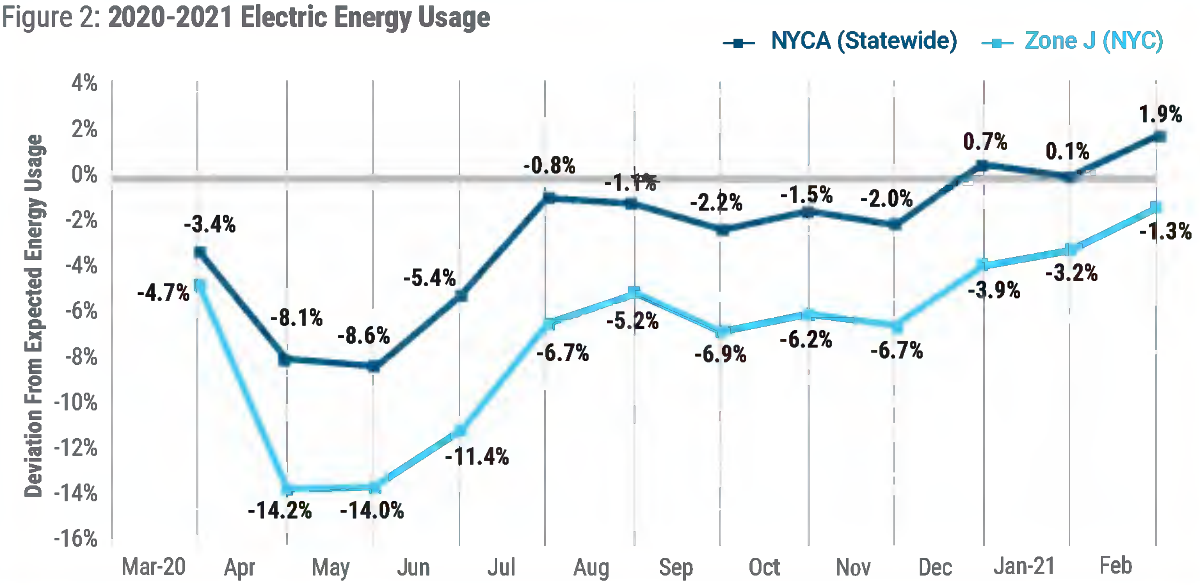
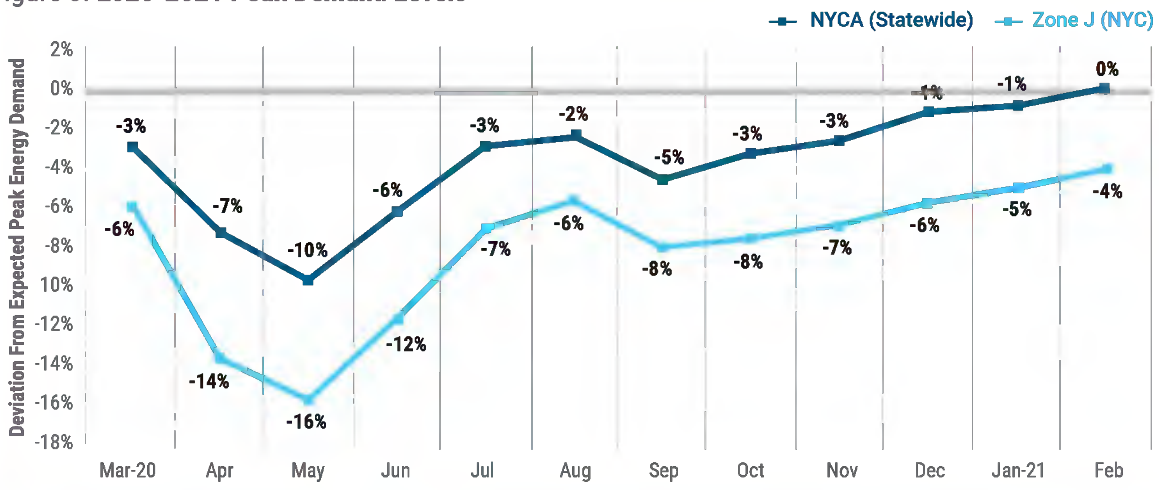


Figure 3: **2020-2021 Peak Demand Levels**



Load and Demand Trends

In 2020, the most significant driver behind the overall reduction in energy consumption was reduced demand from commercial customers. The continued economic recovery and anticipated load changes due to pandemic-induced behavioral changes are incorporated into the long-term forecast.

Figure 4 represents three energy forecasts through 2051 developed by the NYISO. The baseline scenario reflects the expected influence of energy efficiency and behind-the-meter resources, as well as the expected rate of near-term economic recovery and long-term economic growth. "Behind-the-meter" (BTM) generally refers to supply technologies that are installed at one's home or business, or in some cases, connected to a local utility's distribution system. While near-term load is expected to decline, the figure points to longer-term load growth that will be driven largely by electrification. To provide stakeholders, investors, and policymakers with a range of possible outcomes, the NYISO developed high and low load scenarios. The high-load scenario evaluated conditions with higher adoption rates for electrification and reduced adoption of energy efficiency measures and BTM solar. The low-load scenario models increased adoption of energy efficiency measures, which have the effect of reducing demand on the transmission system.

Figure 4: **Electric Energy Usage – Actual & Forecast: 2020-2051 (GWh)**

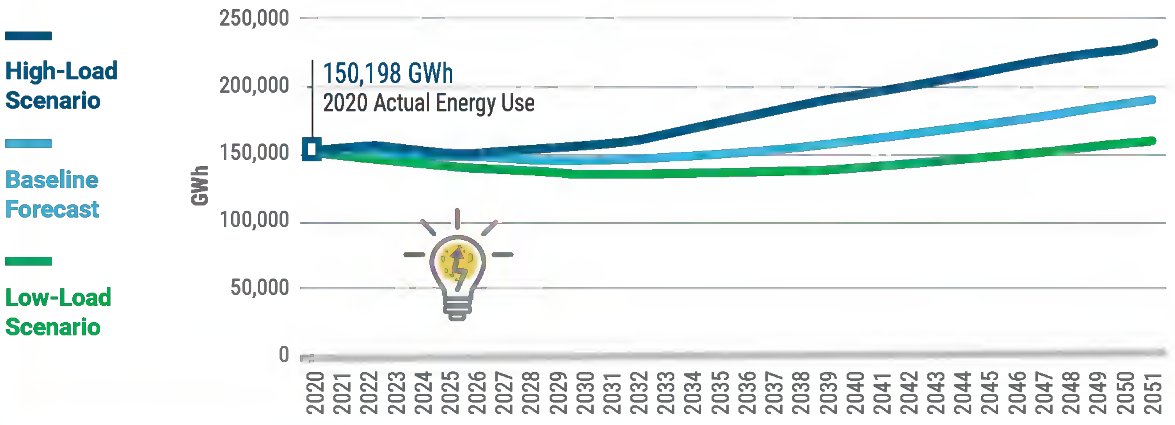
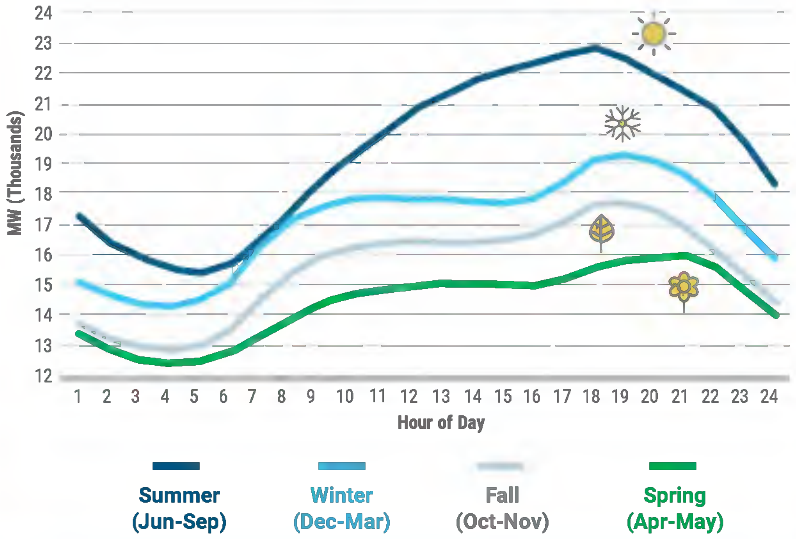


Figure 5 shows the way in which electricity use changes throughout the year, with an overall greater demand for energy in the summer months. On a typical day, demand ramps up throughout the morning, peaking in the afternoon or early evening hours. These load shapes are expected to shift in the future, however, with peak demand likely to occur later in the day when the load-reduction effects of behind-the-meter solar resources wane.

Figure 5: **2020 New York Control Area (NYCA) Seasonal Load Shapes**

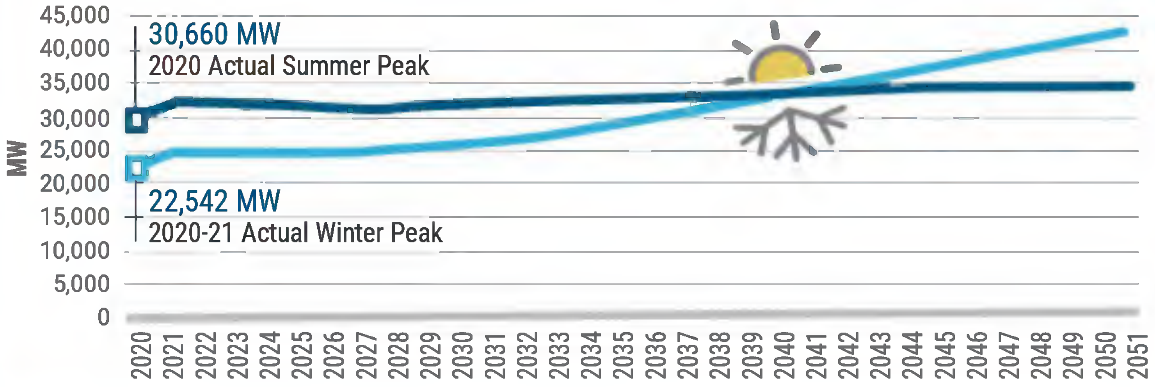


While COVID-19 impacted daily peak loads throughout much of 2020, long-term trends show growing demand levels, particularly in winter months as state policies encourage electrification of heating and transportation.

Figure 6 provides summer and winter peak demand forecasts through 2051. These forecasts show demand projections under expected weather conditions, and account for:

- The demand-reducing impacts of energy efficiency programs;
- Implementation of new building codes and appliance efficiency standards;
- Expanded use of solar and other distributed energy generation; and
- Expected impacts of expanded electric vehicle (EV) usage and electrification, including heat pumps, which may drive the shift in New York from a summer-peaking system to a winter-peaking system in future decades.

Figure 6: **Electric Summer and Winter Peak Demand - Actual & Forecast: 2020-2051**



Electrification Trends

The concept of "beneficial electrification" is growing as state energy and climate policies seek to reduce economy-wide carbon dioxide emissions. Beneficial electrification can be thought of in terms of electric vehicles or electric heating and cooling systems for buildings. State and local policies are encouraging the adoption of technologies that support the transition of fossil-fuel-intensive sectors of the economy to electricity usage. Clean energy production is a key underlying element of electrification policies.

Near-term efforts are focused on transportation and building sectors to replace fossil-fueled vehicles, furnaces, and appliances. These efforts are expected to create long-term upward pressure on electric load growth. The NYISO is continuing to study the impacts of electrification on future electric system demands.

Figure 7: **Electric Vehicle Energy & Peak Impacts – Baseline Forecast**

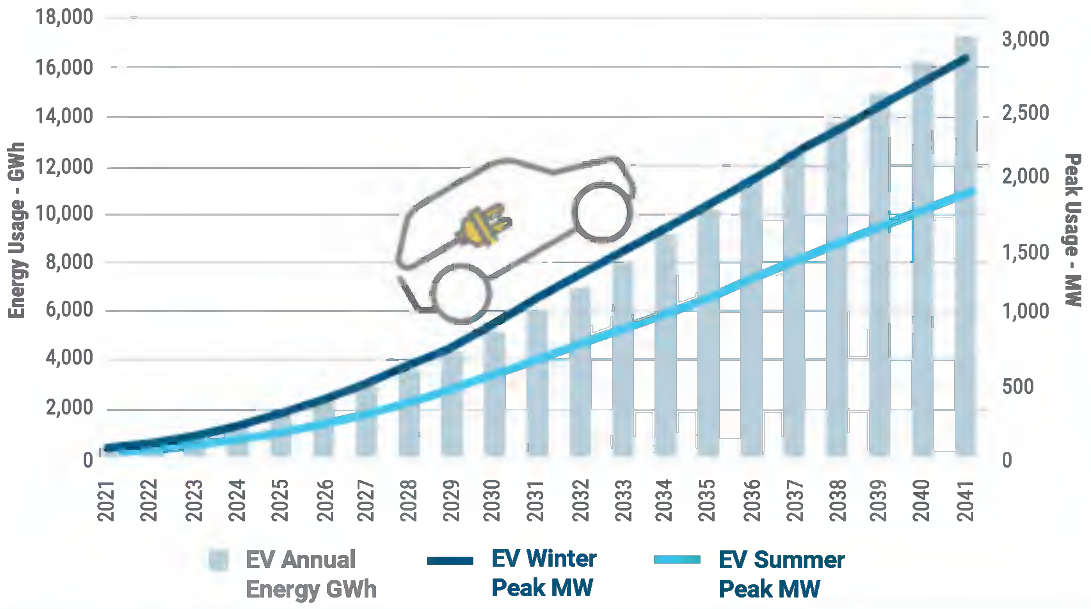
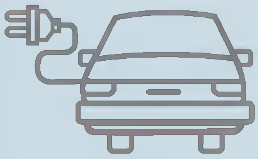


Figure 7 shows the forecast of EV impacts on summer and winter coincident peak demand, as well as energy usage. These forecasts assume over 4.5 million total EV purchases in New York State by 2041, including passenger vehicles, trucks, and buses. Currently, there are nearly 114,000 EVs registered in New York. The impacts on peak demand periods are highly dependent on customer adoption, technologies, incentives, and retail rate structures which can enable EV owners to more efficiently manage vehicle charging cycles.

Load forecasts presented in previous charts reflect varying degrees of EV adoption. EV consumer recharging patterns will have significant implications for demand on the grid. As policies lead to increased EV adoption rates, corresponding policies and programs to promote EV charging practices that limit their impact on peak demand periods will be beneficial.



4.5 Million

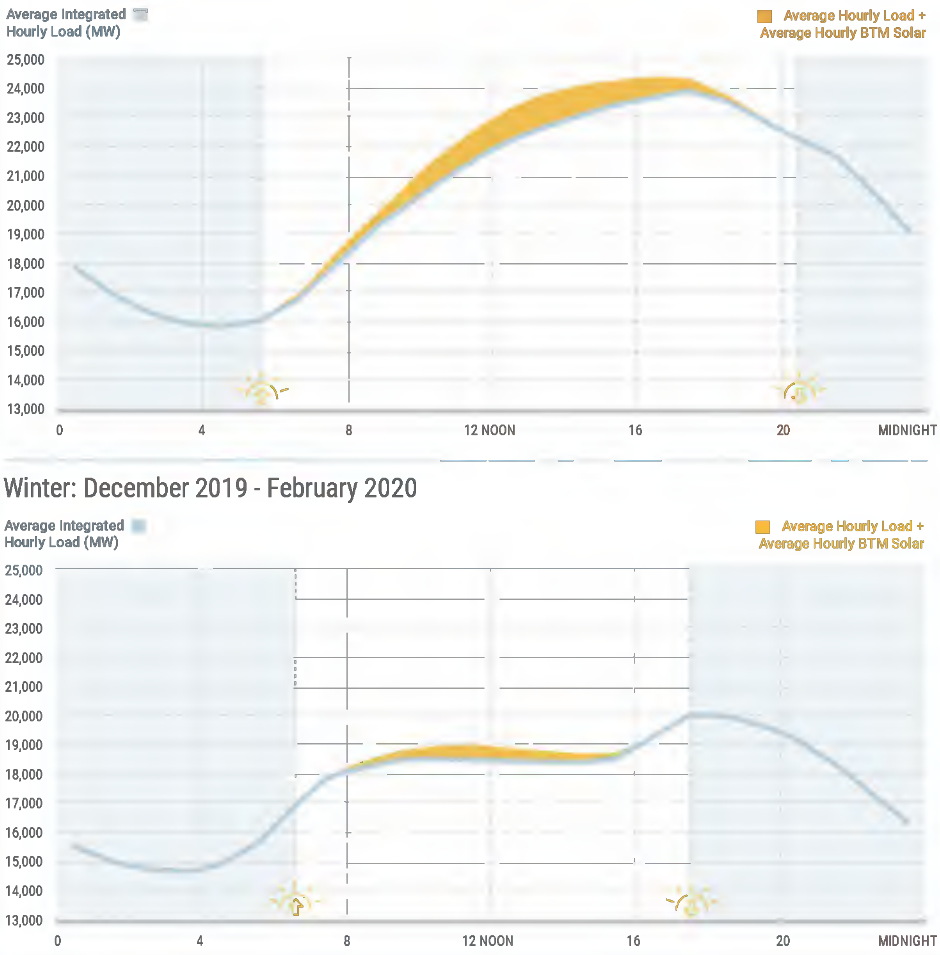
total projected EV purchases in New York State by 2041. Nearly 114,000 EVs are currently registered in New York.

Renewable and Clean Energy Resource Trends

Intermittent supply resources like wind and solar are expected to be a larger contributor to serving load in the future, helping to reduce emissions from the electric sector. Coordinating supply with demand will become increasingly complex because the supply produced by intermittent resources is dependent upon availability of solar and wind energy.

▸ Behind-the-meter (BTM): A generation unit that supplies electric energy to an end user on-site without connecting to the bulk power system or local electric distribution facilities.

Figure 8: **Average Hourly Behind-the-Meter Solar Energy Production**

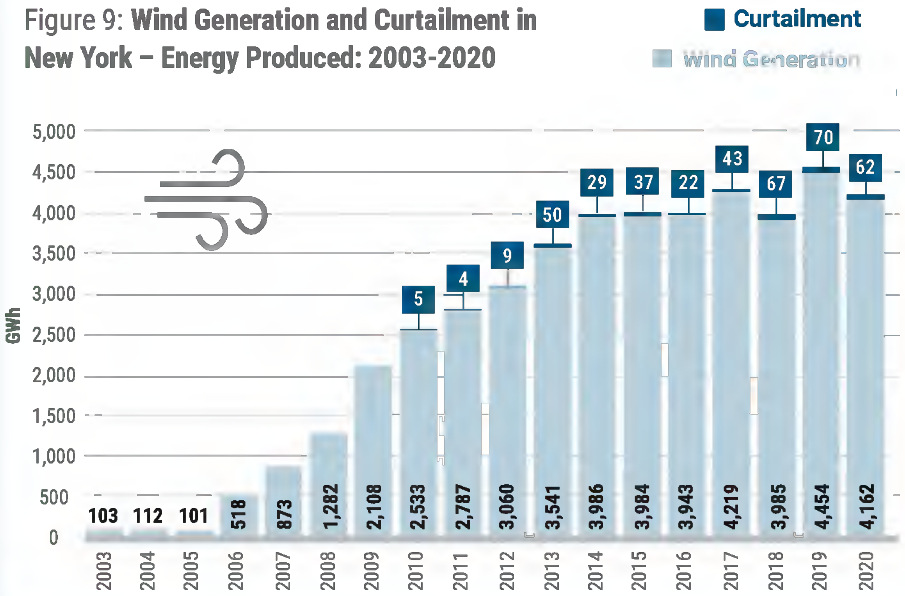


The CLCPA calls for a significant increase in BTM solar resources, totaling 6,000 MW by 2025. Currently, more than 2,500 MW of BTM solar capacity is installed throughout the state. BTM solar resources supply electricity on-site or locally through distribution networks. In doing so, they reduce the amount of load served by the bulk power system. As the number of BTM solar resources increases, uncertainty in load forecasts also increases. BTM resources displace energy that was traditionally supplied by the grid. However, displacement is not the same as elimination, and the energy provided by many BTM resources is not continuous. When those intermittent resources are unavailable to produce energy, the grid must still provide energy to those homes and businesses. To reduce uncertainty due to the effects of greater participation of solar resources on the grid, the NYISO implemented solar forecasting tools to provide day-ahead and real-time estimates of BTM solar production. Understanding the contribution of these resources throughout the day helps grid operators dispatch generation on the bulk power system more efficiently.

Figure 8 illustrates how BTM solar contributed to serving load throughout the day in both summer and winter months. Note that during summer months, solar resources contribute towards peak demand, with production continuing past the peak period. During winter months, solar resources are unavailable to serve peak periods because winter demand typically peaks after sunset.

The level of energy production from wind resources is constantly changing due to its dependency on weather conditions. Just as storm fronts may move across the region and bring windy conditions that can produce large amounts of wind energy, there are also multi-day instances where wind lulls across the region. For example, in 2020 there were 74 instances when all wind resources in New York State combined supplied less than 100 MW to the grid for periods of more than 8 consecutive hours. 100 MW represented about 5% of the installed wind capacity in 2020. Even as more wind capacity interconnects to the system, these low wind events will lead to periods with reduced levels of overall

Figure 9: **Wind Generation and Curtailment in New York – Energy Produced: 2003-2020**



74

instances in 2020 when NYCA wind fleet output remained below 100 MW for more than 8 consecutive hours.

wind energy production to serve load. Increased geographic diversity of wind generation, including the addition of offshore wind as required under the CLCPA, may mitigate some of this risk. With the expansion of wind resources on the system overall, however, planning to meet load during these lulls will become increasingly important.

While the weather dependency of wind energy is one factor that must be planned for, another is constraints in the existing transmission system that limit the capability to deliver production. Figure 9 indicates that additional wind energy could have been supplied to the grid, but at times transmission constraints resulted in a need to curtail production in order to maintain reliable operations. **Additional transmission capability is necessary to alleviate constraints and maximize the potential contribution of these renewable resources to meet electric demand and achieve public policy goals.** This issue was explored in the NYISO's *2019 CARIS* 70 by 30 scenario analysis.

To maintain reliability, bulk power system operators will require a full portfolio of resources that can be dispatched in response to any change in real-time operating conditions. The ability to dispatch resources to reliably meet ever-changing grid conditions and serve New York's electric consumers will always be paramount.

These issues highlight the need for properly designed competitive wholesale electricity markets to incentivize investment in both the transmission capability needed to connect intermittent supply to load from constrained regions of New York, and the dispatchable supply resources needed to balance intermittent supply with demand.

Figure 10: **Energy Storage Nameplate Capacity and Energy Usage Forecast**

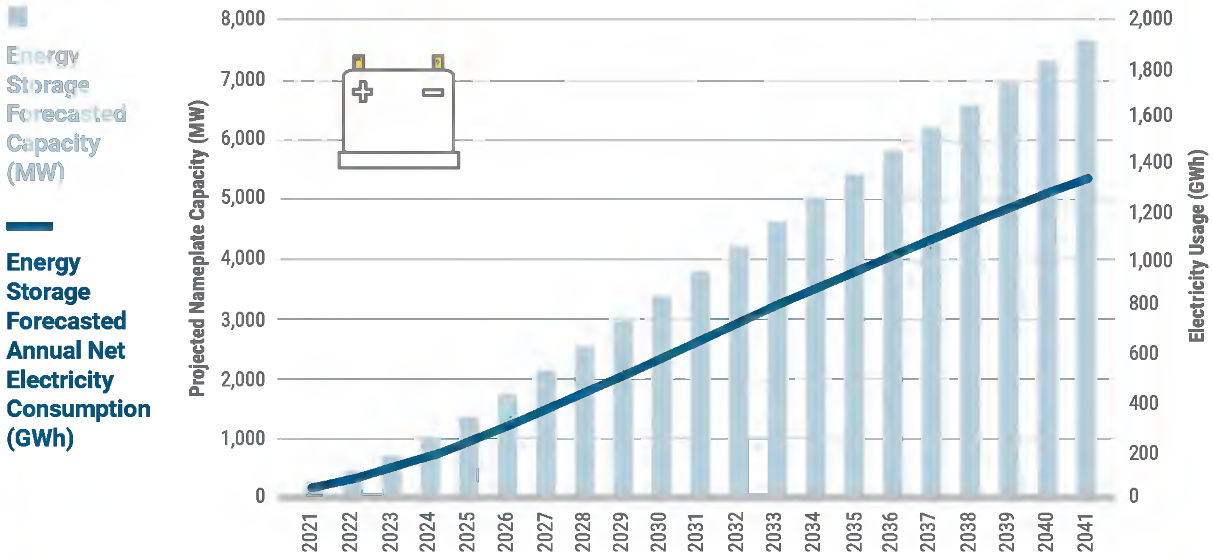


Figure 10 shows the expected growth of energy storage capacity (left axis) in New York State through 2041 as well as the projected increase in energy usage attributable to these resources (right axis). Due to charging and discharging cycles, storage resources represent net load to the grid because they consume more electricity than they inject. Based on existing technologies, the NYISO forecasts the impact of demand from storage resources to be less than 1% of the forecasted total load across the NYCA system. New, more efficient energy storage technologies may help to reduce the forecasted demand impacts from the expanded use of these resources on the grid.

Energy storage resources may be interconnected to the transmission system, distribution system, or a customer's premises to supply energy. The NYISO considers customer-sited and certain distribution system storage resources to be behind-the-meter, meaning they work to reduce demand on the transmission system rather than supply it. When connected to the transmission or distribution system, storage resources can inject energy directly into the grid in response to competitive wholesale market price signals. However, storage has the added flexibility to withdraw energy in response to low prices or system balancing needs.

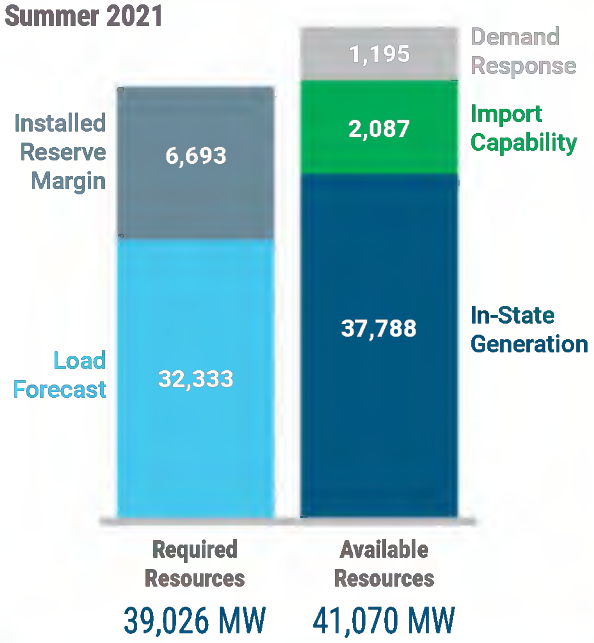
▸ Energy Storage Resources (ESRs):
ESRs promote reliability and efficiency as well as other benefits, such as:

- Provide regulation services
- Shift load
- Manage intermittent renewable energy
- Add to grid reliability
- Provide operating reserves
- Support Blackstart service
- Reduce transmission congestion

Resource Adequacy

In New York, stringent reliability rules require there to be enough generating capacity available to maintain resource adequacy, which is the level of capacity needed to meet forecasted peak consumption. Resource adequacy levels are developed annually through a transparent planning and regulatory process. This process includes establishing a forecast for expected peak demand and determining a reserve margin to address potential issues that can impact resource availability and production capability, such as extreme weather conditions, expected generator performance, and transmission availability.

Figure 11: **Statewide Resource Availability: Summer 2021**



Each year, the NYSRC establishes an installed reserve margin (IRM) identifying the amount of capacity that must be available above the forecasted peak demand to ensure reliable system operations. Developing the IRM is an extensive study process, which starts with an annual analysis of updated load, resource availability, and transmission capability models, which influence the level of capacity needed to maintain system reliability. Resources eligible to satisfy this requirement may include generation, demand response, or imported resources from other regions. NYISO planners play an active role in conducting this annual study of the system in support of the NYSRC's analysis. The NYSRC evaluates the planning models developed by the NYISO and determines the IRM level necessary to maintain system reliability. As part of a layered regulatory approach to meeting the state's capacity needs, the NYSRC approves and then submits its IRM to both the PSC and FERC for acceptance.

For the 2021-22 capability year beginning May 1, 2021, the NYSRC adopted an IRM of 20.7%. Based on a projected summer 2021 peak demand of 32,333 MW, the total installed capacity requirement for the upcoming summer capability period is 39,026 MW.[2] The 2021-22 IRM represents an increase over the prior year. One factor influencing the IRM this year is load forecast uncertainty associated with more volatile weather conditions. A second key factor is the changing supply mix influenced by expected increases in the number of resources on the system whose production capability is weather-dependent and intermittent.

The NYSRC has also evaluated longer-term trends influencing the IRM. In April 2020, the NYSRC approved a study, *The Impacts of High Intermittent Renewable Resources*,[3] which analyzed the potential impact on the IRM from a hypothetical case in which 12,000 MW of renewable resources were added to the model that was used to determine the IRM for the 2020-2021 capability year. "The study shows that to meet the resource adequacy criterion, the installed capacity quantity for New York State will need to increase by 24.3 percentage points, from the *2020 IRM Study* preliminary base case value"[4] which was 118.6% of forecasted peak load for that capability year. The analysis found that "the increase in the installed capacity requirement is driven primarily by the intermittent characteristics of weather-dependent resources."[5] The NYSRC report recommended that additional periodic studies should be conducted, and suggested that those studies should further evaluate the implications of added energy storage and offshore wind to the grid in New York.

Public Policies Shaping the Grid

The CLCPA is shaping the grid of the future in New York. However, it is not the only public policy initiative determining how energy will be supplied, transmitted, and consumed in New York State. For instance, the DEC's Peaker Rule lowers the nitrogen oxide emission limits from certain generation units.

More than a decade ago, New York, in collaboration with neighboring states, formed the Regional Greenhouse Gas Initiative (RGGI) to achieve power sector emissions reductions. In addition, the state's Reforming the Energy Vision (REV) and Clean Energy Standard (CES) policies established new programs for reducing the environmental impacts of energy production and integrating renewable and other clean energy resources. To support the development of clean energy in this competitive environment, the state established a program for Renewable Energy Credit (REC) contracts between the state and clean energy resource developers. More recently, the Accelerated Renewable Energy Growth and Community Benefit Act established a new Office of Renewable Energy Siting within the Department of State to implement an accelerated permitting process for eligible renewable energy and related facilities.

Significant changes are expected to take place at the federal level as well. The Biden administration is focusing on clean energy policies in a manner that more closely aligns with New York State's climate policies, and in some ways expands upon them. The administration is charting a new course to regulate environmental impacts of energy production, with an administration-wide focus on reducing carbon emissions from electricity generation. In March 2021, President Biden released his 'American Jobs Plan"[6] which calls for 100% carbon-free electricity by 2035 and would finance a series of infrastructure initiatives supporting transmission expansion and grid resilience, establishes an Energy Efficiency and Clean Energy Standard "aimed at cutting electricity bills and electricity pollution, increasing competition in the market, incentivizing more efficient use of existing infrastructure, and continuing to leverage the carbon pollution-free energy provided by existing sources."

This new focus extends to FERC. In some of his first actions as the newly appointed Chair of FERC, Richard Glick established a new office focused on environmental justice matters. He also established new proceedings focused on climate change and the interaction of state policies and FERC-jurisdictional wholesale electric markets. In announcing a new proceeding focused on the impact of climate change on the reliability of the grid, Chair Glick stated, "the effects of climate change are already apparent, and we must do everything we can within our statutory authority to ensure that the electric grid is capable of keeping the lights on in the face of extreme weather."

▸ Federal Energy Regulatory Commission (FERC):

The agency that approves the NYISO's tariffs and regulates its operation of the bulk power system, wholesale power markets, and planning.

In announcing another new proceeding focused on the role of capacity market constructs in PJM, ISO-New England, and the NYISO, Chair Glick stated that the purpose of the proceeding is to "examine options for creating durable resource adequacy constructs that will accommodate states exercising their authority in the modern electricity sector."[7] As discussed further, the NYISO, PJM, and ISO-New England participated jointly in the first conference in this proceeding, and filed comments with FERC which included a set of five principles developed by the regions designed to guide wholesale electricity market design enhancements necessary to support state clean energy policy objectives.

At the federal, state, and local levels, public policy initiatives are shaping the grid. How the grid is operated to maintain reliability and economic efficiency while achieving these policies requires careful and informed operations, market design, and planning.

Summary Table of Key Environmental Regulations & Energy Policies

PUBLIC POLICY INITIATIVE	POLICYMAKING ENTITIES	PUBLIC POLICY GOALS	PUBLIC POLICY IMPLICATIONS
Climate Leadership and Community Protection Act (CLCPA)	New York State Public Service Commission (PSC), New York State Energy Research and Development Authority (NYSERDA), New York State Department of Environmental Conservation (DEC), Climate Action Council (CAC)	**6,000 MW** of distributed solar installed by 2025, **185 trillion** BTU reduction in total energy consumption, including electrification to reduce fossil fuel use in buildings by 2025, **3,000 MW** of storage installed by 2030, **70%** of load supplied by renewable resources by 2030, **9,000 MW** of offshore wind installed by 2035, **100%** of load supplied by zero-emissions resources by 2040	**Transformation of the power grid,** necessitating examination of market structures, planning processes, flexible load, and investment in bulk power system infrastructure
"Peaker Rule" Ozone Season Oxides of Nitrogen (NOx) Emissions Limits for Simple Cycle and Regenerative Combustion Turbines	DEC	Reduce ozone-contributing pollutants associated with New York State-based peaking unit generation. Compliance obligations phased in between **2023** and **2025**	DEC rule impacts approximately **3,300 MWs** of peaking unit capacity in New York State. The NYISO analyzed compliance plans through its Reliability Planning Process (RPP) to determine whether the plans trigger reliability needs
NYS Accelerated Renewable Energy Growth and Community Benefit Act (AREA)	Office of Renewable Energy Siting (ORES) within the NYS Department of State, PSC, NYSERDA	Provides for an accelerated path for the permitting and construction of renewable energy projects other than the Article 10 power plant siting law, calls for a comprehensive study to identify cost-effective distribution, local and bulk electric system upgrades to support the state's climate goals, and to file the study with the New York State Public Service Commission	Intended to help **accelerate siting of eligible renewable resources** in support of state policy goals. Intended to establish new transmission investment priorities to facilitate the achievement of state policies
Indian Point Deactivation	Agreement between New York State and Entergy	Deactivate Indian Point units 2 and 3 by **2020** and **2021,** respectively	NYISO issued a deactivation assessment finding no reliability need associated with the loss of Indian Point's **2,311 MW** assuming the addition of certain expected resources. Subsequently, unit 2 deactivated on April 30, 2020. Unit 3 deactivated in April 2021
New York City Residual Oil Elimination	City of New York	Eliminate combustion of fuel oil numbers 6 and 4 in New York City by **2020** and **2025,** respectively	**2,946 MW** of installed capacity affected
Regional Greenhouse Gas Initiative (RGGI)	New York and other RGGI states	Reduce carbon dioxide emissions cap by 30% from **2020** to **2030** and expand applicability to fossil-fired generators 15 MW and above	**29,627 MW** of installed capacity participate in RGGI
Local Law 97	New York City	Requires reduced building greenhouse gas emissions by 40% by **2030**, with compliance starting in **2024,** and 80% by **2050**	Mandate applies to any building in NYC 25,000 square feet or larger; the law was updated in 2020 to include buildings in which up to 35% of units are rent regulated, starting in 2026. Officials estimate the law would **apply to roughly 50,000** of the city's more than one million buildings

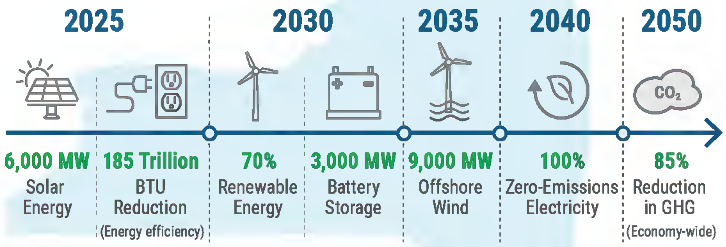
Discussion of Key Environmental Regulations & Energy Policies

Climate Leadership and Community Protection Act (CLCPA)

In 2019, New York State enacted the CLCPA, arguably the most aggressive clean energy and climate agenda in the country.

Climate Action Council (CAC)

The New York State CAC is a 22-member committee that is preparing a Scoping Plan to achieve the emissions reductions called for by the CLCPA. The CAC established and oversees sector-specific advisory panels and working groups, and works in consultation with the state's Climate Justice Working Group and the Environmental Justice Advisory Group.



Advisory Panels & Just Transition Working Group

The advisory panels of the Climate Action Council and the Just Transition Working Group serve to provide sector-specific input to the CAC's Scoping Plan efforts. The NYISO is participating on the Power Generation Advisory Panel. The Just Transition Working Group is providing input to the CAC to ensure an equitable transition for New York's workforce in the state's renewable energy economy.

The draft scoping plan will be finalized by the end of 2021 and issued for public comment before being delivered to the Governor and the Legislature.

Peaker Rule: Ozone Season Oxides of Nitrogen (NO_X) Emission Limits for Simple Cycle and Regenerative Combustion Turbines

In December 2019, the DEC issued requirements to reduce emissions of nitrogen oxides, smog-forming pollutants, from peaking generation units.

The Peaker Rule, which phases in compliance obligations between 2023 and 2025, will affect approximately 3,300 MW of simple-cycle turbines located mainly in the lower Hudson Valley, New York City and Long Island. The rule required affected unit owners to submit compliance plans to the DEC by March 2020. The compliance plans indicated that approximately 1,500 MW of capability will be unavailable during the summer of 2025. Approximately 800 MW of those generators will be unavailable in 2023. Importantly, the Peaker Rule allows the NYISO to designate resources that are needed to sustain reliability on the grid to continue operation on a temporary basis beyond 2023 and 2025 until alternative reliability solutions can be implemented.

The NYISO assessed the reliability implications of these compliance plans in its *2020 Reliability Needs Assessment* (RNA) and quarterly *Short-Term Assessments of Reliability.* The reliability studies identified both transmission security and resource adequacy needs starting in 2023 in the New York City region driven by the unavailability of the affected units. As discussed further, the NYISO worked with the local transmission owner, Con Edison, and other stakeholders, to identify transmission solutions that will resolve all of these identified reliability needs.

NYS Accelerated Renewable Energy Growth and Community Benefit Act

The Accelerated Renewable Energy Growth and Community Benefit Act (AREA) seeks to accelerate siting and construction of large-scale clean energy projects. The act provides an accelerated path for permitting and constructing renewable energy projects by establishing a new Office of Renewable Energy Siting (ORES) within the New York State Department of State to oversee permitting approval for renewable generators larger than 25 MW. Renewable generators between 20 and 25 MW, usually subject to a local environmental review, can opt into this state-administered process, as can eligible renewable projects currently in the Article 10 process. Pursuant to the act, ORES issued new regulations and standards for siting renewable facilities in March 2021. The siting process under these regulations requires ORES to act upon applications within one year, or six months if the applicant is seeking to locate on certain former commercial or industrial sites.

▸ Download the CARIS Report:
Visit www.nyiso.com/library

AREA also authorized the New York Power Authority (NYPA) to undertake the development of transmission investments needed to achieve CLCPA targets. The New York PSC utilized this authority to authorize NYPA to pursue construction of its proposed Northern New York transmission expansion project. The project will increase the capacity of transmission lines in northern New York.

AREA also directed the New York State Department of Public Service (DPS), in consultation with NYSERDA, NYPA, the Long Island Power Authority (LIPA), the investor-owned utilities, and the NYISO to conduct a comprehensive study to identify cost-effective distribution and local and bulk power system upgrades to support the state's climate and clean energy policies.

The *Initial Power Grid Study*, delivered by the DPS and NYSERDA in January 2021, concluded that the public policy transmission projects already approved by the NYISO and the PSC, together with the NYPA priority projects, position the state to achieve the 70 by 30 renewable energy requirement of the CLCPA. The report indicated that additional transmission would be needed after 2030 to move toward the goal of a zero-emission electric system by 2040. Finally, the report indicated that transmission upgrades would be needed to facilitate delivery of the 9,000 MW of offshore wind capacity called for in the CLCPA. Based on the constraints observed in its *2019 CARIS* 70 by 30 scenario, the NYISO informed the PSC that additional transmission is needed to reach the 2030 requirements as well as the 2040 target.

Indian Point Deactivation

On January 9, 2017, Entergy and New York State announced an agreement to close Indian Point units 2 and 3 in 2020 and 2021, respectively. The NYISO evaluated the proposed deactivation as part of the required generator deactivation assessments it performs for proposed generator retirements. Based on the study's assumptions, the NYISO concluded that the proposed Indian Point deactivation did not result in a reliability need. Subsequent reliability planning studies have not altered this outlook. On April 30, 2020, Indian Point unit 2 deactivated. Indian Point unit 3 deactivated in April 2021.

New York City Residual Oil Elimination

New York City passed legislation in December 2017 that prohibits the combustion of fuel oil number 6 by 2020 and oil number 4 by 2025, respectively. After 2025, only fuel oil number 2 may be combusted

within New York City. The rule is expected to impact 2,946 MW of generation in New York City, which previously used fuel oil number 6, or continue to use fuel oil number 4 through 2025. Many generators in New York City that are connected to the local gas distribution network are required to maintain alternative fuel combustion capabilities. In addition, the NYSRC has a minimum oil-burn requirement rule that is intended to ensure that electric system reliability will be maintained in the event of gas supply interruptions.

Generators have taken steps to convert their facilities to comply with the law. While oil accounts for a relatively small percentage of the total energy production in New York State, it is often called upon to fuel generation during critical periods, such as when severe cold weather limits access to natural gas. **As discussed further, dual-fuel capability serves as both an important tool in meeting reliability and an effective economic hedge against high natural gas prices during periods of high demand for natural gas.**

Regional Greenhouse Gas Initiative (RGGI)

RGGI is a multi-state carbon dioxide emissions cap-and-trade initiative requiring affected fossil fuel generators to procure carbon dioxide emissions allowances. The costs for these allowances are factored into the costs of operating fossil fuel-fired generators. Suppliers seek to recover these costs through competitive offers in the wholesale electricity markets. Through this initiative, each participating state determines a set number of allowances, the majority of which are collectively auctioned. The level of available allowances is established in advance and lowered over time to encourage generators to invest in strategies to reduce carbon dioxide emissions.

In December 2020, the DEC finalized new RGGI regulations that cap New York's carbon dioxide emissions at approximately 21 million tons by 2030, representing a 5.2 million ton reduction in carbon dioxide emissions from 2020 levels. The updated rule expanded applicability to generators of 15 MW or greater in New York. New Jersey re-joined RGGI in 2020, and Virginia joined in 2021. Other states, such as Pennsylvania and North Carolina, are considering joining RGGI in the future. The expansion of the RGGI region and anticipated changes to program design features affect the dynamics of allowance cost and availability going forward.

The regional emissions cap, the cost containment reserve, and the three-year compliance periods are designed to minimize reliability concerns. RGGI allowance prices are influenced by the availability and prices of natural gas, the in-region production of emissions-free energy from nuclear facilities and renewable and other clean energy resources, and the overall demand for electricity. The member states will initiate a comprehensive program review in 2021.

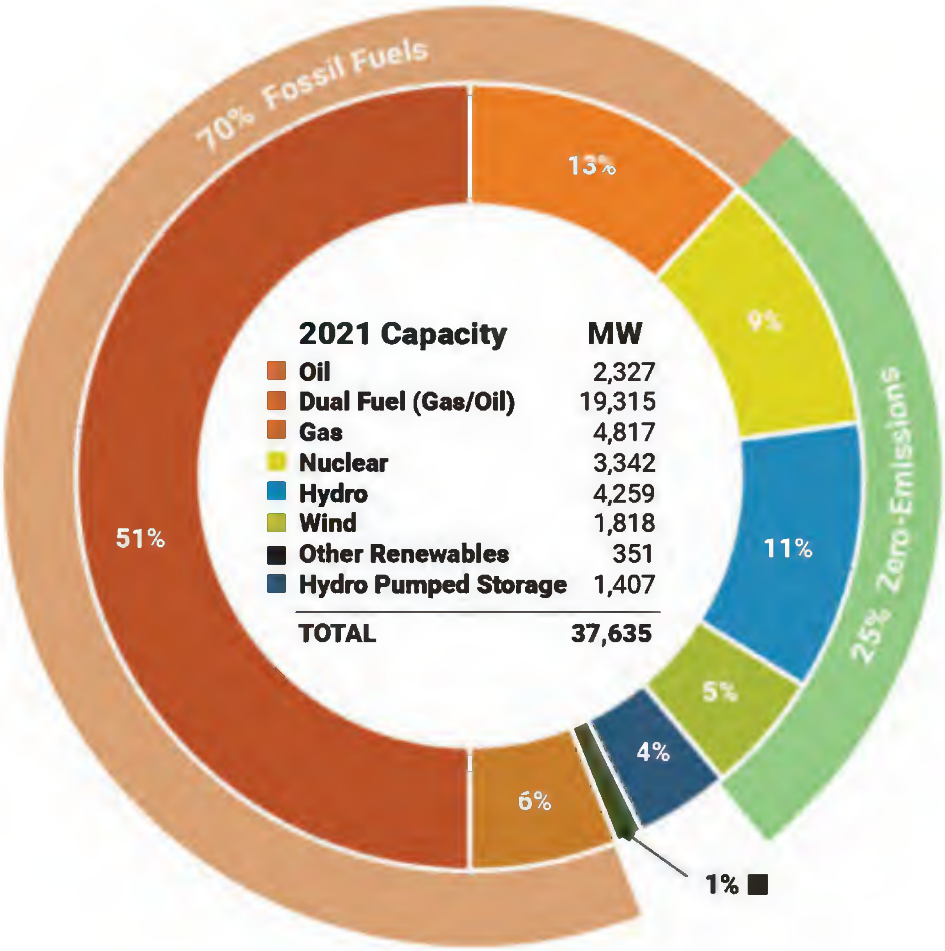
Local Law 97

The New York City Council passed Local Law 97 in 2019, which mandates that any building 25,000 square feet or larger reduce its greenhouse gas emissions by 40% by 2030, and 80% by 2050, with compliance starting in 2024. Officials estimate the law would apply to roughly 50,000 of New York City's more than one million buildings. New York City has established fines for buildings that do not comply. Building owners must pay $268 per metric ton that their carbon footprint exceeds the limit, annually.[8]

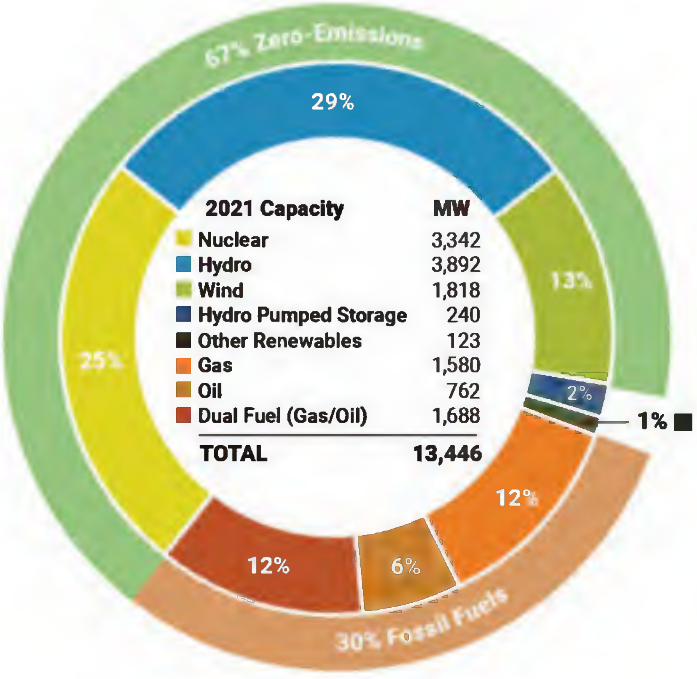
Figure 12: **Summer Installed Capacity (MW) by Fuel Source — Statewide, Upstate & Downstate New York: 2021**

Figure 12 provides the projected mix of resource capacity expected to be available for the 2021 Summer Capability Period

NYCA Summer Installed Capacity



Upstate Summer Installed Capacity (Zones A-E)



Downstate Summer Installed Capacity (Zones F-K)

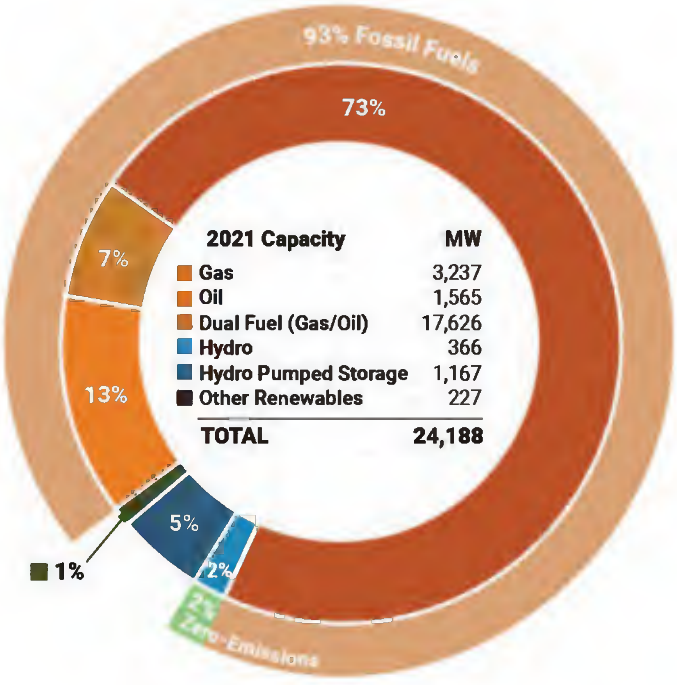


Figure 13:
Energy Production by Fuel Source — Statewide, Upstate & Downstate New York: 2020

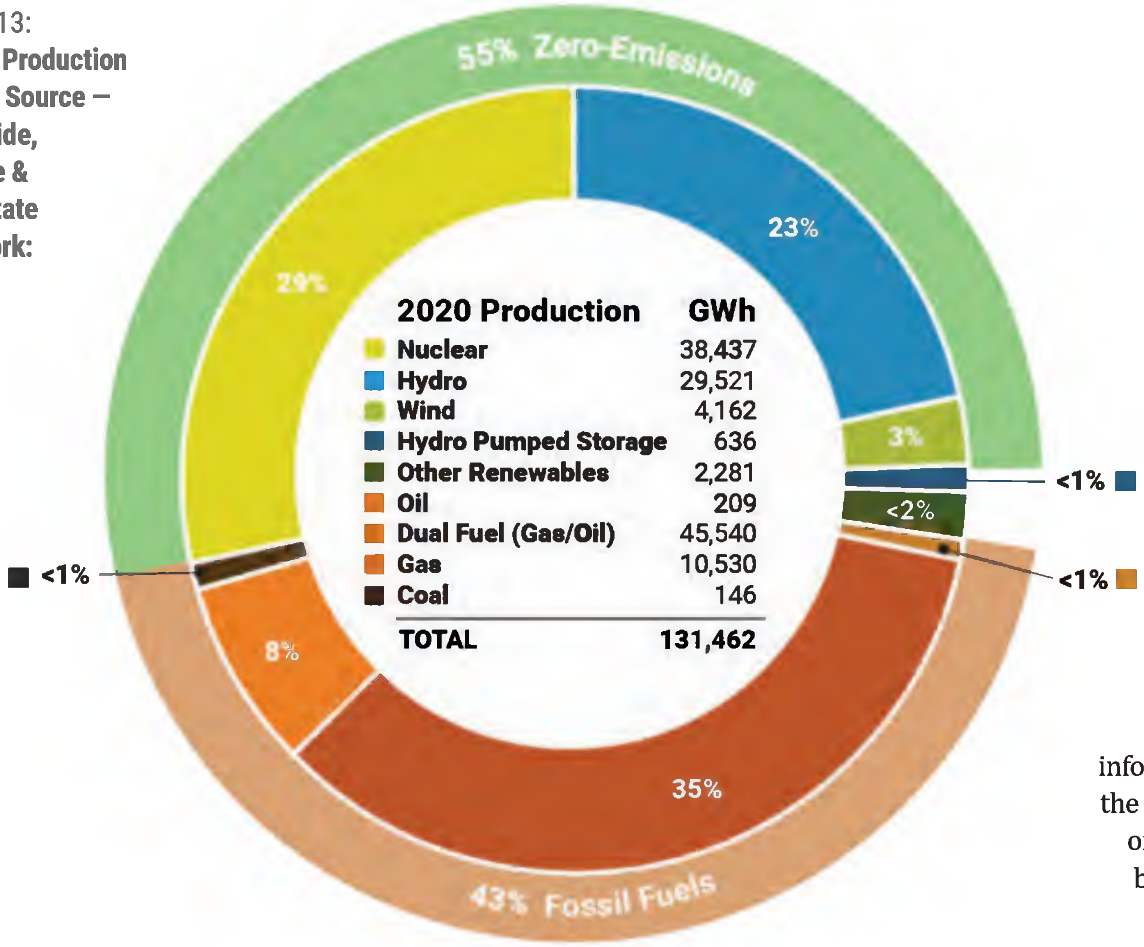
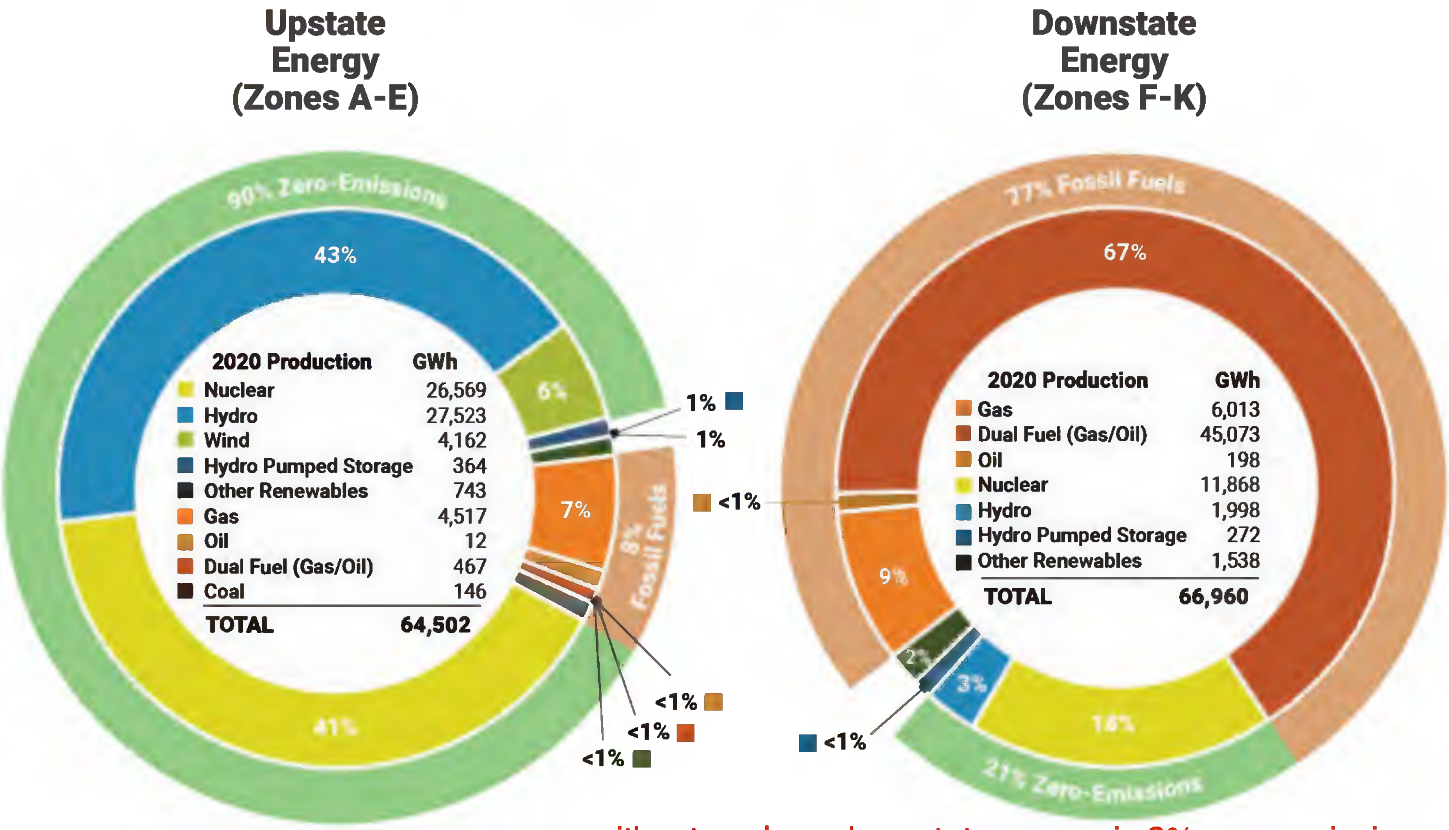


Figure 13 provides information on the production of electricity, by fuel type, in 2020



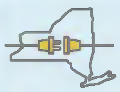
without nuclear, downstate energy is 3% zero-emissions

The Essential Role of Grid Planning & Wholesale Electricity Markets

for Achieving a Greener, Reliable, Resilient & Efficient Grid

Reliability and resilience are achieved in New York through expert system operations and extensive system planning. These functions help to inform a continuous, comprehensive approach to market design, thus incentivizing the kinds of reliability services needed as system conditions change.

Resilience goes beyond traditional measurements of reliability:



Resilience includes **measures that may offer grid operators flexibility** to prevent the risk of system disruptions, limit their scope if they do occur, and support faster restoration efforts in the event of outages;

Resilience may **involve investments to maintain and expand a robust transmission system** to support access to a diverse mix of resources;

Resilience means **greater access to generation with varying fuel types.** In the future, as the grid sees greater levels of weather-dependent wind and solar supply, geographic diversity of these resources could become increasingly important to resilience;

Resilience may also involve **investments in new supply resource technologies** located in or near areas of higher demand that must support reliability while having the clean energy attributes that are necessary to meet the objectives of the CLCPA; and

Resilience also **involves interregional coordination of grid operations and system planning.**

Identifying Risks to Grid Resiliency

The recent experiences in California and Texas highlight the critical importance of markets and planning to provide incentives to develop the necessary infrastructure for maintaining system reliability in response to extreme weather conditions. The NYISO is monitoring the various analyses of the events, as well as the actions being taken in response, to inform consideration of future steps in New York to make the grid here more resilient.

To better understand the future needs of the grid and identify potential reliability issues, in 2020 the NYISO completed a *Climate Change Impact and Resilience Study*. The study modeled New York's grid based on projected 2040 load and the requirement that electricity supply be zero-emitting. The study demonstrated that ready access to adequate quantities of flexible, long-duration, and controllable zero-emitting resources will be critical to meeting electricity needs and maintaining system reliability. The need for these resources can range from momentary to multi-day events.

Current market rules reward suppliers who take measures to support resource availability and performance. Fuel and energy security measures and investments in equipment which promote availability, efficiency, and flexibility, make resources more competitive and more likely to be selected in our competitive wholesale electricity markets. Further planning analyses will continue to inform the development of new reliability service capabilities. Using the study's results, we are identifying market enhancements that will attract investment in the technologies and capabilities that support reliability. Future zero-emission resources must effectively mirror the reliability service capabilities of today's generation fleet without producing emissions. As part of the *Grid in Transition* efforts, the NYISO will use operations and market metrics to identify and prioritize market enhancements to support reliability while seeking to attract investments in innovative new technologies and capabilities.

Our reliability planning processes enable New York to nimbly address reliability needs that are arising due to a shifting resource mix, as higher-emitting fossil fuel units deactivate and new renewable and other clean energy resources enter service. In our Economic Planning Process, we have identified transmission-constrained areas across the state that, if left unaddressed, will limit consumer access to renewable energy. As discussed further, our Public Policy Transmission Planning Process has resulted in new transmission projects that began construction in 2021, and the NYISO is commencing work on a new Public Policy Transmission Planning Process initiative to support offshore wind development.

▸ Learn more:
For more on our recent studies and how we keep the grid reliable, check out our 2040 grid page at www.nyiso.com/2040grid.

In response to the NYISO's *2019 Fuel & Energy Security Study,* the NYISO has continued to implement expanded monitoring capabilities to evaluate potential fuel and energy security concerns. The study states "the availability and consistent contributions of adequate amounts of [dual-fuel] generating resources is necessary to maintain power system reliability in cold winter conditions."[9] To maintain system reliability while transitioning to the clean energy grid envisioned by the CLCPA, new clean energy technologies will need to sustain reliability and resilience in a similar manner. Ongoing efforts by the NYISO include the monitoring of changes to the resource mix, peak winter demand conditions, and forward projections of energy production capability in response to system and weather conditions.

Further, the NYISO conducted a reliability gap analysis in 2019 to identify operational performance metrics which will inform potential market enhancements for system reliability as reliance on weather-dependent intermittent resources continues to increase. The analysis identified such priorities as maintaining the ability to balance load and supply, maintaining adequate quantities of reserve capability, maintaining reliable transmission operations, maintaining blackstart, frequency response, and voltage support capability, addressing supply resource outage scheduling challenges, and maintaining necessary levels of resource adequacy. The identified potential reliability gaps do not represent near-term concerns. The challenge ahead is to design and implement a portfolio of market products, planning, and operational enhancements that facilitate achievement of clean energy policies while maintaining system reliability.

Capacity Markets Support Grid Resiliency

Foundational to operating a reliable system is maintaining the availability of enough generating capacity that can produce energy when needed. A major distinction between the NYISO's markets and the markets in certain others areas, such as California and Texas, is that the NYISO administers a centralized, transparent market to buy and sell capacity.

The NYISO's capacity market serves as a platform to procure the least-cost supply mix necessary to support system resilience and reliability. New York electricity consumers benefit from competitive capacity auctions that minimize costs while rewarding resources that perform when needed. The capacity market includes specific rules to incentivize performance and availability of resources when system needs are greatest, while including penalties for non-performance. Investors in new technologies benefit from transparent market prices that align market signals with system needs. Existing suppliers benefit from market signals that reward resources that operate efficiently by maintaining or upgrading their performance capabilities.

Determining the level of capacity needed is an extensive planning process derived from strict reliability rules, engagement with stakeholders, and oversight from state and federal regulators. The process is conducted annually, involving the expertise of NYISO planning, which evaluates changes in forecasted demand, supply performance capabilities, and transmission system constraints. This analysis supports the NYSRC's efforts to consider and approve installed capacity reserve margins. NYSRC determines the appropriate IRM and submits necessary revisions of such values to both the PSC and FERC for acceptance.

In New York, electricity demand is highly concentrated in the metropolitan areas of the lower Hudson Valley, New York City, and Long Island. Therefore, it is not sufficient, from the perspective of system reliability, to only evaluate the state as a whole to determine how much capacity is needed to support reliability. Understanding how transmission constraints can limit the delivery of needed capacity is essential.

The NYISO and its stakeholders annually review locational capacity requirement levels for regions within New York where transmission constraints limit the delivery of needed capacity. This review establishes requirements to procure capacity within specific areas to safeguard resource adequacy in those regions. These requirements are reflected in the NYISO's capacity market, through which competitive auctions efficiently procure the needed resources. This process is another important tool in supporting reliability and resiliency for all areas of New York.

This process of establishing capacity requirements and obligations works to reliably meet demand, even as the supply mix changes in response to clean energy policies. As will be discussed further, the NYISO has prioritized a comprehensive review of capacity market rules which will focus on reforms that improve alignment of markets and clean energy policies while continuing to reliably meet demand as the grid changes.

Every 5 minutes, 24/7, 365

electricity in NY is bought and sold through wholesale energy markets.

Energy Markets: Provide day-ahead and real-time commitments to meet load

Ancillary Services: Every six seconds resources compete to respond to changing system needs.

Capacity Markets: Ensure enough generation to meet peak demand and encourage generators to invest in new technology and deactivate outdated resources.

Wholesale energy and ancillary services markets provide the least-cost mix of resources to maintain daily and intra-daily operational reliability, dispatching every six seconds and re-running the markets across New York every five minutes. Capacity markets work in tandem with these markets to preserve the availability of these services through competitive monthly and seasonal auctions. **Together, the energy, ancillary services, and capacity markets support reliability through competitive markets that reward performance, even in the most challenging conditions, while minimizing overall consumer costs.**

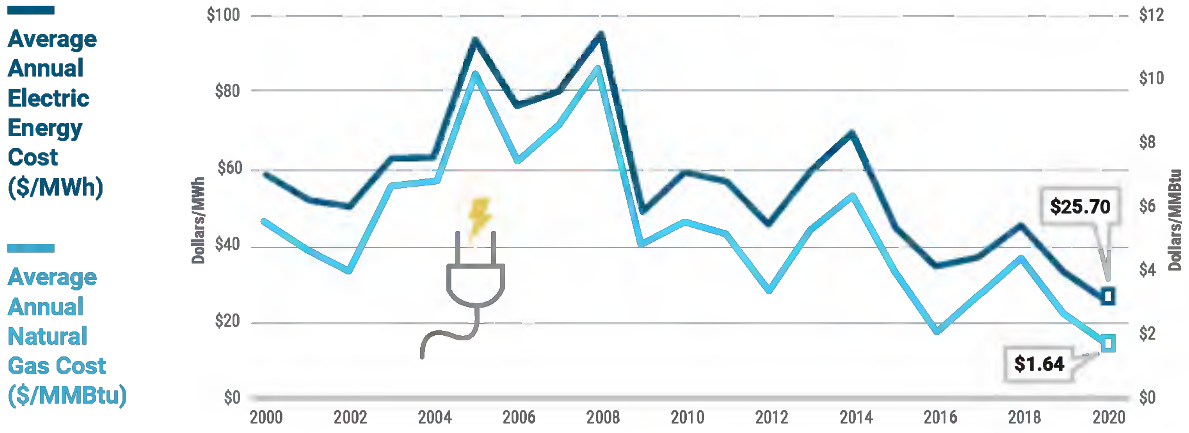
Competitive Markets for a Grid in Transition

Overview

Electricity markets provide a strong, proven framework to facilitate change in the power system. The wholesale markets have played a significant part in meeting New York's environmental and clean energy goals since the inception of the NYISO. Since 2000, New York's generation fleet has evolved to become markedly cleaner and more efficient. 12,739 MW of new generation have been developed, with their locations informed by locational energy and capacity price signals. **Price signals from the NYISO's markets have encouraged more efficient resources to enter the market, while at the same time signaling less efficient generation to exit.** These locational price signals inform investors on when and where to add generation and other new resources on the bulk power system to most efficiently serve consumer needs. Competitive market pricing has also contributed to 10,535 MW of older and less efficient facilities retiring or suspending operations and being replaced by cleaner and more efficient technologies.

Wholesale electricity prices are directly influenced by the cost of the fuels used to produce electricity. In New York, the cost of natural gas and the price of electricity are closely correlated because, based on the current resource fleet, gas-fired generation often establishes the clearing price for electricity in the NYISO's wholesale electricity market. **Average annual wholesale energy prices in the NYISO's market reached a record low of $25.70/MWh in 2020.**

Figure 14: **Natural Gas Costs and Electric Energy Prices: 2000-2020**



$25.70/MWh
record low average annual wholesale energy price in the NYISO's markets in 2020

12,739 MW
of new generation has been added to the grid since 2000

10,535 MW
of less efficient facilities retired or suspended for cleaner technologies

Enhancing Wholesale Electricity Markets to Meet Changing Needs

The NYISO's wholesale markets are fulfilling the mission and goals of reliability and economic efficiency. As the grid transitions to greater reliance on weather-dependent intermittent resources, developing and implementing market mechanisms that support changing reliability needs is essential. Anticipating and developing effective market rules for the new services needed is essential for maintaining reliability, advancing the benefits of electricity markets, and meeting the objectives of clean energy policies.

In comments filed prior to FERC's March 23, 2021 *Technical Conference Regarding Resource Adequacy in the Evolving Electricity Sector*, the NYISO joined PJM and ISO-New England in submitting a statement, *Foundational Market Objectives for a Reliable Future Grid*, which details shared principles that "should stand as guideposts to ensure a reliable, efficient, and increasingly clean power system in the regions we serve."[10] They include:

New Services to Ensure Continued Reliability. New market products and services will be needed to ensure the power system can meet emerging reliability needs. These may include new ancillary services or products, to be developed in tandem with and to support the integration of greater renewable energy, storage, and distributed energy technologies;

Continued Efficient Integration of Demand-Side Resources into Competitive Wholesale Markets. The transition to the future grid requires a wholesale market structure that allows for new and existing technologies to compete on equal footing. This includes the capability for wholesale price-responsive demand to play an active role in the wholesale markets;

A Focus on Sound Pricing in the Energy Market. NYISO, PJM, and ISO-New England believe that we must continue to ensure that energy and reserve prices accurately reflect these markets' supply and demand fundamentals, every minute of every day;

Accurate Assessment of Resource Capacity Contributions to Resource Adequacy. It is imperative to accurately value capacity resources based on their contributions to reliability. This allows capacity market accreditation and compensation to be properly aligned with individual resources' expected reliability benefit to consumers; and

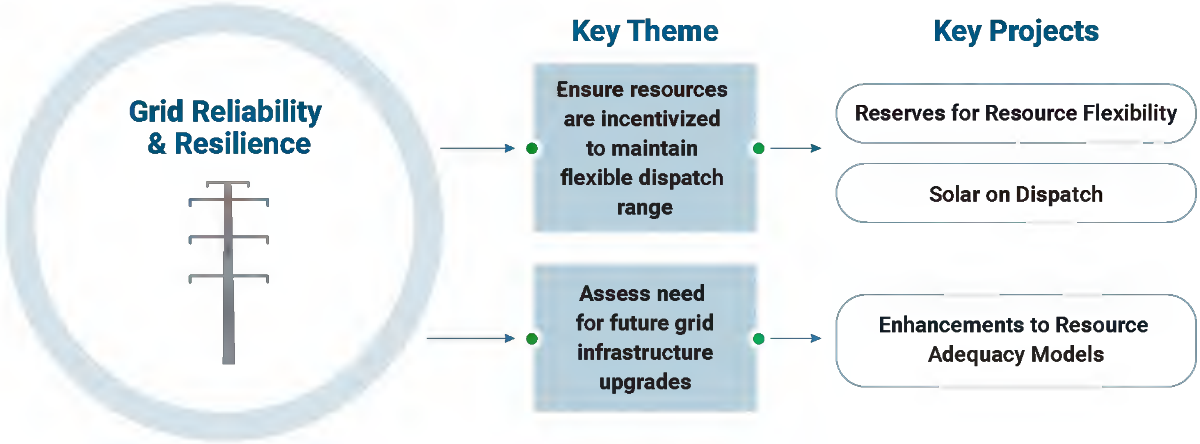
Capacity Markets Calibrated to Induce Reliable New Entry and Efficient Exit. Capacity market incentives must be sufficient to encourage resource entry when needed. Continued focus on the requirement for resources to perform when needed will also be required.

The statement goes further to say that the three regions "believe that by adhering to these principles we can work to facilitate states' ability to pursue their policy objectives in concert with the ISO/RTO-administered, competitive wholesale electricity markets."

With these principles in mind, the NYISO is engaging stakeholders in a series of initiatives designed to enhance our wholesale markets to better align market signals with the grid services necessary for maintaining reliability and market efficiency as we transition to a clean power system.

Grid Reliability and Resilience

Wholesale markets play a critical role in meeting New York's reliability needs. Wholesale energy and capacity market products form price signals that indicate both current and future reliability needs, incentivizing both real-time performance and long-term investment. The changing portfolio of resources serving the electric needs of New York requires an ongoing review of the NYISO's existing market products and planning processes to efficiently and reliably serve New York's electricity requirements. Projects categorized under this initiative serve to maintain reliability and efficient operation of the grid under normal, stressed, and extreme conditions.



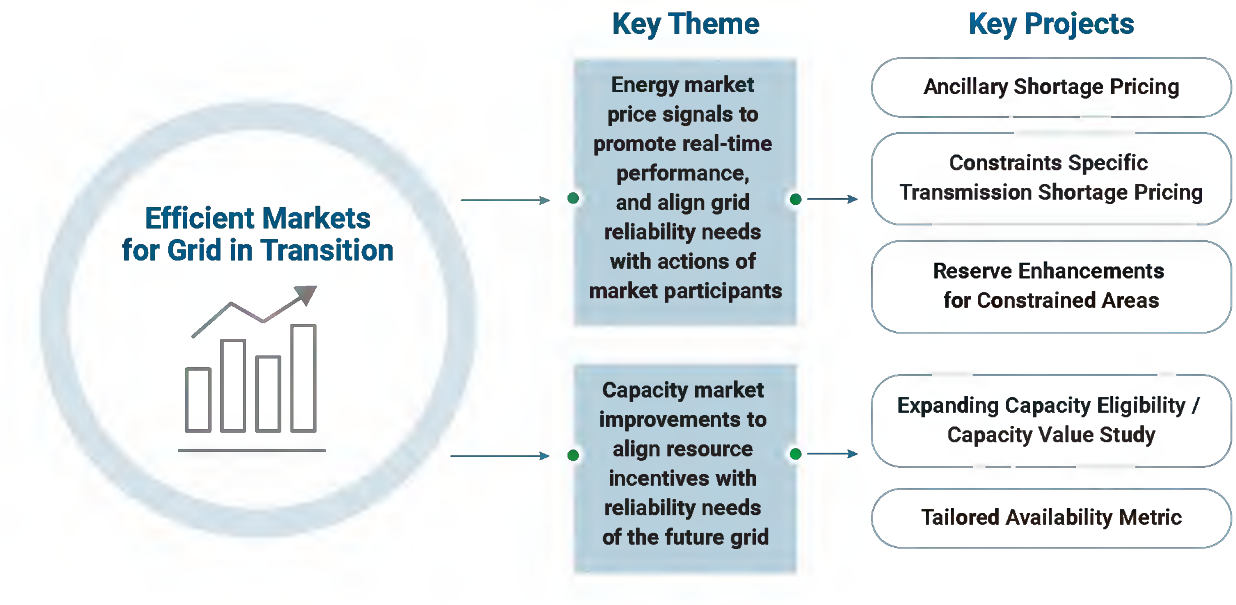
Grid Reliability and Resilience initiatives seek to address the growing need for flexible resources and infrastructure investment to better integrate renewable energy into reliable grid operations. The ability to change output quickly in response to system conditions, known as ramping, is an important resource attribute needed by grid operators to maintain reliability. The *Reserves for Resource Flexibility* project will help address uncertainties with managing the variability of supply and load on the system by procuring additional quantities of reserve capability in appropriate locations. The NYISO plans to deploy this project in 2021.

As higher levels of weather-dependent intermittent resources connect to the grid, it will be important to have appropriate market mechanisms to manage that variability. The NYISO successfully developed innovative tools to dispatch wind resources, meaning that these resources have the ability to be dispatched downward if economic conditions or grid security require this action. With the *Solar on Dispatch* project, the NYISO will apply a similar technique with solar projects. The NYISO plans to deploy this project in 2021.

Identifying resource adequacy needs on a grid increasingly supplied by weather-dependent intermittent resources will require improved modeling capabilities and tools. **Starting in 2021, the NYISO engaged stakeholders on the *Enhancements to Resource Adequacy Models* project to evaluate the models used to support reliability through the NYISO markets.** The project will consider updates to these models to reflect emerging technologies and changing system dynamics. It will also be important to periodically reassess the reliability value resources provided in relation to the market signals needed to support investment.

Efficient Markets for a Grid in Transition

The addition of weather-dependent intermittent resources, energy storage resources, and distributed energy resources will create a more dynamic grid. Maintaining and enhancing market efficiency is a key focus of market design engagement with stakeholders as we move towards this new, more dynamic paradigm.



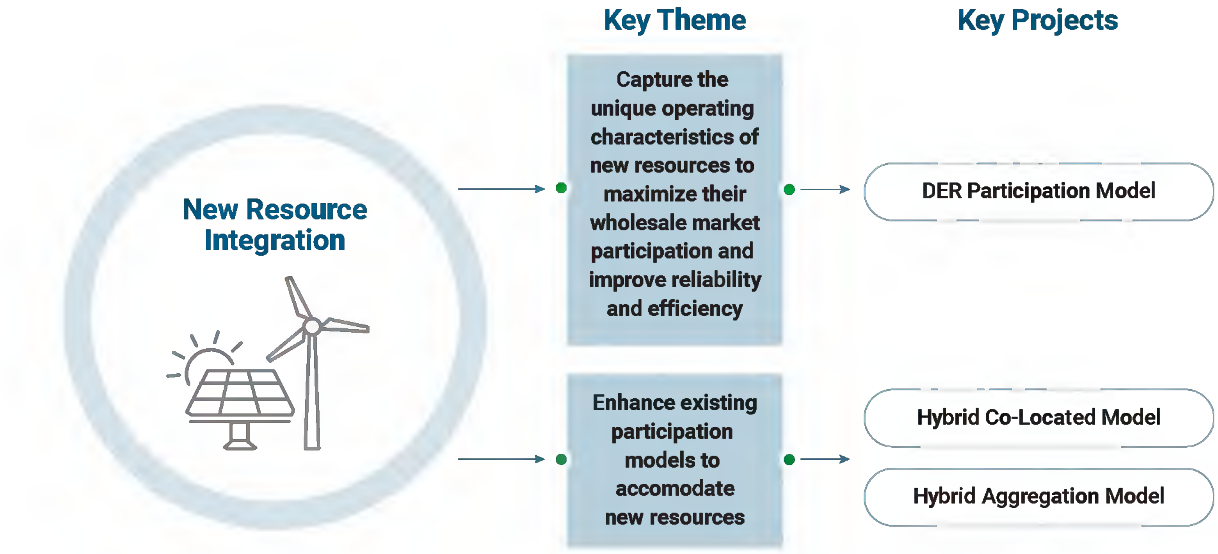
An efficient market will require accurate, location-based, real-time price signals. As the amount of weather-dependent intermittent generation on the grid grows, ancillary services' price signals will become more important to align the reliability needs of the grid with the actions of suppliers. The NYISO is undertaking initiatives, such as the *Ancillary Services Shortage Pricing* project, that will consider whether current shortage pricing levels are adequate to promote real-time responsiveness and incentivize needed investment. The NYISO plans to deploy the *Ancillary Services Shortage Pricing* project in 2021.

The *Constraint Specific Transmission Shortage Pricing* and *Reserve Enhancements for Constrained Areas* initiatives are geared towards encouraging investment and performance where the system has the greatest needs. These efforts are expected to begin with stakeholder engagement in 2021, with potential project deployments over the coming years. Longer-term market enhancements will be informed by these new initiatives, continued assessment of the evolving needs and conditions of the system, and collaboration with stakeholders and policymakers.

The NYISO's capacity market initiatives, *Expanding Capacity Eligibility* and *Tailored Availability Metrics,* explore alternative approaches to delivering resource adequacy to New York's grid as large quantities of intermittent and distributed energy resources are deployed in the coming years. As the system evolves, the NYISO will re-examine how peak hour periods are defined to reflect changes in demand relating to electrification, energy storage, and the growth of behind-the-meter distributed energy resources. Periodically, the reliability benefits associated with different resource types will be re-evaluated in order to maintain alignment of benefits with proper market value.

New Resource Integration

Distributed energy resources, energy storage resources, and hybrid-storage resources (i.e., generation co-located with energy storage resources behind a single point of interconnection) offer the potential to make load and supply resources more adaptable and responsive to wholesale market price signals and system needs. In order to optimize the reliability and efficiency benefits of these technologies, market participation models must account for their unique operating characteristics.



The *DER Participation Model* project aims to enhance participation of distributed energy resources in the competitive wholesale markets. These measures closely align the bidding and performance measurements for distributed energy resources with the rules for generators and establish a state of the art model that is largely consistent with the market design envisioned by FERC in its Order 2222. As a next step, the NYISO will develop market concepts to encourage the participation of flexible load, which will become increasingly important as the levels of weather-dependent intermittent resources on New York's grid increases in response to the state's climate and clean energy policies.

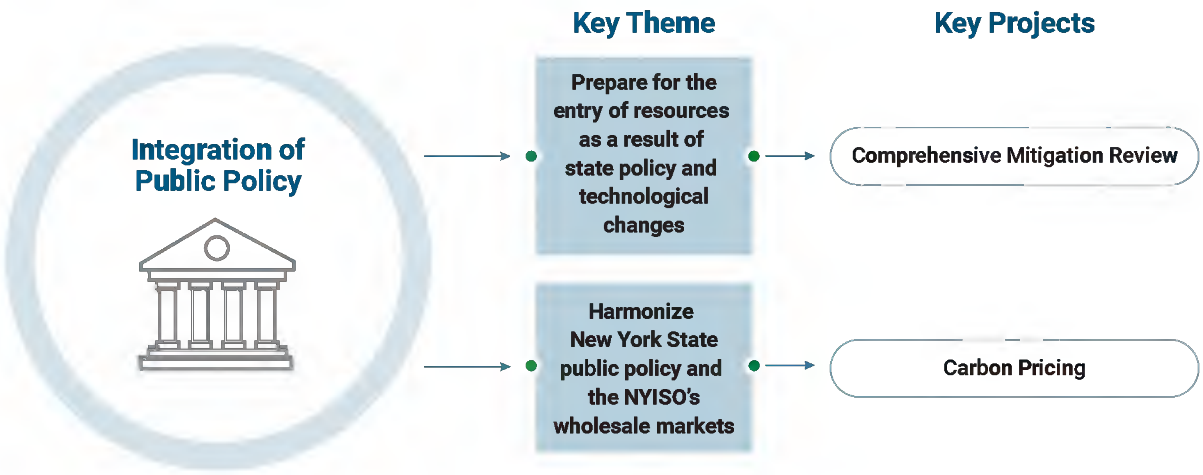
These efforts will add new means by which resources can participate in the NYISO's markets, as well as enhance existing participation models. Along a similar theme, the NYISO is developing market participation rules for wholesale market generation resources co-located with storage. As part of this effort, the NYISO has identified two potential participation models for such resources: *Hybrid Co-Located Model* and *Hybrid Aggregation Model*.

▸ **Distributed Energy Resources (DER):** A broad category of resources that includes distributed generation, energy storage technologies, combined heat and power systems, and microgrids. A DER is generally customer-sited to serve the customer's power needs, but may, in some instances, sell excess energy production or ancillary services to the grid.

The NYISO worked with its stakeholders throughout 2020 to develop the *Hybrid Co-Located Model*. The NYISO plans on making this model available to developers in late 2021. **Additionally, the NYISO is working with its stakeholders throughout 2021 to further develop a method for hybrid resource participation in the wholesale markets. This ongoing work will support policy efforts to integrate more clean energy resources into the grid.**

Integration of Public Policy

The CLCPA sets the stage for aggressive state action to reduce greenhouse gas emissions and promote expansion of renewable, distributed energy, and energy storage resources. It is imperative that the NYISO implement steps to harmonize wholesale electric power market design with state public policy goals. The initiatives described above all include projects that will help the grid prepare for an increase in weather-dependent intermittent resources by enhancing the NYISO's ability to achieve reliability through markets.



To further prepare for the entry of clean energy resources, the NYISO and its stakeholders are continuing a *Comprehensive Mitigation Review* to evaluate and propose reforms to the mitigation rules for new market entry of resources into its capacity market. Reforming the mitigation framework is an essential part of maintaining efficient resource entry and exit as the generation mix rapidly changes in the coming years.

The capacity market has undergone significant changes in both design and resource mix since the Buyer-Side Mitigation (BSM) measures were first implemented in May 2008. BSM rules were developed to evaluate the competitiveness of traditional generators, but new resource types, such as battery storage, weather-dependent and distributed resources, are fundamentally different in design and operation. New York State is structuring out-of-market payments in the form of Renewable Energy Credits (RECs) and Zero-Emissions Credits (ZECs) to incentivize resources with desirable environmental attributes to enter or remain in the market. Such resources are potentially subject to mitigation under the BSM rules. New York State and many NYISO stakeholders increasingly see the BSM rules as imposing unnecessary and unjust costs on consumers, interfering with legitimate state policy choices and, ultimately, doing more harm than good. **The current version of the BSM rules is not a lasting, durable solution. A fresh look at potential changes is required.**

While these issues are not unique to New York, the NYISO recognizes these challenges and is acting to address them. BSM rules and questions of federal and state oversight of wholesale capacity markets should not be debates between competitive or regulated approaches to meeting our energy needs. **The NYISO believes that federal and state oversight of capacity markets can be harmonized to retain the benefits of competition while achieving shared objectives for a cleaner and more reliable grid.** The NYISO is actively engaged with stakeholders on a variety of approaches

to address these issues in the market modernization proceedings that FERC commenced in 2021. As NYISO President and CEO, Rich Dewey stated at FERC's March 23, 2021 technical conference, "when we come down to FERC from New York with solutions…. it's not going to be one solution. It's going to be a portfolio of five or six or seven solutions that will incorporate changes to the requirements in the capacity market; it's going to be variations to the level of compensation that each of the resources and the appropriate attributes are entitled to; it's going to be looking at it in concert and in tandem with what we need to do to the energy and ancillary service markets to offset some of those resource shifts."[11]

An important opportunity that could more efficiently reflect climate change policies in the NYISO's wholesale electricity market is *Carbon Pricing*, which is a proposal designed to charge generators for their carbon emissions, while allowing these generators to include the carbon charge within their wholesale market offers. Under the proposal, the NYISO would continue to commit and dispatch resources to meet load at the least cost to consumers; however, the resulting dispatch would incorporate the generators' cost of carbon dioxide emissions and allow units to compete on both fuel and emissions costs. There are also design elements to provide that imports from existing external resources and exports are evaluated on a level playing field with internal New York generators. The carbon charge collected from suppliers would be returned to the Load Serving Entities (LSEs) that serve consumers.

The NYISO continues to believe that its *Carbon Pricing* proposal, or an economy-wide carbon pricing mechanism, has the potential to provide significant value as a means to integrate public policy into the NYISO markets. Incorporating the cost of carbon dioxide emissions into the NYISO's competitive energy market aligns policy goals more closely with the performance of the grid. The NYISO, however, will look to move forward with a stakeholder vote on the *Carbon Pricing* proposal only with support on the proposal from New York State.

How does carbon pricing work?

New York State sets a social cost of carbon
as a price per ton of emitted CO_2 based on the impact to the environment

Power plants pay
for the CO_2 they release into the atmosphere

Generation owners receive economic incentive
as a price per ton of emitted CO_2 based on the impact to the environment

New Yorkers benefit
from reduced costs and lower emissions

Wholesale electricity markets have provided substantial benefits to New Yorkers. Engagement with policymakers and stakeholders to address the needs of the evolving grid is vital to the achievement of the state's energy policy objectives, while maximizing the continued reliability and economic benefits of wholesale markets for New York's energy consumers.

Enhanced Planning for the Future Grid

Overview

The NYISO's planning responsibilities are composed of three primary components. First, a Comprehensive System Planning Process which examines near-term and longer-term issues impacting grid reliability, economic planning, and public policy transmission planning. Second, NYISO planners evaluate the reliability implications of resources interconnecting and deactivating from the grid. Third, the NYISO also conducts interregional planning with neighboring grid operators.

In addition, the NYISO conducts topical grid studies as necessary, such as the *Climate Change Impact and Resilience Study*, to fulfill the essential element of our mission as an authoritative source of information, providing independent analysis and data to stakeholders, asset owners and investors, and policymakers.

The NYISO's planning studies use sophisticated models to assess the capability of the transmission system and the adequacy of resources to meet New York's electricity needs. There are numerous factors considered in these models, including:

Forecasts of consumer demand and peak loads, including the implications of distributed energy resources and behind-the-meter technologies that change traditional views of expected supply and demand;

The impact of changes in generation and transmission resources available to the electric system;

Economic outlook data; and

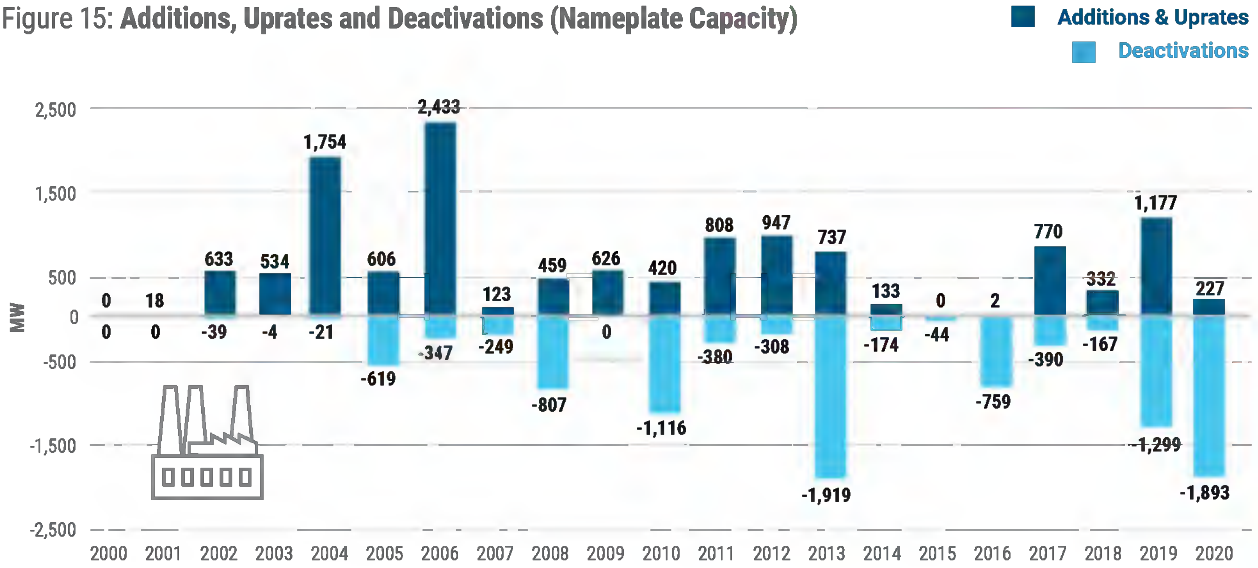
Weather forecast models, increasingly impacted by climate change.

Power Supply Trends in Investment and Deactivations

As the state's public policy goals have encouraged investments in renewable energy resources, developers increasingly are proposing generation in New York's upstate regions (Load Zones A-E), away from downstate load centers, based on physical factors such as the suitability of wind conditions for energy production and land availability. State policies have encouraged developers to propose nearly 55,000 MW of new offshore wind, land-based wind, solar, and energy storage capacity for potential interconnection to the grid.

The CLCPA is attracting new clean energy resources to interconnect to the grid, while policies like the DEC's Peaker Rule will result in reduced availability or deactivation of the existing higher-emitting fossil fuel-fired generation units. As the statewide generation resource mix changes in response to these policies, new *near-term challenges* may arise in maintaining the *long-term reliability* of the New York electric grid.

Figure 15: **Additions, Uprates and Deactivations (Nameplate Capacity)**



NYISO's Comprehensive System Planning Process

Planning for a Reliable Electric Grid

The Reliability Planning Process itself is composed of three components:

1. Each transmission owner conducts a public Local Transmission Planning Process for its transmission district that feeds into statewide planning;
2. Starting in 2020, the NYISO began conducting a Short-Term Reliability Process every quarter to address near-term needs, with a focus on needs arising in the next three years. The Short-Term Reliability Process includes assessing the potential for reliability needs arising from proposed generator deactivations; and
3. The *Reliability Needs Assessment* (RNA) focuses on longer-term reliability needs for years four through ten of a ten-year, forward looking study period.

Together, these processes enable the NYISO to nimbly identify reliability needs ranging from localized needs to broader statewide needs arising over the next decade.

In 2020, the NYISO initiated its biennial Reliability Planning Process cycle by developing and issuing the *2020 RNA*. This assessment serves as the foundational study to support the NYISO *Comprehensive Reliability Plan* (CRP). The RNA process, which entails ongoing stakeholder engagement, evaluates long-term electric system reliability for both resource adequacy and transmission security. If it identifies any violation of reliability criteria for the bulk power system in New York State, the NYISO issues a report identifying the general location and quantifying the amount of power needed to resolve the identified need.

▸ Download our reports: visit www.nyiso.com/library

Following the issuance of the RNA, the CRP details the NYISO's plans for continued reliability of the bulk power system over the ten-year planning horizon. The CRP also updates assumptions critical to determining system needs and evaluates solutions proposed to resolve identified reliability needs found in the RNA. Market-based solutions to reliability needs are favored over regulated solutions.

To address any identified needs in a competitive, cost-efficient manner, the NYISO solicits market-based solutions, which may entail investment in transmission, new supply resources, or demand-reduction measures. As a further measure to ensure solutions are implemented where and when they are needed, the NYISO also designates one or more responsible transmission owner to develop regulated backstop solutions. At the same time, other developers can also provide alternative regulated solutions. The NYISO selects the more efficient or cost-effective regulated transmission solution.

The NYISO's Reliability Planning Process provided an important look at the implications of the DEC's Peaker Rule, which affects availability of certain resources beginning in 2023. Some affected unit owners plan to fully deactivate their facilities in response to the implementation of the Peaker Rule, making them permanently unavailable to the system, while others proposed seasonal limitations that would render facilities unavailable to the system during summer.

The NYISO has implemented planning process enhancements to address the increased pace of change on the grid in response to state policies that promote a rapid shift to clean energy technologies. In 2020, the NYISO implemented the Short-Term Reliability Process, which complements the RNA by identifying needs over the next five years, with a focus on the needs arising in the first three years. Produced for the first time in the fourth quarter of 2020, the assessment identified reliability needs that could arise beginning in 2023. The NYISO subsequently issued a solicitation to resolve the need, and ultimately selected a proposal from the local transmission owner. The new short-term process enables the NYISO to monitor for grid needs every quarter, and allows asset owners and investors, transmission owners, and asset developers to respond nimbly to the needs that arise as the resource fleet evolves in response to environmental requirements and energy policies.

▸ **Peakers:** Peaking power plants, also known as peaker plants or just "peakers", are power plants that generally run when there is a high demand — known as peak demand — for electricity.

The impacts on the availability of resources affected by the DEC's Peaker Rule were also incorporated into the RNA. The RNA identified longer-term resource adequacy and transmission security reliability needs in the New York City area that arise in the 2024-2030 timeframe. The NYISO worked with local transmission owners and other stakeholders to identify key updates to resolve system needs related to the near-term concerns. These updates also resolved the reliability needs identified in the RNA. **The NYISO will continue to employ these important planning tools to identify any emerging system needs.**

Planning for an Economically Efficient Grid

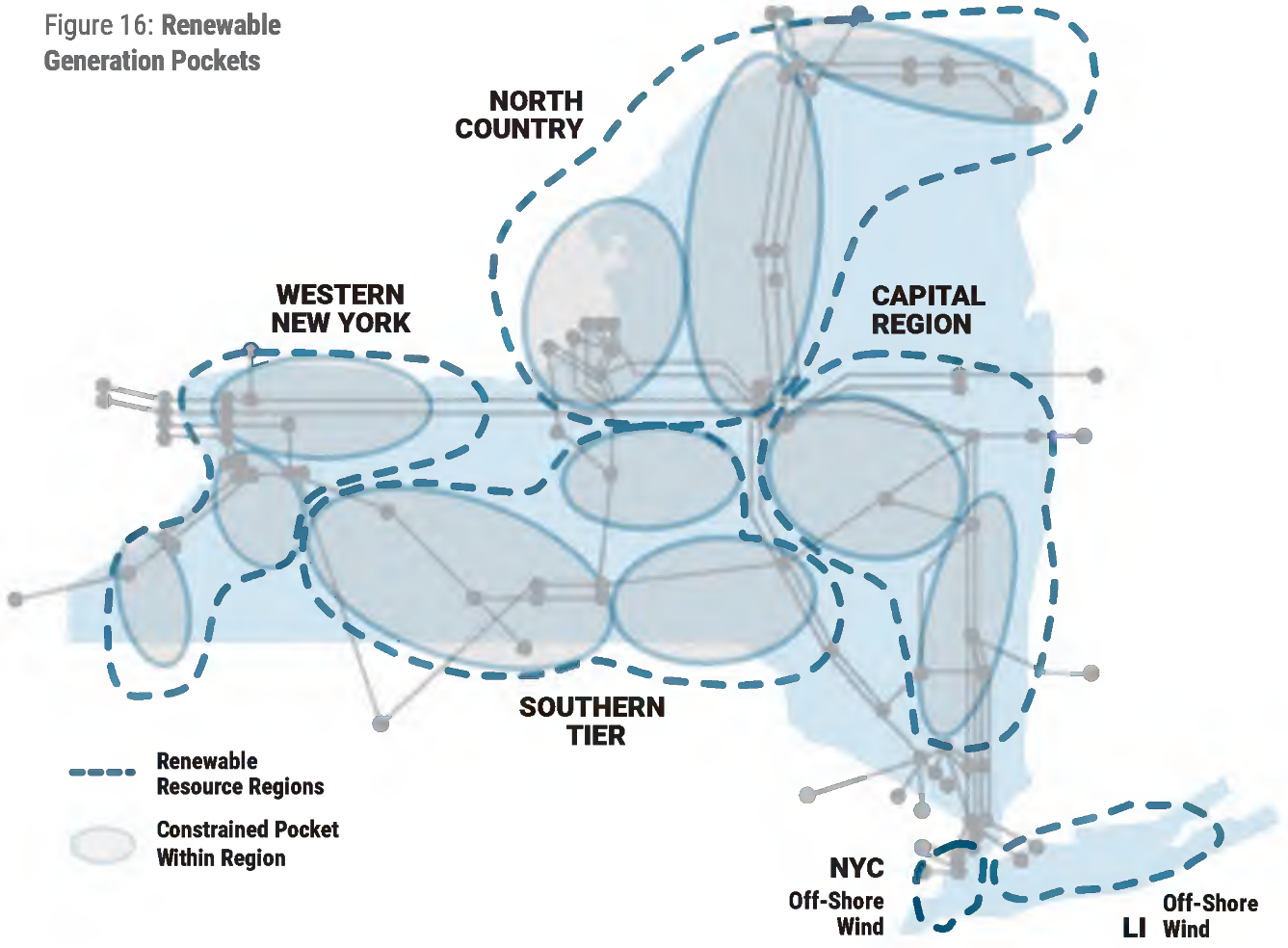
In 2020, the NYISO undertook a comprehensive review of its Economic Planning Process to determine how the studies, tools, and metrics in that process could be enhanced. The impetus for the review arose, in part, from the rapidly shifting resource landscape toward renewable resources driven by the CLCPA and other state clean energy policies. This changing landscape led the NYISO to engage stakeholders to examine how the NYISO's economic planning studies could be enhanced to identify the most economic and efficient locations for the construction of renewable resources, the transmission needed to deliver energy to consumers from onshore and offshore renewable resources, and the impact of the renewable resources on the transmission system. The enhancements that were developed extend the study outlook to 20 years and broaden the benefits considered in

evaluating potential projects to address congestion, such as the deliverability of energy output from new renewable resources and capacity cost savings associated with transmission expansion. These enhancements were approved by stakeholders and were accepted by FERC in April 2021.

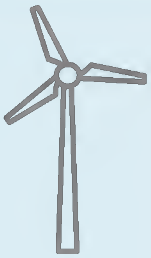
While enhancements to the Economic Planning Process were under consideration, the NYISO completed the *2019 Congestion Assessment and Resource Integration Study* (CARIS), which provided an economic analysis of transmission congestion and the potential costs and benefits of relieving transmission congestion. The study analyzed generic transmission, generation, energy efficiency, and demand response solutions in regions that could yield congestion cost savings.

The *2019 CARIS* study included a 70 by 30 scenario analysis of New York's electric system to identify transmission constraints that may prevent the delivery of renewable energy to achieve the CLCPA's 70% renewable energy mandate for 2030. This analysis modeled a set of load and generation assumptions for 70% of New York's load to be supplied by renewable resources by 2030, including 15,000 MW of utility-scale solar, 7,500 MW of behind-the-meter solar, 8,700 MW land-based wind, and 6,000 MW offshore wind capacity. This detailed study is helping policymakers and developers to identify opportunities for transmission expansion to facilitate achievement of the state's climate policy goals.

Figure 16: **Renewable Generation Pockets**



The 70 by 30 scenario identified transmission-constrained "renewable generation pockets," as well as the levels of renewable generation curtailments that would occur within each pocket. "Curtailments" occur when renewable generation exceeds the transmission limits, requiring suppliers to reduce their output in order to avoid overloading transmission facilities. The generation "pockets" revealed by the study represent regions in the state where renewable generation resources cannot be delivered fully to consumers statewide. The study projects that transmission constraints in these pockets will likely result in curtailment of 11% of the total potential renewable energy production across New York, with curtailment levels in some individual pockets as high as 63%. The findings of this analysis underscore an important point: additional transmission investment is necessary to achieve the objectives of the CLCPA.



▸ Wind Curtailment: Signals from the NYISO directing wind resources to reduce output in response to transmission constraints.

Planning for Public Policy Requirements

Under the NYISO's Public Policy Transmission Planning Process, interested entities propose, and the PSC identifies, transmission needs driven by Public Policy Requirements. A Public Policy Requirement is a federal or state law or regulation, including a PSC rulemaking order, which drives the need for additional transmission capability in the state. In response to a declared Public Policy Need, the NYISO requests that interested entities submit proposed solutions and evaluates the viability and sufficiency of those proposed solutions to satisfy each identified need. The NYISO then ranks the solutions and may select the more efficient or cost-effective transmission solution to each identified need. The NYISO provides cost recovery for selected solutions through transmission charges in its tariffs. Considering typical schedules for development and construction of transmission, the NYISO estimates that the timeline for projects pursued through its Public Policy Process from the PSC's declaration of a need to the in-service date of a transmission project could span approximately five to six years. Given the timeframes specified by the CLCPA, the NYISO's Public Policy Process is well suited today to address needs beyond 2025.

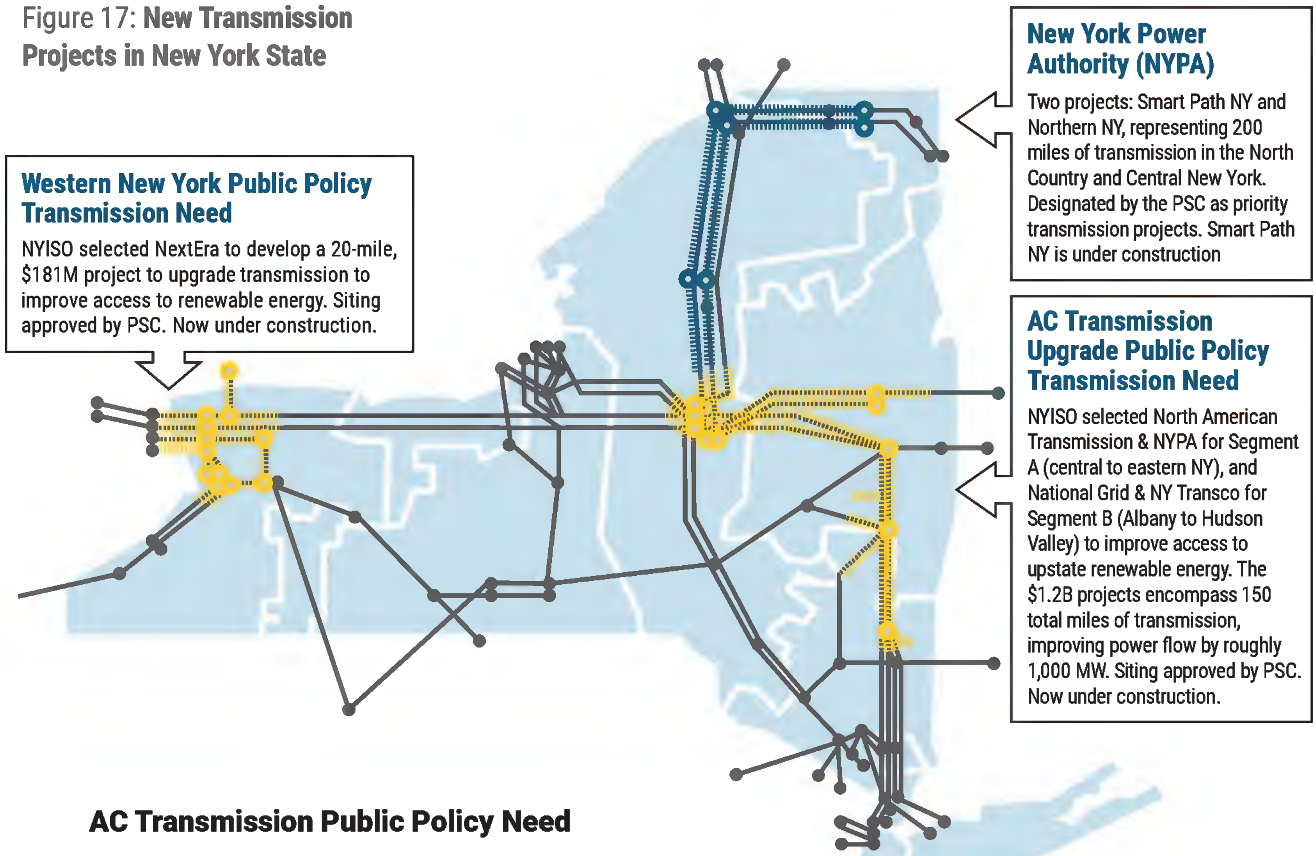
Clean energy policies are driving the need for investment in the transmission system to ensure that clean energy supplies are deliverable to consumers. Specific transmission infrastructure investments to meet these needs depends, in part, on the evolution of the resource mix and the geographic distribution of new renewable generation. Most of New York's renewable energy capability is located in upstate and northern New York. To bring renewable energy to market, three new transmission projects are under construction, representing the single largest investment in transmission infrastructure in New York State in more than 30 years.

Western New York Public Policy Transmission Project

In October 2017, the NYISO's Board of Directors selected the Empire State Line proposal from NextEra to address the public policy need for new transmission in western New York. This need was identified to support the state's goal to more fully utilize renewable energy from the Robert Moses Niagara Hydroelectric Power Station as well as imports from Ontario. The transmission upgrades are also expected to provide reliability, environmental, and economic benefits.

The PSC has granted all regulatory approvals and the project commenced construction in March 2021. The project is anticipated to enter into service by June 2022.

Figure 17: **New Transmission Projects in New York State**



AC Transmission Public Policy Need

In December 2015, the PSC identified a Public Policy Transmission Need to relieve congestion on the interfaces between upstate and southeastern New York, which run from central New York, through the Capital Region, to the lower Hudson Valley. The PSC action sought to increase transfer capability from central to eastern New York by at least 350 MW (Segment A) and from the Albany region through the Hudson Valley region by at least 900 MW (Segment B).

In April 2019, the NYISO's Board of Directors selected a joint proposal by North American Transmission and NYPA for Segment A, and a joint proposal by National Grid and New York Transco for Segment B. The projects will reduce total system electricity production costs, lower system capacity procurement costs, replace aging transmission infrastructure, improve system performance, reduce emissions, and add resilience and operating flexibility to the New York power grid. The selected developers of the projects have each received all necessary regulatory approvals from the PSC. Both the Segment A and Segment B projects commenced construction in 2021 and are planned to enter into service by December 2023.

Current Public Policy Transmission Planning Cycle

In August 2020, the NYISO invited interested parties to submit proposed transmission needs driven by Public Policy Requirements. In response, the NYISO received 15 proposals for transmission needs driven by Public Policy Requirements, including the CLCPA and the Accelerated Renewable Energy Growth and Community Benefit Act (AREA), and submitted those proposals to the PSC. Eleven of those proposals, associated with the development of transmission in support of offshore wind generation, were also submitted to the Long Island Power Authority for consideration. In its comments to the PSC, the NYISO expressed its support for declaration of Public Policy Transmission

Needs to deliver renewable energy to consumers from upstate generation pockets, offshore wind facilities connected to Long Island, and offshore wind facilities connected to New York City.

In March 2021, the PSC issued an order declaring that offshore wind goals are driving the need for additional transmission facilities to deliver that renewable power from Long Island to the rest of New York State. The PSC referred the identified need to the NYISO to solicit potential solutions. The NYISO will evaluate potential solutions to determine which represents the more cost-effective or efficient approach to addressing the PSC-identified needs. As with the projects discussed above, any project selected through this process will be subject to the PSC-administered permitting process before construction is allowed to begin.

Transmission Planning Under Accelerated Renewable Energy Growth and Community Benefit Act (AREA)

NYPA Priority Transmission Projects

The AREA authorized NYPA to undertake the development of transmission enhancements needed expeditiously to achieve CLCPA targets. On October 15, 2020, the PSC adopted criteria for designating priority transmission projects. The PSC also approved NYPA's request to proceed with development of its proposed Northern New York Transmission Projects. These transmission upgrades seek to increase the capacity of certain transmission lines in northern New York to accommodate incremental delivery of renewable energy.

AREA System Planning Directives

In addition to authorizing NYPA to develop transmission, the AREA directed the DPS, in consultation with NYSERDA, NYPA, LIPA, the investor-owned utilities, and the NYISO, to conduct a comprehensive study to identify cost-effective distribution and local and bulk electric system upgrades to support the state's climate and clean energy policies. Utilities submitted a *Local Transmission and Distribution Report* in November 2020. Following a public comment period, the PSC directed utilities to pursue certain planned local transmission and distribution upgrades primarily designed for local reliability enhancements, which will also increase capacity to carry more renewable energy.

▸ Public Service Commission (PSC):

The Department of Public Service (DPS) is the staff arm of the Public Service Commission (PSC). The PSC regulates the state's electric utilities and exercises jurisdiction over the siting of major electric generation and transmission facilities in New York State.

DPS and NYSERDA's *Initial Power Grid Study*, released in January 2021, concluded that the transmission system, with the inclusion of the Western New York and AC Transmission public policy transmission projects and the NYPA priority projects, have positioned the state to achieve the 70 by 30 renewable energy requirements of the CLCPA without the need for further additional transmission capability. The report indicated that additional transmission will be needed to achieve the CLCPA's objective of a zero-emissions electric system by 2040. The *Initial Power Grid Study* indicated that transmission upgrades would also be needed to deliver the 9,000 MW of offshore wind capacity called for in the CLCPA.

In its comments on the study, the NYISO highlighted the need for additional transmission investment to achieve the 70 by 30 goal based on the expected location of renewable resources within the state. The NYISO emphasized the need for transmission to deliver renewable energy to consumers, suggesting that the PSC declare transmission needs for delivery of land-based renewable resources in

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Episode 14: NYISO VP Zach Smith on Emission-Free Grid Planning, Climate Change & the Interconnection Queue.
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▸ Interconnection Queue:

A queue of transmission and generation projects that have submitted an Interconnection Request to the NYISO to be interconnected to the state's electric system. Depending on the level of proposed capacity, most projects must undergo three studies before interconnecting to the grid: a *Feasibility Study* (unless parties agree to forego it), a *System Reliability Impact Study* (SRIS), and a *Facilities Study*.

▸ Class Year:

A group of supply projects seeking to interconnect to the transmission system in similar timeframes, and which have reached similar milestones in their development efforts. These projects are studied to assess the cumulative impact they may have on the system and determine the costs to mitigate those impacts.

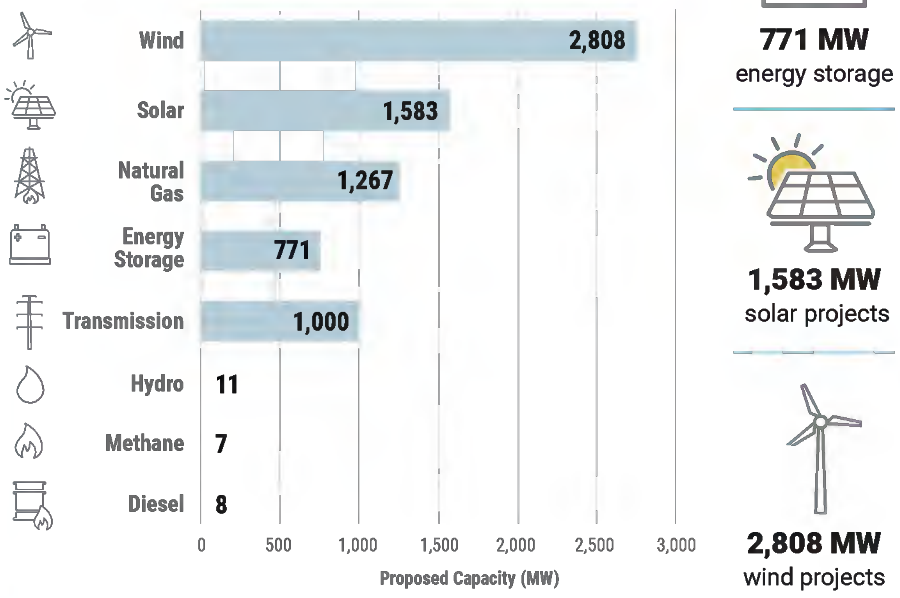
upstate New York renewable generation pockets and for offshore wind resources to connect to Long Island and New York City. The NYISO noted that its streamlined competitive public policy transmission process is well positioned to fulfill those needs for the state.

Interconnection Planning

In response to state policy and the advancement in the cost efficiency of new technologies, developers are proposing an ever-growing portfolio of new clean energy projects to interconnect to the grid. Interconnection rules that support grid reliability, along with siting and other regulatory processes that facilitate timely review and consideration of projects, are necessary in order to effectively respond to the rapid growth of projects being developed in response to the state's clean energy policies. The NYISO's interconnection study process identifies potential adverse reliability impacts associated with new resources interconnecting to the grid. The process, which requires significant coordination by the NYISO with developers and affected transmission owners, identifies necessary system upgrades and their estimated costs to allow investors to make more informed investment decisions.

The volume of resources seeking to interconnect to the grid has increased dramatically in recent years. To facilitate this growing investment, the NYISO worked with stakeholders to implement a comprehensive redesign of the interconnection study process in 2019, offering greater flexibility and expedited study options to developers seeking to obtain the necessary information to develop projects interconnecting to the grid.

Figure 18: **Class Year 2019**



The enhancements have already proven effective in accelerating the interconnection study process. The improvements were applied for the first time to the Class Year 2019, the largest in the NYISO's history, with 66 projects representing 7,254 MW of capacity, and helped the NYISO to bring the Class Year process to closure in record time. The vast majority of the Class Year 2019 projects are renewable generation and energy storage, including 32 solar projects totaling 1,583 MW in capacity, 10 wind projects with a total capacity of 2,808 MW, and 16 energy storage projects representing 771 MW.

Interregional Planning

Through their respective interregional processes, the NYISO, ISO-New England, and PJM collaborate to identify and resolve planning issues with potential interregional impacts, consistent with NERC reliability requirements and applicable state, regional, and local reliability criteria. Interconnections with neighboring systems are important tools to support grid reliability, resiliency, and market efficiency by providing opportunities for the exchange of capacity and energy. Interregional transmission facilitates access to a diversity of resources, supporting reliability and resilience while maintaining economic efficiency.

The NYISO, PJM, and ISO-New England have implemented the *Northeastern ISO/RTO Planning Coordination Protocol* and other joint agreements to increase their joint planning and coordination. The protocol supports:

Exchanging data and information between the regions;

Coordinating interconnection requests and transmission requests with cross-border impact;

Developing a *Northeastern Coordinated System Plan*;

Performing planning studies through an open stakeholder process; and

Allocating the costs associated with interregional projects having cross-border impacts consistent with each regions' tariffs and applicable federal regulatory policies.

The three regions hold regular biannual meetings to share information on their regional plans and potential cross-border projects. These meetings are open to participation by all interested parties. In 2020, the three regions published an updated *Northeastern Coordinated System Plan*, which covers the period of 2020-2028. The report did not identify any need for new interregional transmission projects.

As a member of the Eastern Interconnection Planning Collaborative (EIPC), the NYISO also conducts joint evaluations with planning authorities across the entire Eastern Interconnection, a region that includes 40 states and several Canadian provinces from the Rocky Mountains to the Atlantic Ocean, and from Canada to the Gulf of Mexico. The EIPC is made up of 19 member electric

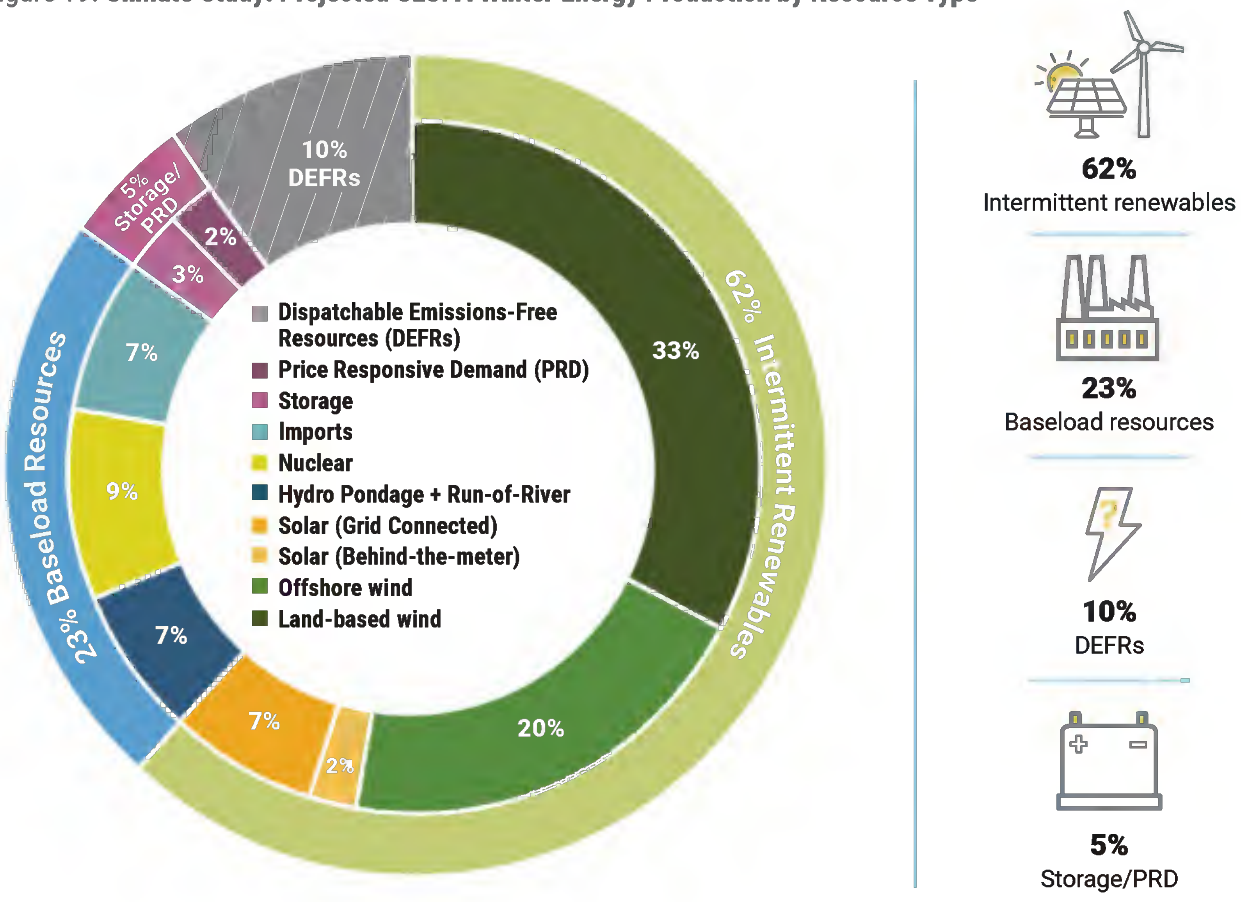
system planning authorities, and was the first organization to conduct interconnection-wide planning analysis across the eastern portion of North America. In 2020, the EIPC completed a study on changing system frequency response capabilities resulting from the shift towards electric generation from wind and solar resources. The study found that maintaining system frequency is a concern and warrants continued study.

Climate Change Impact and Resilience Study

In 2020, the NYISO completed the second phase of its *Climate Change Impact and Resilience Study* (Climate Study), which looks at the state's goal of a zero-emissions grid by 2040. The study offers information on potential impacts to system reliability and resource availability associated with climate change and extreme weather events. The study informs potential changes to planning, operational practices, and/or wholesale market design features by reviewing the potential impacts of a range of extreme conditions on power system reliability in 2040.

To reflect compliance with the CLCPA, all of the existing fossil-fueled generating resources were removed from the resource mix that was analyzed. However, to preserve reliability, the study included an undefined "backstop resource" to supply the grid whenever wind, solar, and energy storage resources were insufficient to meet demand. Since the backstop resource must be fully dispatchable to balance the system effectively, the study referred to these resources as "Dispatchable Emissions-Free Resources," or DEFRs.

Figure 19: **Climate Study: Projected CLCPA Winter Energy Production by Resource Type**



The idea behind the inclusion of DEFRs is to mimic the reliability service capabilities currently supplied by fossil fuel resources while meeting the CLCPA's requirement of zero-emissions. Resources with this combination of attributes are not commercially available at this time, but will be critical to future grid reliability. In order to phase down the fossil fuel resources currently providing these services, new technologies are needed. The Climate Study makes no assumptions about what technologies will be capable of performing these reliability services. While the study finds that the system will need as much as 30,000 MW of installed capacity of these type of resources, the actual energy production required from these resources is expected to be lower than energy production from other types of resources.

In addition to assessing the performance of the resource mix, the study modeled coastal and inland storms, extended wind lulls, heat and cold spells, and drought and icing events using historical experience with similar events to assess their effects on power system infrastructure and operations.

The Climate Study offers the following observations:

Weather scenarios involving storms and/or sustained reductions in renewable resource output (e.g., due to wind lulls) can lead to loss of load occurrences;

Electrification, particularly in the building sector, will transform New York into a winter-peaking system. As a result, climate disruptions in the winter have a greater impact on future grid operations; and

In the summer, severe weather events increase the system's reliance on DEFRs, but potential loss of load is only a risk in relation to severe coastal storms or upstate windstorm events.

Weather variability, which impacts the output from wind and solar resources, presents a fundamental challenge to relying exclusively on those resources to meet electricity demand, particularly during extended wind lull events. Even outside of multi-day wind lulls assessed in the study, the Climate Study's results suggest that reductions in wind output create significant reliance on DEFRs to avoid potential loss of load events.

Battery storage resources help to fill in voids created by reduced output from renewable resources, but sustained periods of reduced renewable generation rapidly deplete battery storage capabilities. The study modeled more than 15,600 MW of storage capacity as part of the 2040 resource mix, concluding that the contribution of storage is quickly exhausted when renewable energy output drops off for periods of days.

While increased reliance on renewables will result in greater vulnerability to severe weather, the Climate Study finds that managing the technological transition introduces more difficult reliability challenges than extreme weather does. Most importantly, this analysis suggests that establishing energy market designs and policies to encourage innovation are critical to accelerating development of new flexible and dispatchable resources. This dynamic will be key to managing the transition of New York's electricity sector reliably and economically.

Maintaining Grid Readiness

NYISO Cyber and Physical Security

The NYISO maintains a comprehensive program to address cyber and physical security risks, enabling the secure operation of New York's bulk power system and electricity markets in the face of an ever-evolving threat landscape. Energy is one of the sixteen infrastructure sectors identified by the Department of Homeland Security as critical to the nation's well-being. Accordingly, the systems and networks of electric sector organizations must remain secure, functional, and resilient at all times.

The NYISO's security program draws from mandatory NERC Critical Infrastructure Protection (CIP) standards and other cybersecurity frameworks, guidelines, and best practices. The NYISO's security posture is premised on continuous evaluation of its assets within the context of a highly dynamic range of cyber and physical security risks. The NYISO implements its compliance with mandatory cyber and physical security regulatory requirements as part of a layered, defense-in-depth strategy that relies on strong, security focused processes, state-of-the-art technology, and skilled staff to protect its critical infrastructure assets from incursion, around-the-clock.

A key element of the cybersecurity program is maintaining a high degree of situational awareness to reduce the time between the introduction of a potential threat to when that threat is identified and effectively mitigated. **The NYISO has a state-of-the-art Cybersecurity Operations Center (CSOC), operating around-the-clock to continuously evaluate and respond to rapidly evolving cyber risks.** Using advanced technologies that collect and orchestrate threat and vulnerability indicators, security events, and alerts from government and other sources, skilled analysts are able to assess and remediate cyber risks as they occur.

The NYISO's security program continuously works with government and industry partners. The NYISO collaborates on cyber and physical security activities with New York State, including the DPS, the Division of Homeland Security and Emergency Services and the New York State Police, as well as with New York electric utilities and other market participants. We lead cybersecurity training and roundtable exercises that test participants' incident response plans, identify opportunities for improvement, and enhance information sharing among state agencies and the industry.

At the national level, the NYISO engages on power grid security with FERC, NERC, the Electricity Information Sharing and Analysis Center, the Departments of Energy and Homeland Security, and the Federal Bureau of Investigation. The NYISO participates in cyber and physical security policy and standards development activities and real-time cybersecurity threat information sharing. The NYISO also works with other grid operators to enhance operational and situational awareness, and routinely participates in industrywide grid security exercises — such as NERC's GridEx — that test the electric sector's response to challenging simulated cyber and physical security threat scenarios and incidents.

The electric industry maintains stringent industry infrastructure protection standards, and is addressing the management of cyber risks as a very high priority. The NYISO, other grid operators, and industry participants have worked collaboratively with regulators to identify best practices and develop standards designed to maintain the ability to procure equipment and services in manners that mitigate supply chain risks. The NYISO has continued to increase its focus on enhancing procurement and cybersecurity practices which address cybersecurity threats.

Over the next decade as the energy industry is transformed by public policy and technological innovations, the NYISO is undertaking a multi-year strategy to utilize cloud-computing platforms to provide secure, dynamic, high-performing, and cost-optimized technology services.

NYISO Business Continuity and Pandemic Planning

Business continuity is the practice of coordinating, facilitating, and executing activities that identify and mitigate operational risks that can lead to disruptions before they occur. The NYISO is subject to NERC CIP standards requiring the development and testing of continuity plans to recover reliability functions performed by critical cyber systems. This planning maintains the continuous stability, operability, and reliability of the bulk power system.

The NYISO has long maintained a comprehensive organizational business continuity and disaster recovery program, which has included pandemic planning, safeguards for business information systems, and contingency plans in the event of a significant disruption of NYISO systems or facilities. The NYISO's pandemic plan enables it to sustain operations and carry out essential functions during a widespread infectious disease outbreak, where impacts may affect availability of labor and intellectual capital. The NYISO's pandemic plan provides escalating levels of action that are proportional to the risk to its operations resulting from an outbreak.

The COVID-19 outbreak brought that planning into action. In February 2020, the NYISO's pandemic plan was activated to maintain operations throughout the pandemic. The pandemic has levied a terrible toll on human life and health in New York, across the nation, and throughout the world. As New York continues to address this historic health and economic crisis, the NYISO and our colleagues in the electric supply, transmission, and distribution sectors have demonstrated an unwavering commitment to serving the citizens of this state. The NYISO took steps to protect grid reliability and protect the health and safety of our employees. The NYISO's proactive steps on pandemic planning poised the organization to transition to working remotely, while seamlessly continuing to fulfill our mission. This commitment was exemplified in the spring of 2020, when a 37-person team volunteered to enter a sequestration program, completely isolating themselves from their families to ensure uninterrupted grid operations. Despite the significant disruptions caused by the pandemic, the NYISO's strong commitment to business continuity planning and testing led to a high level of overall performance in project delivery, systems operations, and stakeholder engagement in 2020.

A Final Word

New York's grid is transforming in response to the clean energy future envisioned by the CLCPA. **The NYISO is committed to meeting these objectives reliably and with the same commitment to economic efficiency that has benefited consumers for over twenty years.** Through expert system operations, planning, and wholesale electricity market design, the NYISO is anticipating the reliability needs of the future grid envisioned by the CLCPA. With that knowledge, we will continue to engage stakeholders and policymakers to design and implement the operations, planning, and market enhancements necessary for the grid in transition. While much will change, the NYISO's commitment to reliability will remain, as will the belief that competitive wholesale electricity markets designed to encourage clean energy and protect consumers from investment risk are the best and most powerful means to meeting the needs of the grid of the future.

Glossary

The following glossary offers definitions and explanations of phrases used in *Power Trends 2021,* as well as terms generally used in discussions of electric power systems and energy policy.

Ancillary Services: Services that support the reliable operation of the power system, which can include voltage support, frequency regulation, operating reserves, and blackstart capabilities.

Behind-the-Meter Generation: A generation unit that supplies electric energy to an end user onsite without connecting to the bulk power system or local electric distribution facilities. An example is a rooftop solar photovoltaic system that primarily supplies electricity to the facility on which it is located.

Bulk Power System: The transmission network over which electricity flows from suppliers to local distribution systems that serve end-users. New York's bulk power system includes electricity-generating plants, high-voltage transmission lines, and interconnections with neighboring electric systems located in the New York Control Area (NYCA).

Climate Action Council (CAC): A 22-member committee tasked with preparing a scoping plan to achieve the state's clean energy and climate agenda.

Capability Period: Lasting six months, the Summer Capability Period runs from May 1 through October 31. The Winter Capability Period runs November 1 through April 30 of the following year. A Capability Year begins May 1 and runs through April 30 of the following year.

Capacity: Capacity is the maximum electric output that a generator can produce. It is measured in megawatts (MW).

Capacity Factor: Capacity factor measures actual generation as a percentage of potential maximum generation. For example, a generator with a 1 megawatt capacity operating at full capacity for a year (8,760 hours) would produce 8,760 megawatt-hours (MWh) of electricity. The generator's annual capacity factor would be 100%.

Carbon Pricing: A market-based approach to create incentives for reduced carbon dioxide emissions by incorporating costs associated with carbon dioxide emissions, such as damage to crops or health care costs, into energy markets.

Class Year: A group of supply projects seeking to interconnect to the transmission system in similar timeframes, and which have reached similar milestones in their development efforts. These projects are studied to assess the cumulative impact they may have on the system and determine the costs to mitigate those impacts.

Climate Leadership & Community Protection Act (CLCPA): A law that requires New York to reduce economy-wide greenhouse gas emissions 40 percent by 2030 and no less than 85 percent by 2050 from 1990 levels. The law establishes technology-specific mandates for deploying clean energy technologies as well as a Climate Action Council charged with developing a scoping plan of recommendations to meet these targets.

Co-located (Hybrid) Resources: Generation co-located with energy storage resources behind a single Point of Interconnect.

Comprehensive Reliability Plan (CRP): A study undertaken by the NYISO that evaluates projects offered to meet New York's future electric power needs, as identified in the Reliability Needs Assessment (RNA). The CRP may trigger electric utilities to pursue regulated solutions to meet reliability needs if market-based solutions will not be available to supply needed resources. It is the second step in NYISO's Reliability Planning Process.

Critical Infrastructure Protection (CIP) Standards: A set of requirements designed to secure the assets required for operating the bulk power system. CIP requirements include the security of electronic perimeters, protection of critical cyber assets, personnel training, security management, and disaster recovery planning. CIP standards are developed by NERC, and approved by FERC.

Curtailment: In the context of intermittent sources of generation, refers to signals from the NYISO directing an intermittent resource to reduce its output. Sometimes referred to as economic curtailment, the NYISO's signal is based on the intermittent resources' price offers in the energy market, whereby transmission constraints induce prices that make the continued operation of certain intermittent resources uneconomic, prompting a reduction in output to alleviate the transmission constraint.

Day-Ahead Market (DAM): A NYISO-administered wholesale electricity market in which electricity and ancillary services are auctioned and scheduled one day prior to use.

Demand Response (DR) Programs: A series of programs designed to facilitate economic- and reliability-based load reduction measures by compensating electricity users that reduce consumption at the direction of the NYISO, either by economic dispatch or in response to a reliability condition. The NYISO demand response programs include Day-Ahead Demand Response Program (DADRP), Demand Side Ancillary Services Program (DSASP), Emergency Demand Response Program (EDRP), and Special Case Resources (SCR) program.

Dispatchable Emissions-Free Resources (DFERs): Intermittency from increased renewables creates the need for energy that can, like fossil fuels, be dispatched immediately, but which is emissions-free. Technologies being developed in this category now include green hydrogen and renewable natural gas.

Distributed Energy Resource (DER): A broad category of resources that includes distributed generation, energy storage technologies, combined heat and power systems, and microgrids. A DER is generally customer-sited to serve the customer's power needs, but may, in some instances, sell excess energy production or ancillary services to the power system.

Eastern Interconnection: The Eastern Interconnection is one of the three electric grid networks in North America. It includes electric systems serving most of the United States and Canada, from the Rocky Mountains to the Atlantic coast. The other major interconnections are the Western Interconnection and the Texas Interconnection.

Electricity Market: In economic terms, electricity is a commodity capable of being bought, sold, and traded. An electricity market is a system enabling purchases. The NYISO administers the wholesale electricity markets in New York, enabling competing generators to offer their output to retailers.

Electrification: Adopting technologies that support the transition of fossil-fuel-intensive sectors of the economy to electricity. Sometimes referred to as "beneficial electrification" due to its underlying goals of promoting societal benefits through emissions reductions.

Energy: Energy is the amount of electricity a generator produces over a specific period of time. It is measured in megawatt-hours (MWh). For example, a generating unit with a 1 megawatt capacity operating at full capacity for one hour will produce 1 megawatt-hour of electricity.

Energy Storage Resources (ESRs): Energy storage resources are devices used to capture energy produced at one time for use at a

later time. ESRs include technologies like batteries and pumped hydro storage.

Federal Energy Regulatory Commission (FERC): The federal agency responsible for regulatory oversight of the NYISO's operation of the bulk power system, wholesale power markets, and planning and interconnection processes. The NYISO's tariffs and foundational agreements are overseen and approved by FERC.

Gigawatt (GW): A unit of power or capacity equal to one billion watts.

Gigawatt-Hour (GWh): A gigawatt-hour is equal to one gigawatt of energy produced or consumed continuously for one hour.

Installed Capacity (ICAP): A qualifying generator or load facility that can supply and/or reduce demand as directed by the NYISO.

Installed Reserve Margin (IRM): The level of capacity that must be secured, above projected system peak demand, to maintain reliability after accounting for unplanned and scheduled outages as well as transmission capability limitations. The IRM requirement can be met through a combination of installed generation, import capabilities, and demand response. The IRM is established by the New York State Reliability Council (NYSRC) and designed to maintain specific resource adequacy criteria.

Interconnection Queue: A queue of transmission and generation projects that have submitted an Interconnection Request to the NYISO to be interconnected to the state's electric system. Depending on the level of proposed capacity, most projects must undergo three studies before interconnecting to the grid: a Feasibility Study (unless parties agree to forego it), a System Reliability Impact Study (SRIS), and a Facilities Study.

Intermittent Resource: An electric energy source whose output varies due to the fluctuating nature of its fuel source. Examples include solar energy which is dependent upon sunlight intensity, or wind turbines where output is dependent on wind speeds.

Load: A consumer of energy, or the amount of energy consumed. Load can also be referred to as demand.

Load Serving Entity (LSE): An entity, such as an investor-owned utility, public power authority, municipal electric system, or electric cooperative that procures energy, capacity, and/or ancillary services from the NYISO's wholesale markets on behalf of retail electricity customers.

Locational Capacity Requirement (LCR): A portion of the statewide installed capacity that must be physically located within a locality to meet reliability standards. Locational Installed Capacity Requirements have been established for the New York City (Zone J), Long Island (Zone K), and lower Hudson Valley (Zones G-J) capacity zones.

Megawatt (MW): A measure of electricity that is the equivalent of 1 million watts. It is generally estimated that a megawatt provides enough electricity to supply the power needs of 800 to 1,000 homes.

Megawatt-Hour (MWh): A megawatt-hour is equal to one megawatt of energy produced or consumed continuously for one hour.

New York Control Area (NYCA): The area under the electrical control of the NYISO. It includes the entire state of New York, divided into 11 load zones.

North American Electric Reliability Corporation (NERC): The not-for-profit international regulatory authority whose mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid. NERC's jurisdiction includes users, owners, and operators of the bulk power system.

Peak Load: The maximum power demand on the electric grid measured in megawatts (MW). Peak load, also known as peak demand, reflects the highest average hourly demand experienced on the system.

Peakers: Peaking power plants, also known as peaker plants or just "peakers", are power plants that generally run when there is a high demand — known as peak demand — for electricity.

Public Policy Transmission Planning: Part of the NYISO's Comprehensive System Planning Process. Public Policy Transmission Planning consists of two steps: (1) identification of transmission needs driven by Public Policy Requirements that should be evaluated by the NYISO; and (2) requests for specific proposed transmission solutions to address those needs, and the evaluation of those specific solutions. The New York State Public Service Commission identifies transmission needs driven by Public Policy Requirements and warranting evaluation, and the NYISO requests and evaluates specific proposed transmission solutions to address such needs.

Real-Time Markets: A NYISO-administered wholesale electricity market in which electricity and ancillary services are settled every five minutes. The Real-Time Market addresses changes in operating conditions relative to what was anticipated in the Day-Ahead Market. For instance, changes to load or anticipated generator output are accounted for in the Real-Time Market through a competitive auction process.

Regional Greenhouse Gas Initiative (RGGI): A market-based regulatory program in the United States to reduce greenhouse gas emissions. RGGI is a cooperative effort among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginia.

Reliability Needs Assessment (RNA): A report that evaluates resource adequacy and transmission system security over years four through 10 of a 10-year planning horizon, and identifies future needs of the New York electricity grid. It is the first step in the NYISO's reliability planning process.

Renewable Energy Credit (REC): A mechanism to link the environmental attributes associated with certain forms of renewable energy generators with the energy produced by those generators. One REC equates to one MWh of energy generated from eligible renewable energy resources. In New York State, NYSERDA procures RECs from eligible resources to incentivize development of renewable resources and measure compliance with the renewable energy goals of the state's Clean Energy Standard (CES).

Resource Adequacy: The ability of the electric system to supply electrical demand and energy requirements at all times, taking into account scheduled and unscheduled outages of system elements. A system is considered adequate if the probability of having sufficient resources to meet expected demand is greater than the minimum standards to avoid a blackout.

Short-Term Reliability Planning Process: NYISO process to examine reliability needs over a 5-year period, with a focus on the first three years, including the impact of generator deactivations.

Transfer Capability: The amount of electricity that can flow on a transmission line at any given instant, respecting facility rating and reliability rules.

Transmission Constraints: Limitations on the ability of a transmission facility to transfer electricity.

Transmission Security: The ability of the electric system to withstand disturbances, such as electric short-circuits or unanticipated loss of system elements.

Zero-Emissions Credit (ZEC): A mechanism to link the environmental attributes associated with the energy produced by certain eligible zero-emissions generators. In New York, one ZEC equates to one MWh of energy generated by eligible nuclear generators.

Endnotes

[1]https://www.governor.ny.gov/news/governor-cuomo-outlines-2021-agenda-reimagine-rebuild-renew-1

[2]Installed Capacity - View ICAP and UCAP Calculations (nyiso.com)

[3]https://www.nysrc.org/PDF/MeetingMaterial/ECMeetingMaterial/EC%20Agenda%20252/4.2a%20HR%20White%20Paper%20-%20Clean%20Final%20Draft-Attachment%204.2a.pdf

[4]ibid

[5]ibid

[6]https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan/

[7]https://cms.ferc.gov/media/transcript0218201

[8]https://codegreensolutions.com/nyc-carbon-emissions-bill-passed-into-law-local-law-97-what-it-means-for-commercial-building-owners/?gclid=CjwKCAjw9r-DBhBxEiwA9qYUpdzT2P6Za9ALSSCQw_WQ8dIblUP7Zv_6P8mvMZ0nZTKdQgmQI8wTnRoC164QAvD_BwE

[9]https://www.nyiso.com/documents/20142/8372822/Analysis%20Group%20Fuel%20Security%20DRAFT%20Report%202019.10.21%20Text.pdf/89da1ad5-4cd3-6f28-649d-96d1f5b9d823

[10]https://cms.ferc.gov/media/panel-1-richard-j-dewey-president-and-ceo-new-york-independent-system-operator-inc

[11]https://cms.ferc.gov/media/ad21-10-000-tc-transcript

NYISO In Brief

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for maintaining the safe, reliable flow of power throughout the Empire State.

The mission of the NYISO, in collaboration with its stakeholders, is to serve the public interest and provide benefit to consumers by:

- Maintaining and enhancing regional reliability;
- Operating open, fair, and competitive wholesale electricity markets;
- Planning the power system for the future; and
- Providing factual information to policymakers, stakeholders and investors in the power system.

The NYISO manages the efficient flow of power on more than 11,000 circuit-miles of electric transmission lines on a continuous basis, 24 hours-a-day, 365 days-a-year — in compliance with the most rigorous reliability requirements in the nation.

As the administrator of the wholesale electricity markets, the NYISO conducts auctions that match the power demands of electric utilities and energy service companies with suppliers offering to sell power resources.

The NYISO's Comprehensive System Planning Process assesses New York's electricity needs and evaluates the ability of proposed power options to meet those needs. This planning process involves stakeholders, regulators, public officials, consumer representatives, and energy experts who provide vital information and input from a variety of viewpoints.

The NYISO is subject to the oversight of the Federal Energy Regulatory Commission and regulated in certain aspects by the New York State Public Service Commission. NYISO operations are also overseen by electric system reliability regulators, including the North American Electric Reliability Corporation, Northeast Power Coordinating Council, and the New York State Reliability Council.

The NYISO is governed by a 10-member, independent Board of Directors. The members of the NYISO's Board of Directors have backgrounds in electricity systems, finance, information technology, communications, and public service. The NYISO is unaffiliated with any market participant or government entity. The members of the Board, as well as all employees, have no business, financial, operating, or other direct relationship to any market participant. The NYISO does not own power plants or transmission lines.

The NYISO engages stakeholders in a robust and transparent shared governance process that involves representation from a variety of interests, including transmission owners, generator owners, public authorities and municipal utilities, large and small consumers, and environmental advocates. Through open engagement and consensus building with stakeholders, rules and procedures address our wholesale electricity markets, system planning, and grid operations are developed.

New York ISO
Independent System Operator

For more visit: www.nyiso.com/power-trends

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EXHIBIT B

Date of Request: November 4, 2019

Case 17-F-0282

Application of Alle-Catt Wind Energy LLC for a Certificate of Environmental Compatibility and Public Need Pursuant to Article 10 to Construct a 340 MW Wind Energy Project

INTERROGATORY/DOCUMENT REQUEST

Request No.:	Coalition-17
Directed To:	DPS Staff
From:	Coalition of Concerned Citizens – Gary Abraham

Information Name of Person(s)

Preparing Response: John Cary, Joel Andruski Date: 11/14/19

1. In response to IR CCC-15, Q2, DPS Staff states that the NYISO approved System Reliability Impact Study (SRIS) for the Alle-Catt project together with a production cost modeling analysis provided with Exhibit 8 of the project application "report on the Project's ability to reliably interconnect to the State's bulk electric system and the deliverability of the Project's energy." We have been unable to find a quantitative assessment the deliverability of this Project's generation of electricity. What is the basis for Staff's conclusion that the two referenced documents evaluate the deliverability of the Project's energy?

   Response:

   If this question refers to the "deliverability of the Project's energy" in terms of a deliverability analysis required by the NYISO as part of their Class Year facilities studies, this was not the intended use of the term "deliverability" by DPS Staff. The SRIS only assesses the projects ability to reliably interconnect to the bulk electric system. The production cost modeling analysis that was performed by the Applicant and DPS Staff estimates how much energy will be delivered to the system or produced annually and this is the context in which Staff used the word "deliverability".

2. Article 10 requires the Siting Board to determine whether this project beneficially adds to or substitutes for "the electric generation *capacity* of the state." PSL § 168(3)(a) (emphasis added). Why would a *deliverability* analysis be required in this case?

   Response:

   The NYISO deliverability analysis referred to in the response to Question 1 above is not

required under PSL 168(3)(a).

3. In response to IR CCC-15, Q2, DPS Staff states: "Modeling the system beyond 2023 would only serve to capture the effects of load changes and inflation, but would not capture the evolution of the generation and transmission system." In response to Q1, Staff states: "It is unreasonable to assume that all projects currently in the NYISO queue will continue to be developed or will be in service at the time the Alle-Catt wind project enters commercial operation." We agree. However, in response to IR CCC-2, ACWE has stated that its system impacts model assumes that in 2023, Eight Point Wind, Galloo Island, Number Three Wind, Bull Run Wind, Ball Hill Wind, and Baron Wind are not in service. What justifies excluding these facilities from the analysis?

   Response:

   During the time of the production modeling consultation for Alle-Catt Wind, Galloo Island Wind, Eight Point Wind, Number Three Wind, Bull Run Wind, Ball Hill Wind and Baron Wind did not have an approved Certificate. As mentioned in DPS Staff's response to CCC-15 Question 1, For Exhibit 8 purposes, DPS Staff has used the criteria that generation projects should only be modeled in the base case if they have an approved Certificate of Environmental Compatibility and Public Need (CECPN), as a project cannot be constructed until a certificate is granted. The granting of a certificate also indicates the high probability that a project will be constructed.

4. Were the system impacts of Alle-Catt modeled for the year 2033, what generating facilities and transmission projects would Staff reasonably assume will be operational by that date?

   Response:

   Staff cannot reasonably predict what generating facilities and transmission projects will be operational in 2033. Please see DPS Staff's response to Question 3.

5. Summing all large-scale wind and solar projects found on the most recent NYISO Interconnection Queue with proposed in-service dates in 2023 or earlier, and excluding the facilities Leidos included in its system model for Alle-Catt, results in 5,263 MW additional renewable capacity on the grid in 2023 not accounted for in Leidos' analysis. If this result is correct, has Leidos provided a fair and accurate prediction of the project's impacts on the grid in 2023?

   Response:

   In DPS Staff's opinion, Leidos provided a fair and accurate prediction of the project's impacts on the grid in 2023. Please refer to DPS Staff's response to CCC-15 question 1

and 4 for the basis of our answer.

6. Considering that Alle-Catt would operate for at least 20 years following the year it enters commercial operation (2023), and considering that the NYISO Interconnection Queue provides proposed in-service dates for each facility currently on the queue, why would it be unreasonable to estimate a numerical capacity for low-carbon generators expected to be in service for selected years beyond the Project's first year of operations, 2023?

   Response:

   The purpose of Exhibit 8 production modeling is mainly to capture forecasted energy, emission and wholesale price impacts for a facility during its estimated first full year of operation. A one-year study is sufficient to assess the magnitude and direction of these impacts, and DPS Staff runs its in-house modeling simulations to assesses the reasonableness of the Applicants model. The input assumptions agreed upon between ACWE and DPS Staff, were based on the last year (2023) of the NYISO's 2018 CARIS II dataset, which most accurately represents expected system conditions at the time the project is expected to be in service.

7. In the Article 10 Case 16-F-0328, Number Three Wind LLC, application Appendix 8 (Electric System Production Modelling Report), Leidos reports that on the basis of its modeling, NTW will reduce New York carbon dioxide emissions by approximately 15,800 tons per year. NTW would have a maximum generating capability of 126 megawatts (MW). By contrast, Alle- Catt would have a capacity of 380 MW but in Alle-Catt's Appendix 8, Leidos reports the facility will reduce New York CO^2 emissions by approximately 417,141 tons per year. What explains why NTW would displace only 3.8% of Alle-Catt's modeled CO^2 emissions, when NTW would have about one-third (37%) of Alle-Catt's capacity? Stated differently, why is it not reasonable to believe Alle-Catt's displacement of CO^2 will be closer to 5,239 tons per year, *i.e.*, the result for NTW scaled up to Alle-Catt's capacity?

   Response:

   Production simulation models can only estimate the magnitude of emission impacts for a given project. As mentioned in Leidos' response to IR CCC-2.3 Question 2, emissions displaced by the project can depend on numerous variables such as the projects location on the grid, types and locations of other generation on the grid and the various transmission constraints on the system.

8. All other things being equal, is it true that by siting Alle-Catt in close geographical proximity to several other large-scale wind energy projects, the energy output of all the projects will frequently be highly correlated in time?

Response:

DPS Staff objects to the vague nature of this question. The Coalition needs to specify which large-scale wind energy projects in close geographical proximity to Alle-Catt that it is referring to.

9. At those times when Alle-Catt's generation pattern is highly correlated in time with other wind energy projects in the region, will the project's volatility be synchronized or correlated and thereby amplified rather than being dampened and averaged out across all regional facilities?

Response:

DPS Staff objects to this question as it is outside the scope of the Article 10 review process.

10. According to NYISO, *Power Trends 2019*, New York's electric grid must have between 15% and 18% more capacity than is needed on average, in order to ensure against blackouts. As more and more intermittent renewable power penetrates the grid, due to the unreliability of such generators, NYISO says that excess capacity will need to grow to between 40% and 45%. NYISO has said most of that increase will be provided by large-scale renewable projects. Does Staff agree with NYISO's broad conclusion, that that due to its unreliability, renewable power can displace other power sources less and less, forcing the system to over-build intermittent resources to effectively (albeit inefficiently) utilize them?

Response:

The Coalition needs to provide citations for the statements, "According to NYISO, Power Trends 2019, New York's electric grid must have between 15% and 18% more capacity than is needed on average, in order to ensure against blackouts" and "As more and more intermittent renewable power penetrates the grid, due to the unreliability of such generators, NYISO says that excess capacity will need to grow to between 40% and 45%," in order for Staff to be able to accurately respond to this question.

11. In New York, since wind farms are must run generators, the balancing generators they require are equally must run. That is, but for the wind farm, balancing generators would not run. Gas- powered plants are generally the only balancing sources available to be called by NYISO to manage intermittent generation. How precisely do GE-MAPS or PROMOD models include emissions from such balancing plants necessary to operate the Alle-Catt project? Do either of these models include explicit ramping or cycling impacts?

Response:

Staff is uncertain what the Coalition means by "balancing generators." Please rephrase. In regard to whether either model includes explicit ramping or cycling impacts, ramping is not included. Cycling impacts, however, are captured as fuel consumption and energy output from each resource is counted in every hour during the year.

12. A related question that may be contained in your answer to Q8 is related to the manner in which the methods being considered in this matter to determine energy system impacts account for emissions impacts: do either Staff's or the Applicant's methods incorporate an avoided emissions approach (relying on assumed emission factors, for example), or do they utilize a dispatch model (relying on information about the generating units within the region of interest, as well as the regional transmission system and regional electricity loads, including information on transmission constraints within control areas and transmission limits between control areas)?

Response:

The production modeling software DPS Staff uses in its Exhibit 8 analysis utilizes a least cost dispatch algorithm which relies on generator specific data, a full security constrained transmission system model, and hourly load forecasts by zone.

13. NYISO has stated that "renewable resources may submit large negative offers [into the wholesale market] to ensure their dispatch regardless of market prices, system conditions, or their actual marginal cost of generation. This behavior exacerbates the potential for very low and even negative energy prices, which in the long run increases the cost to consumers." Case 15-E-0302, Comments of the New York Independent System Operator, Inc. (April 22, 2016), 9 Specifically, such negative offers put "additional financial strain on other existing conventional, clean and renewable resources". Id. To avoid this outcome, NYISO recommends alternative incentives for intermittent renewables, compared to "bundled PPAs [power purchase agreements], as well as contracts for differences ('CFDs') and utility-owned generation ('UOG'), . . . [since] each of these three mechanisms—PPAs, CFDs, and UOG—would insulate renewable resources from competitive price signals, cause inefficient market outcomes, and raise reliability concerns." Id., 12. Does Alle-Catt's reliance on a contract for Renewable Energy Certificates (RECs) with NYSERDA raise similar concerns about increasing costs to consumers?

Response:

No. Alle-Catt's reliance on a contract for Renewable Energy Certificates (RECs) with NYSERDA does not raise similar concerns about increasing costs to consumers.