



Achieving a Reliable Zero-Emissions Grid by 2040

**A Guide for the
Climate Action Council**

November 2020

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An Open Letter to the Climate Action Council

As we review the events of 2020 and look to our future goals and challenges, it is clear that a reliable electric system has become more important than ever before. 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 wellbeing of all New Yorkers. Through this period of great uncertainty and across a 20-year history, we at the New York Independent System Operator (New York ISO for short) have fulfilled our mission of maintaining grid reliability, overseeing efficient wholesale markets, and conducting expert grid system planning for New Yorkers.

Looking forward, all of us at the New York ISO are committed to a strong partnership with the Climate Action Council (CAC), state and federal policymakers, market participants, and industry stakeholders to address the priorities and measures set forth under the state's Climate Leadership and Community Protection Act. We continue to collaborate with the state to evaluate the impacts of climate change and the steps necessary to maintain reliability as we transition to the future grid as envisioned in the CLCPA.

In pursuit of the important mandates set forth in the CLCPA, we must remember the degree to which system reliability, economic efficiency, and environmental efficiency are interlinked. These attributes can and must coexist in support of our power system, our economy, and consumer interests. We're proud that these benefits have been delivered to New York's electricity consumers since our inception. Our markets have worked in step with the nation-leading environmental policies of New York State to reduce carbon dioxide emissions rates by 55%, sulfur dioxide by 99%, and nitrogen oxide by 92%. Markets have consistently driven down the cost of wholesale power to the benefit of consumers. While we witnessed system reliability issues in other parts of the country this past summer, New York maintained the strictest reliability standards in the nation. We continue to expand our rigorous planning studies to incorporate changes in both public policy and climate and identify emerging system needs and necessary market enhancements.

The CLCPA calls on the Climate Action Council to consult the New York ISO in its role as the "federally-designated bulk electric system operator". We are also honored to be serving on the CAC's Power Generation Advisory Panel. We are confident that the information and expertise



Richard Dewey
CEO, New York ISO



Emilie Nelson
EVP, New York ISO



we provide regarding operations, planning and competitive electric markets will play an essential role in supporting the CAC's objectives, and in achieving the mandates of the CLCPA. This guide provides a fact-based summary of the challenges before us as well as opportunities for solutions. We are committed to offering the tools, skills, independent perspective, and experience necessary to transition to a power system that serves the economic, environmental, and reliability needs of all New Yorkers. The members of the CAC, panels and working groups provide a powerful force for change. Through such collaboration, New York once again leads the way.

We look forward to working with you.

Sincerely,

Richard Dewey,

President & CEO, New York ISO

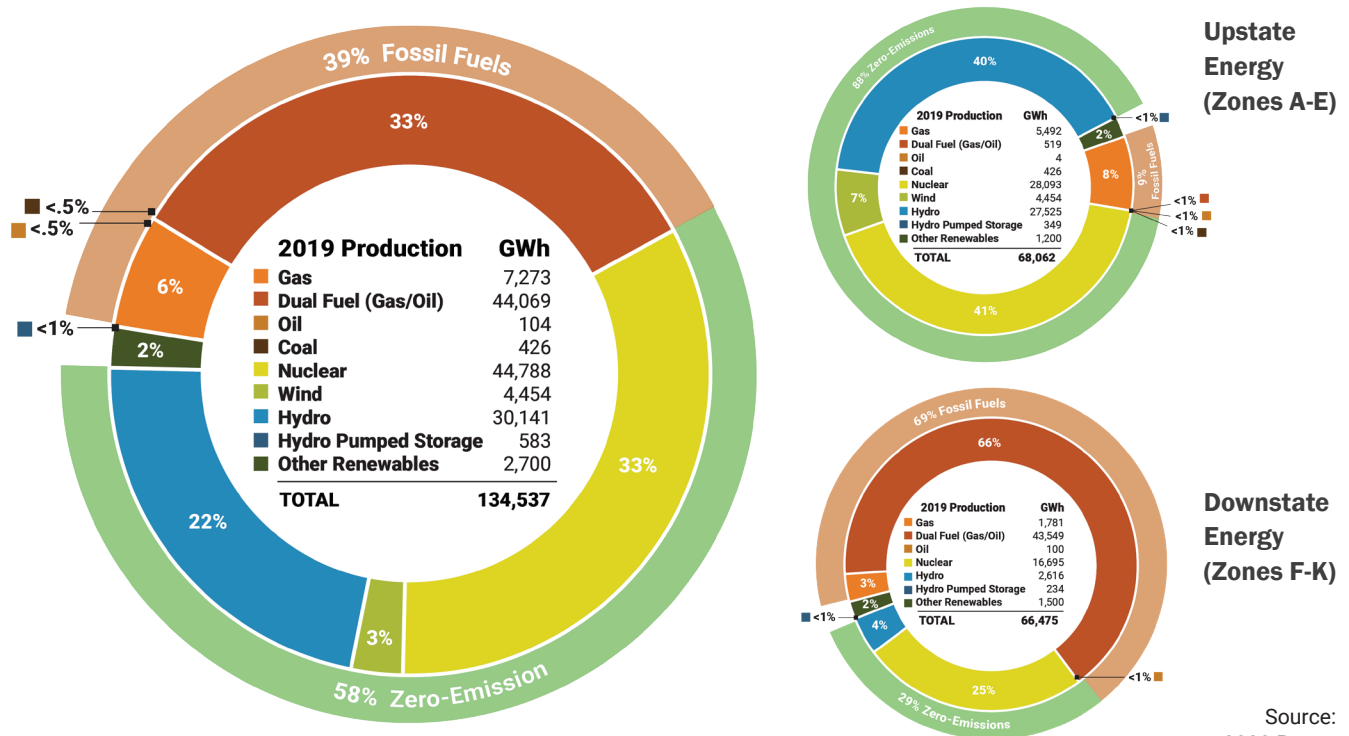
Emilie Nelson,

Executive Vice President, New York ISO and Power Generation Advisory Panel
member to the Climate Action Council

100% Carbon-Free Electricity by 2040

Wholesale electricity markets have resulted in a cleaner grid. We continue to enhance the market rules and planning tools necessary to realize the grid envisioned by the CLCPA. The vast majority of carbon dioxide emissions in New York State come from transportation and heating buildings. The scope of changes needed to address these sectors is unprecedented.

Figure 1: Energy Production by Fuel Source — Statewide, Upstate & Downstate New York: 2019



Source:
2020 Power Trends

To reduce these emissions, “electrification” of these sectors will be needed, requiring a power grid that is clean, efficient, and flexible. Achieving the CLCPA requires a rapid advancement of existing technologies, as well as those we have yet to imagine. Therefore, an approach that encourages innovation and flexibility will be the most likely to succeed.

We have been working with stakeholders and policymakers to understand the reliability needs of the grid in transition and to develop new market rules designed to support reliability, minimize costs to consumers, and support the state’s ambitious environmental objectives.

Planning for a Grid in Transition

A reliable grid of the future begins with comprehensive, robust planning to understand and ascertain how the system is likely to change. In 2019 and 2020, we performed a series of



planning studies to assess the likely challenges to state public policy objectives, such as the replacement of peaker units beginning in 2023; the shift towards 70% renewable energy by 2030; and ultimately the shift towards a zero-emissions grid by 2040. What is clear from the NYISO's analyses is that additional transmission capability is necessary to alleviate constraints on the system and maximize the potential contribution of the renewable resources that will be necessary to achieve the objectives of the CLCPA.

California's experience during the summer of 2020 offers insight into what can happen when the lack of a centralized capacity market is combined with a lack of adequate dispatchable generation to account for weather dependent, renewable resources. To address the future needs of the grid and avoid similar concerns in New York, we initiated a new Climate Impact Study that modeled NY's grid based on projected 2040 load and the requirement that electricity supplied to the grid must be zero-emitting. The study was a new endeavor for us, and identified numerous instances when supply would be insufficient to meet reliability requirements and load. Based on the study results, the system will require flexible and controllable zero-emitting resources that grid operators can call on to supply the grid at times when renewable resources are not available and the capabilities of storage are insufficient to meet the total need. These needs can range from momentary to multi-day events. The resources that will meet these needs must effectively mirror fossil fuel generators' capabilities without producing emissions. Using the study results, we are identifying market enhancements that will attract investment in the technologies and capabilities needed to support reliability. These include fast ramping products and increased reserve requirements, as well as structural market design changes like carbon pricing.

Our reliability planning processes enable New York to nimbly address reliability needs that are arising due to a shifting resource mix as older higher-emitting fossil fuel units deactivate and new renewable 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. **To maximize the benefits from renewable energy resources, we are revamping our economic planning process to enhance the information we provide to investors and policymakers regarding transmission opportunities.**

Our Public Policy Transmission Planning Process has already produced new transmission projects. The first project selected will maximize renewable energy output from Western New York. The second project selected, which is the largest transmission addition in New York State in more than 30 years, will transmit clean and renewable energy resources from upstate New York to downstate, where consumer demand is greatest and most dependent on fossil-fuel generation. We commenced our most recent Public Policy Transmission Planning Process in August 2020, and a vast majority of commenters proposed major transmission upgrades to

address electricity needs associated with the CLCPA, including planned offshore wind. Findings of these processes are detailed below.

70% Renewable Energy by 2030

Our long-term planning studies projected 2030 load levels, modeled the New York grid's ability to deliver 70% renewable energy, and identified multiple areas throughout the state with transmission constraints. These transmission limitations could lead to significant curtailment of renewable resources if not addressed. **Absent transmission upgrades in these areas, the state will not be able to take full advantage of the renewable energy buildout.**

9,000 MW of Offshore Wind by 2035

Our transmission expansion process provides avenues for the study and interconnection of new transmission projects proposed to meet offshore wind targets. The same 70x30 scenario also identified pockets of transmission constraints in the areas where offshore wind would interconnect with the grid. Our interconnection queue already has at least 30 proposed offshore wind generation projects. Our interconnection and comprehensive system planning processes position us well to address the need for new transmission system infrastructure that will enable achievement of New York's clean energy goals.

Our planning processes continue to influence market design changes and increase the focus on attracting investment in much needed flexible resources.

Competitive Markets Drive the Innovation Required to Achieve CLCPA Goals

Wholesale electricity markets harness competition to improve efficiency and encourage innovation. Competitive wholesale electricity markets provide a powerful platform to attract the new technologies that will be essential to achieving the transformation envisioned by the CLCPA. Effective and efficient wholesale markets attract investment while minimizing financial risk to consumers. Our mission is grounded in reliability, planning for the future, providing open access to transparent, competitive markets, and the sharing of data and expertise. In pursuit of our mission, we continue to actively work with stakeholders and policymakers to facilitate change on the grid. Energy, ancillary service, and capacity market design changes intended



to advance the growth of Distributed Energy Resources (DERs) and expand energy storage resources are bringing the grid in transition to reality. As technologies change and the resource mix supplying the grid evolves, ongoing market improvements will continue to occur.

Our *Carbon Pricing Proposal*, which seeks to reflect a “social cost” of carbon dioxide emissions in our wholesale energy market, is at the forefront of this effort. We continue to see the implementation of carbon pricing as a “ready-now” means to support the public policy goals of the state through the competitive energy market. Multiple studies find that instituting carbon pricing would help New York meet its clean energy goals faster and more cost effectively, while reducing emissions more quickly and maintaining grid reliability. A broad set of stakeholders, ranging from industry to environmental advocates, agree and have thrown support behind the proposal. As will be further discussed, our *Carbon Pricing Proposal* offers an innovative pathway to addressing the CLCPA’s aggressive mandates that promotes reliability, economic and environmental efficiency through an innovative pathway to address the CLCPA’s aggressive mandates.

3,000 MW of Energy Storage by 2030

Storage technologies will be critical to help grid operators balance the intermittency of renewables with the need to provide reliable power to residents. Storage possesses a unique ability to quickly withdraw and inject energy on the system, which can enhance flexibility and grid resilience. Storage can also improve the economic and environmental performance of the grid. **By charging during periods of low demand and high renewable output, and then providing that energy to the system during periods of higher demand and reduced renewable output, storage resources can provide consumer benefits while reducing overall emissions.** We have implemented industry-leading market rules that will ease entry for storage assets, and we are working with stakeholders to develop additional enhancements, such as hybrid resources that combine storage with renewables behind a common interconnection point, and incentivize the innovation necessary to meet the needs of the future grid.

6,000 MW of Solar by 2025

Recognizing the challenges and opportunities that come with integrating grid-scale solar, we have worked with stakeholders to develop market rules that support both large-scale solar integration and aggregations of smaller, behind-the-meter solar resources. Our innovative partnership with the New York State Mesonet operated by the University at Albany provides real-time weather data from across the state that is integrated with a cutting-edge weather forecasting system to predict solar output. This partnership sharpens and enhances our operators’ ability to manage the flow of intermittent solar resources while maximizing their value.

Resource Adequacy and Sustained Resiliency in New York

For more than a century, “dispatchable” generation primarily supplied the grid, meaning grid operators could direct the output from resources in real time to match changing load conditions. The CLCPA requires that 70% of energy consumed in the state be supplied by renewable energy sources by 2030. Many renewable resources are considered “intermittent” or “variable” meaning output is dependent on weather conditions as opposed to being readily available over long, mostly predictable periods of time. An increased reliance on intermittent resources will fundamentally change the manner in which the critical balance between supply and demand is maintained. The objective before all of us is to solve this new reliability paradigm through proper investments that balance CLCPA mandates with the regulatory requirement to provide power that supports the health, safety and welfare of all New Yorkers.

To support reaching the CLCPA mandates, **we have worked with stakeholders and policymakers to create new, innovative rules for integrating energy storage technology and DERs onto the grid.** Through collaboration, the New York ISO’s market rules were enhanced to expand capacity market eligibility to storage resources. We continue to work on additional market enhancements to support the ongoing evolution of the grid. Our *The Grid in Transition* report features additional opportunities for future market initiatives.

New York ISO’s Shared Governance Delivers Value for the CAC

Open and transparent, our shared governance process brings together utilities, suppliers, environmental interests, consumer interests, as well as state and municipal interests together to address the challenges of our grid in transition. Collaboration among electric industry participants is essential to the development of solutions to meet the needs of the evolving grid in an effective and equitable manner.

Our shared governance process has a proven record of success in addressing the challenges and opportunities facing the bulk power system and wholesale electricity markets in New York. In fact, 8 of the 20 members of the CAC represent firms that are actively engaged in our shared governance process.

Buyer-Side Mitigation

Open and transparent market competition is a pillar of our mission. Much focus and discussion has been paid recently to the New York ISO’s capacity markets and the element of what is known as Buyer-Side Mitigation (BSM). Mitigation rules prevent buyers and sellers from taking actions that harm competition. Buyer-side mitigation rules were initially put in place to prevent buyers from artificially suppressing capacity prices and to maintain an appropriate price signal for investments needed to maintain reliability. The New York ISO has recently implemented a renewable exemption for eligible intermittent renewable technologies tailored to the competitive market conditions in the applicable location. We are continuing to examine these rules with our stakeholders in light of the changes in technology that are the



aims of New York State’s public policy. **Continuing to evaluate the mitigation framework is essential to maintain the consumer benefits of reliability and market efficiency as the mandates of the CLCPA rapidly change the generation mix in the coming years.**

This current review is important because the installed capacity market is undergoing significant and rapid change in resource mix and market rules. BSM rules were originally developed to evaluate traditional generators, but the anticipated rapid development of new resource types, such as battery storage, weather-dependent intermittent resources and DERs, is driving changes to the market rules including BSM. These resources are more likely than traditional generator technologies to be partially funded by governmental entities to meet policy mandates. It is also important to keep in mind that the New York ISO’s *Carbon Pricing Proposal* was developed to properly compensate renewable resources and could provide an additional revenue stream to these resources, potentially making them more likely to be exempt (i.e., economic) under the BSM evaluations. Continuing to work with stakeholders, as well as state and federal policymakers on this important issue is essential. We have made it a priority to explore new strategies that will preserve the benefits of competitive markets, while achieving the state’s clean energy objectives.

The Value of Carbon Pricing in Electricity Markets

Through the passage of the CLCPA, New York State affirmed its position as a leader in addressing climate change. A study conducted by the Analysis Group, *Clean Energy in New York State: The Role and Economic Impacts of a Carbon Price in New York ISO’s Wholesale Electricity Markets. Summary for Policy Makers*, found that integrating carbon pricing into wholesale energy markets helps the state meet its clean energy goals faster and more cost-effectively while reducing emissions and maintaining grid reliability.

In the wake of COVID-19, carbon pricing can also reduce state-funded clean energy costs while providing clear signals that reward investment in clean energy and increase flexibility to redirect constrained budgets. Given the predominance of fossil generation in downstate New York, a carbon price would provide strong signals for reducing emissions and local air pollution in environmental justice communities.

Globally Recognized and Widely Supported in New York

Leading economists recognize the elegance and importance of establishing a cost on carbon emissions. The World Bank believes that carbon pricing is an essential tool to keep global

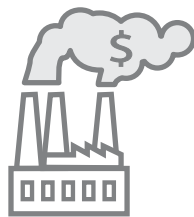
warming below 2°C and achieving zero net emissions before the end of this century. The World Economic Forum featured our *Carbon Pricing Proposal* on its website and produced a recent video that discusses the benefits for consumers, the state’s policy mandates and renewable technology. In New York, public support for carbon pricing from labor, environmental and advocacy groups now includes: the New York League of Conservation Voters, the International Brotherhood of Electrical Workers Local #97, the American Wind Energy Association, the Alliance for Clean Energy NY, and Carbon Free NY. The plan has also gained the support of environmental justice champions Reverend Kirsten John Foy, Hazel Trice Edney, and Reverend Reginald Bachus.

How Carbon Pricing Works



The state sets a price per ton

of carbon emitted based on environmental impact



Power plants pay

for the carbon they release into the atmosphere



Generation owners receive economic incentive

to reduce emissions, including through investment in or carbon-free resources



New Yorkers benefit

from reduced costs and improved air quality

Next Steps

If the state supports moving forward with carbon pricing, New York ISO stakeholders formally vote on this plan to approve wholesale market rules for carbon pricing. The proposal would eventually need to be reviewed and accepted by the Federal Energy Regulatory Commission (FERC), which just recently issued a policy statement signaling its willingness to review such proposals for consideration.



We believe that carbon pricing is an essential, ready-now part of the toolkit for achieving a carbon-free grid by 2040.



— Richard Dewey, CEO, New York ISO



A Call to Action

It is our mission at the New York ISO to maintain reliability of the wholesale electric system; to oversee open, competitive electricity markets; to plan for the future grid; and to provide independent and expert information for all stakeholders. We come to work every day with the importance of that mission in mind, as we provide an essential function and serve a critical role on behalf of all New Yorkers. Through proactive engagement, we can work to achieve the objectives of the CLCPA in a manner that maintains reliability, minimizes costs to consumers, and benefits our environment.

The Benefits of Wholesale Electricity Markets

A fundamental benefit of the wholesale electricity markets is the incentives they provide for resources to be flexible, perform in real-time, and to locate in areas of need on the grid. Competitive markets support reliability, drive innovation, attract technology, and decrease electric bills. The CLCPA mandates for 2030, 2040, and beyond, require that we leverage the markets' unique and powerful ability to incentivize and attract investment behaviors, adapt to changing economic conditions, and deliver reliability.

The Case for Approving Carbon Pricing

Readying the power sector for a renewable future is essential as we contemplate electrification of entire sectors of the economy, like transportation, and move to a zero-emission grid. Carbon pricing:

- Provides “ready-now” market solution that works in harmony with state policies and existing state-administered programs.
- Moves financial risk away from consumers and places it on investors and developers, where it is most appropriate.
- Accelerates carbon reduction at a lower cost than state administered programs alone.
- Addresses the disproportionate impact of high-emission power plants on human health, and, specifically, disadvantaged environmental justice communities exacerbated by COVID-19 and offers an opportunity to efficiently improve air quality in these communities across the state.

The renewable and clean energy investment requirements in the CLCPA pose a significant challenge, and time is of the essence for the state to be successful. We at the New York ISO believe that the Climate Action Council's Scoping Plan should include a call to integrate the social cost of carbon in the New York ISO's wholesale electricity markets as described in our much-studied and supported *Carbon Pricing Proposal*.

Appendix of Source Material

These reports, developed by and on behalf of the NYISO, have been vetted in a fully transparent shared governance system comprised of nearly 400 stakeholders, including power producers, utility companies, state agencies, consumer and environmental interests, and others. These reports are all accessible on our website at www.nyiso.com/library

The 2020 Climate Change Impact Study. The New York ISO retained the Analysis Group to develop and analyze resource mixes to serve load under the CLCPA 2040 state goals and then to layer on top of this analysis various climate change-type scenarios that could impact the electric system. The Analysis Group included scenarios such as heat waves, cold spells, wind lulls, droughts, and severe storms. One of the key findings of this work is identifying the need for significant amounts of a flexible emission-free resource in the downstate area.

The 2020 Reliability Needs Assessment (RNA). The RNA results identify numerous reliability needs driven by various system changes in the 10-year study horizon, including the unavailability of single-cycle peaking turbines. The removal of certain peaking generation from the RNA base case is due to the DEC Peaker Rule, and is based on the compliance plans provided to the DEC by each generator owner in early March. The compliance plans result in over 800 MW of capacity being unavailable during the summer starting in 2023, and over 1,400 MW total capacity unavailable in 2025. The vast majority of this capacity is located in New York City. Properly incentivizing the buildout of dispatchable renewable resources (our Carbon Pricing proposal would be very beneficial here) will be key in ensuring a just transition for these plants and the people they serve.

Congestion Assessment & Resource Integration Study (CARIS). This study identifies areas of transmission congestion over a ten-year period. CARIS developed a 70x30 scenario to identify the types of needs on the grid of the future will. Renewable capacity buildouts were calculated for each load level to approximate the achievement of 70x30 targets. The scenarios modeled up to approximately 15,000 MW utility-scale solar, 7,500 MW behind-the-meter solar, 8,700 MW land-based wind, 6,000 MW offshore wind, and existing hydro generation. The study identified significant transmission-constrained areas throughout New York State that could prevent full utilization of that renewable energy. These renewable generation pockets are regions in the state where renewable energy resources cannot be fully delivered to consumers statewide due to insufficient bulk and local transmission facilities.

Clean Energy in New York State. The Role and Economic Impacts of a Carbon Price in NYISO's Wholesale Electricity Markets. Summary for Policy Makers. The Analysis Group report, commissioned by the New York ISO, examines how New York will best accomplish the CLCPA goals and meet the Act's mandates for reducing GHG emissions in the power sector and in the economy at large.

Carbon Pricing Proposal. The study finds that introducing a "social cost" of carbon dioxide (CO₂) emissions into New York's competitive, wholesale energy markets can help the state meet its clean energy goals faster and more cost-effectively while reducing emissions and maintaining grid reliability.



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