New York ISO
Independent System Operator

2024 Market Vision

A Report by the
New York Independent System Operator

December 2024 DRAFT

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Legend for 5-year Plans

ID	**Issue Discovery**	NYISO has facilitated education session(s) for stakeholder knowledge development of problem/issue, conducted stakeholder solicitation of potential solutions to address problem/issue, and summarized findings at a working group meeting for potential ranking and future project identification.
SD	**Study Defined**	The scope of work for the study has been presented to stakeholders, including a discussion on the necessary input(s), assumption(s) and objective(s) of the study.
SC	**Study Complete**	Scope of work to be performed has been completed; results and recommendations have been presented to the appropriate Business Owners and stakeholders.
CP	**Market Concept Proposed**	NYISO has initiated or furthered discussions with stakeholders that explore potential concepts to address opportunities for market efficiency or administration improvements.
MDC	**Market Design Complete**	NYISO has developed with stakeholders a market design such that the proposal can be presented for a vote at the BIC, OC, or MC to define further action on the proposal.
FR	**Functional Requirements**	NYISO has completed documentation of the functional requirements and the Business Owner has approved.
SDS	**Software Design Specification**	The software design document is complete and software development is ready to begin.
DC	**Development Complete**	Development has been completed, packaged and approved by the Supervisor.
DEP	**Deploy**	Required software changes to support commitment have been integrated into the production environment.

Introduction

The NYISO administers the nation's leading wholesale electricity markets. These wholesale electricity markets consist of:

- a **Capacity Market** with strip (seasonal), monthly, and spot auctions that establish regional prices to meet New York's resource adequacy needs;
- an **Energy Market** with a day-ahead auction to prepare for the next day's power system operation and a series of real-time auctions that clear every five-minutes and establishes locational prices to meet New York's electricity needs every minute of every day;
- **Ancillary Services Markets**, such as operating reserves and regulation service, that provide needed flexibility and backup to help meet New York's needs when the unexpected happens and to establish prices for those products. Additional ancillary services, such as voltage support and black start, support robust transmission operations or help restore the power system after a complete or partial failure and are compensated through cost-of-service payments; and
- a **Transmission Congestion Contracts Market** to help buyers and sellers manage or hedge locational price risk.

These elements of the NYISO wholesale electricity markets work together to support the efficient delivery of reliable electricity to every New Yorker, which also helps to keep the long-term cost of electricity as low as possible.

Since the inception of the NYISO, the markets have undergone continuous reforms to enhance price signals needed to meet reliability needs, integrate new technologies, and represent additional capabilities of resources in the market. While significant attention and focus has been placed on Capacity Market reforms over the past couple of years and will continue to be a significant portion NYISO's efforts, with its stakeholders, there are also critical reforms underway in the Energy and Ancillary Services Markets to support reliable grid operation under a changing grid. These reforms and enhancements will be heavily focused on the Ancillary Services Markets to better account for the quantity of different reliability products needed to maintain reliable operation. As part of those efforts, additional scrutiny will be placed on what grid attributes are needed to maintain reliability, if they should be procured through a market mechanism, and the associated costs and payments for those reliability services.

The wholesale electricity market rules benefit from a highly collaborative governance process where potential market rule changes are vetted with stakeholders. The shared governance process is made up of representatives of a broad swath of interests, including utilities, suppliers, public power interests, consumers, and environmental interests, including entities focused on environmental justice concerns. The shared governance process is designed to balance these interests while supporting strong

collaboration among stakeholder interests and with the NYISO. This is important as these wholesale market rules are extremely complex, and modification requires thorough review and vetting. Once a change is supported by our stakeholders, it is also reviewed by the NYISO's Board of Directors. Only after the NYISO Board of Directors and stakeholders in the shared governance process have approved potential market rule changes, the NYISO submits proposals for consideration by the wholesale market regulator, the Federal Energy Regulatory Commission (FERC), which must accept the proposed rule changes for them to become effective.

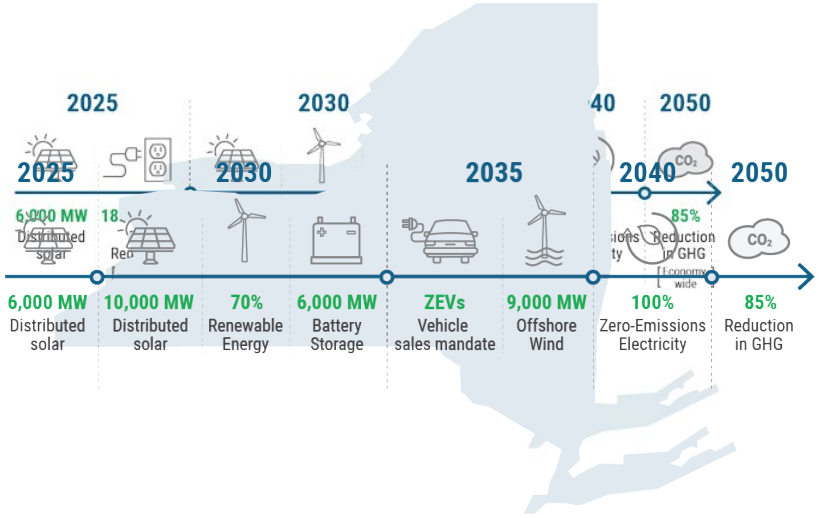
This Market Vision report, formerly Master Plan, discusses the wholesale electricity market initiatives planned for the next five years. These initiatives will require the commitment and collaboration of NYISO's stakeholders, policymakers, and regulators to be successful.

A Changing Power System

In 2019, New York State lawmakers passed the Climate Leadership and Community Protection Act (CLCPA). This law bolstered the clean energy commitment of New York already envisioned in the Clean Energy Standard (CES).

State polices are driving the state's supply mix to an electric power system supplied by zero-emitting resources, with an abundance of renewable energy and storage resources. At the same time, public policies are also encouraging many more circuit miles of transmission and distribution, and electrification of many facets of the economy. Through its reliability and economic studies, the NYISO has identified a need for non-emitting resources that, in aggregate, possess similar attributes to today's conventional fossil-fueled resources. NYISO refers to these resources as Dispatchable Emissions Free Resources (DEFRs).

Figure 1. State Energy Policy Mandates



All this is leading to a tremendous amount of change to an infrastructure system critical to the health, safety, and welfare of New Yorkers.

This transition needs to be carefully planned and executed, especially since the electrification of other

parts of the economy amplifies the need for a reliable and resilient electricity system. It will also be very important that the wholesale electricity markets continue to deliver the least cost electricity available to consumers.

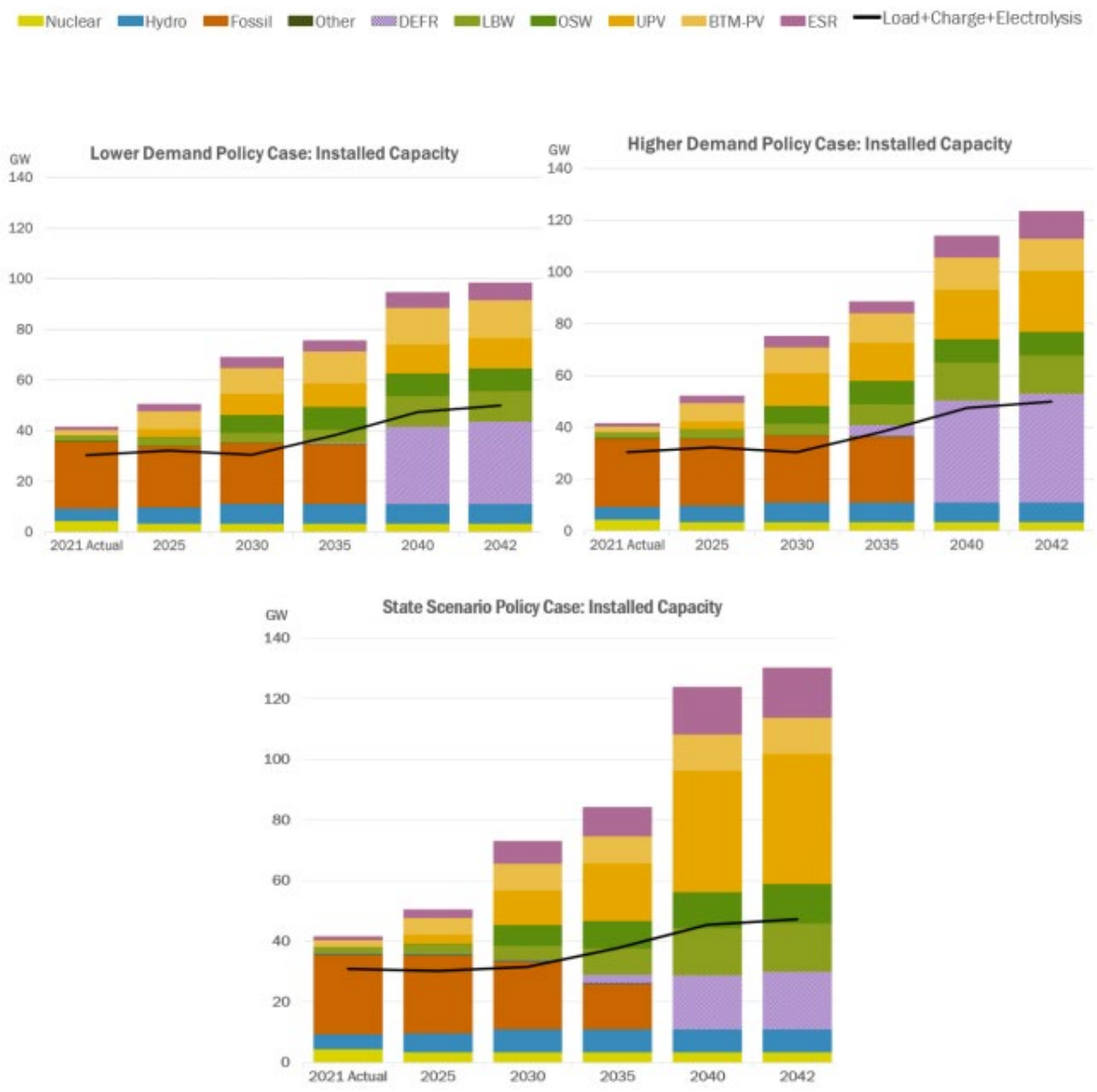
The wholesale electricity market is the platform for such a transition. It is designed to incentivize an orderly transition for economic entry and exit, where new technologies and resources with needed attributes are added before existing resources that we rely on for system reliability retire. The transparent market signals provided by wholesale electricity markets, reflecting the balance between new supply, and retiring resources, can serve to inform market participants, developers, stakeholders, and policymakers as we progress through this transition.

New Challenges

The wholesale electricity markets in New York are fundamentally sound and built on a strong foundation of reliability and market principles. However, the operation of the power system will change with the expected addition of over 45 GW of intermittent renewable resources to meet the CLCPA, fueled primarily by wind and solar energy. For context, the current generation fleet in NY is roughly 41 GW.

Figure 2. Anticipated NYCA Capacity and Generation Changes

Source 2023-2042 System & Resource Outlook



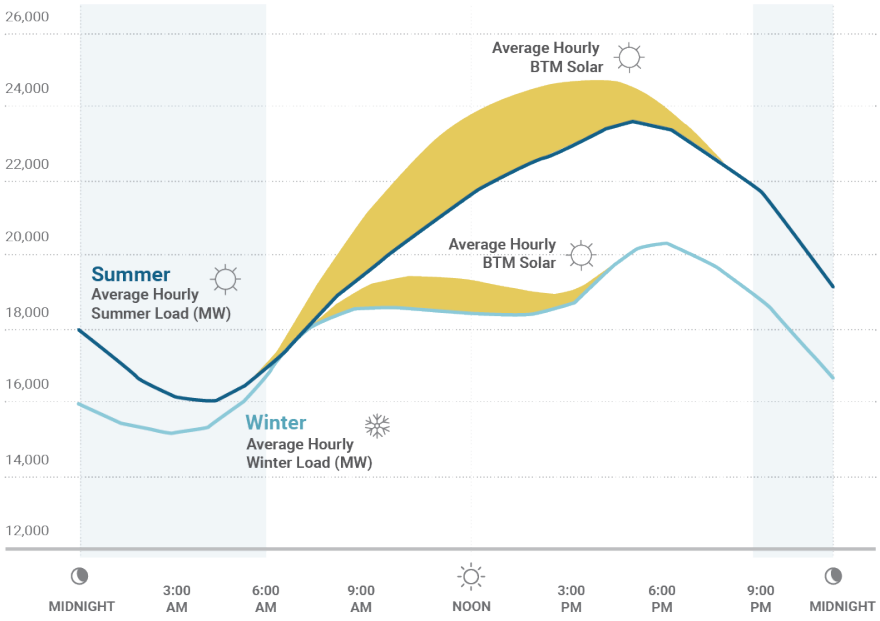
Since renewable resources generally act as low-cost supply, they displace more flexible resources that can come on and off quickly. Unlike conventional baseload resources, such as nuclear and combined cycle generators, output from renewable resources is highly variable since these resources rely on the weather to produce electricity.

About half of the 45 GW of new supply is expected to be solar resources. The output from these resources varies greatly, both daily and across the seasons, with spring being most advantageous for high solar output and winter most limiting with almost zero solar output.

The CLCPA envisions adding storage resources that can capture the excess output from renewable resources when the power system does not need it and deliver that energy when the output from renewable resources is diminished, and the power system does need it.

The attributes of current storage technologies vary greatly. Some storage resources, such as batteries, have limited duration capabilities (less than 4 hours of stored energy) but can ramp very quickly. Some storage resources may have a few days or a week of stored energy but must be configured ahead of time to either consume or produce energy and are not highly flexible. Other storage resources, such as pumped-hydro storage, have many hours of storage capability (8 to 12 hours) and are flexible in that they can be called on quickly (in less than 10 minutes), ramp quickly, and, in some cases, seamlessly ramp from consuming to producing or vice-versa.

Figure 3. Summer and Winter Behind-the-Meter Solar Performance



The power system is getting more complex, with an abundance of new technologies and resources added to the power system that do not have a long track record of reliable configuration or operation. These resources, known as inverter-based resources, rely on software-based electronics to perform, leading to a higher probability of misconfiguration, mis-operation, or failure of the resource to react to system conditions correctly. The industry is currently grappling with best practices, standards, and operating procedures that would minimize the risk to reliability based on poorly designed or configured technologies. However, there is still much learning to

do before these risks can be meaningfully mitigated.

Lower operating margins are leading to higher power system stress, and aging equipment is more susceptible to failure when operating under stressed conditions. There are also increased challenges with the integration and coordination of smaller resources, many of which are not able to respond to dispatch signals scattered across many different voltage levels (*i.e.*, transmission, sub-transmission, networked distribution, and radial distribution) of the power system.

These changes in resource mix lead to a need for:

- A diverse mix of dispatchable resources to address renewable balancing and uncertainty:
    - Dispatchable: Resources that can follow instructions to increase or decrease output on a minute-to-minute basis;
    - Short Notification: Resources that can start quickly (<10 minutes);
    - Zero/Minimal Downtime: Resources that can cycle often with minimal to zero downtime;
    - Fast ramping: Resources that can quickly follow net load to manage ACE on a second-to-second basis; and
    - Energy Secure: Resources that can provide energy for multiple hours and days regardless of weather, storage, or fuel constraints.
- Resources that support power system strength and stability and minimize operational risk:
    - Resources that can hold their bus voltage regardless of topology or resource commitment;
    - Resources sized to avoid extreme contingency scenarios, where contingency reserves may be expensive or unavailable, and loss of generation does not contribute to Loss of Load Events (LOLE) or Expected Unserved Energy (EUE); and
    - Resources that can support frequency response.

Well-functioning wholesale electricity markets provide signals that incentivize the resource attributes needed to support a reliable and resilient power system. The changes to the power system resource mix are creating new challenges to the reliability and resilience of the power system. New York's wholesale electricity market must adapt to address these challenges and provide signals that support the resources needed to continue to support the reliable delivery of electricity.

Capacity Market

The Capacity Market provides fixed cost recovery, net of energy and ancillary service revenues, for resources eligible to sell capacity. This supports a diverse resource mix that can reliably serve all New Yorkers.

Capacity is measured in two ways:

- As installed capacity (ICAP), which measures the nameplate or demonstrated maximum capability of resources; and
- As unforced capacity (UCAP), which measures the reliable capacity available from a resource to serve load. UCAP allows for a MW of capability to be compared to any other MW of capability, known as fungibility, regardless of resource, technology, or location.

The NYISO supports the work of the New York State Reliability Council (NYSRC), which annually establishes the amount of capacity that must be procured to maintain reliability. These requirements are converted into UCAP terms for use in the Capacity Market clearing process. These requirements are designed to establish the amount of ICAP needed to meet the standard of avoiding voluntary transmission level load shedding from happening more than once every ten years.

Growing Concerns About Winter Reliability

The retirement of nuclear and coal facilities has created a much larger reliance on natural gas-fueled generators, especially in southeast New York. Natural gas continues to be relied upon to provide heat for commercial and residential buildings as previous codes and policies encouraged the shift to using cleaner natural gas. At the same time, the existing infrastructure and supply of natural gas in New York is not expanding to support the growing reliance on natural gas.

These changes place an additional burden on the existing and aging natural gas infrastructure, and it is of growing importance to understand how these shifts are creating risks for natural gas-fueled generators to be available on the coldest days of winter. These impacts are not unique to New York, and neighboring regions, including New England, Quebec, Ontario, and the Mid-Atlantic, are facing similar risks of insufficient capabilities during the winter season.

Winter Reliability Capacity Enhancements is a project that is focused on understanding these emerging winter risks. The effort will also focus on determining how best to incorporate changes into the Capacity Market structure so that the market properly signals the times of year (seasons) that resources are needed most and properly values resources that can contribute the most to winter reliability.

Winter Fuel Capability Study is a project focused on better understanding the availability of fuel for

fossil-fuel generation during stressed winter conditions. This understanding will better support operational awareness of the impact of winter conditions on fuel availability as well as support efforts to model fuel availability in reliability analysis such as the Installed Capacity Reserve Margin ("IRM") study performed each year.

Markets that Support the Transition

New York's power system is changing. New transmission investments are being made across the state to improve the ability of renewable energy to supply energy to customers. Conventional resources face more stringent emissions requirements, and in some cases, these policies are leading to retirement of highly flexible generators. Economic development opportunities are also leading to large investments in new facilities that will support new industries across New York. These new facilities are expected to be large electricity consumers.

A holistic review of the Capacity Market structure and purpose will be undertaken as part of the ***Capacity Market Structure Review*** project, which the NYISO views as a top priority for the Capacity Market to continue to send appropriate price signals to maintain reliability. The Capacity Market must balance two roles, adequately incentivizing resources needed to meet reliability needs based on accurate market signals and the needs of market participants and policy makers for information and stability to make decisions on resource investment. This effort is likely to result in several recommendations and prioritizations for enhancements or revisions to the Capacity Market, with the issues outlined below expected to be considered as part of the review.

A reliable power system requires diversity in the resource mix. Combining a set of resources whose operational characteristics, are not all the same, creates opportunities for managing correlated issues and provides natural redundancy. For example, the NYISO recently alerted the industry to an issue where not enough resources are projected to be available in New York City when certain simple-cycle fossil generators ("peakers") retire in 2025 due to new environmental regulations.

The main risk from these retirements is the ability to control flows on the transmission system, known as transmission security. Generally, resources do not contribute similarly to transmission security, and this power system service is not specifically compensated for in the wholesale market. The NYISO will be investigating how best to include transmission security needs in the wholesale market with the ***Valuing Transmission Security*** project.

The Capacity Market currently establishes market signals through market prices for four regions of New York. These areas have historically been defined by limitations to deliver electricity from one area to

another. As the power system changes, it is expected that these historical limitations of power delivery will also change. It will not be cost-effective to upgrade transmission to eliminate all the delivery limitations.

Therefore, it is important that the Capacity Market be able to adapt to account for any changes to these limitations of electricity delivery. The NYISO will be working through the question of how granular the Capacity Market regions need to be as part of the ***Granular Capacity Market Pricing*** project.

Changes to Capacity Market regions have large consequences and should not be something that is rushed into; however, it is just as important to make sure that Capacity Market price signals remain consistent with locational reliability needs. Additionally, the design of the Capacity Market regions (or Localities) also impacts how resource deliverability analysis should be performed.

The NYISO believes it needs to have a clearer view of how granular Capacity Market pricing areas might be before it can turn its attention to the ***Deliverability Improvements*** project. This effort will work through the role of the New Capacity Zone (NCZ) study and resource deliverability studies performed in the Class Year or Expedited Deliverability Study processes. It is expected that any changes to how Capacity Market pricing regions are defined will require reconsideration of the NCZ and resource deliverability studies.

Other Capacity Efforts

The ***Review of Control Area System Resources*** project looks to review the existing market structure such that Control Area System Resources provide comparable reliability benefits and are compensated accordingly when compared to other types of resources. Additionally, the latest ***Demand Curve Reset*** as defined by the NYISO tariff will be in effect starting in 2025.

While significant work is anticipated to be undertaken to evolve the Capacity Market, underlying software systems supporting and operating the Capacity Market will need to be revised and enhanced to support rapid implementation of the market evolution. The ***ICAP Efficiencies*** project is a major effort to improve the underlying software systems to better support future market changes.

Capacity Market Plan

	2024	2025	2026	2027	2028	2029
		Market Vision 2024				
Capacity Market						
Demand Curve Reset	SC	DEP		SD	SC	DEP
Capacity Improvements to Support Reliability						
Winter Fuel Capability Study		SC				
Winter Reliability Capacity Enhancements	ID	MDC	SDS	DEP		
Capacity Market Structure Review		ID	Continue Based on Findings			
Valuing Transmission Security	ID		CP	MDC	SDS	DC
Granular Capacity Market Pricing	ID			SD	SC	Continue Based on Findings
Deliverability Improvements				Develop Improvements Consistent with Granular Capacity Market Pricing		
Improving Market Processes						
Review of Control Area System Resources		MDC	DEP			
System Upgrades to Support Future Markets						
ICAP Efficiencies		DEP				

Figure 4. Capacity Market 5-year Plan

Energy Market

The NYISO-administered wholesale Energy Market provides suppliers and consumers with operational signals about power system conditions. These signals also reward resources and consumers that are most flexible. These markets simultaneously procure energy, operating reserves, and regulation services, known as co-optimization. This is an extremely efficient way to procure all services at the least possible cost. The wholesale Energy Market also:

- Establishes resource schedules, including fossil fuel-fired generators, batteries, hydro, pumped-hydro, nuclear, renewable generators, demand response, and distributed energy resources;
- Economically evaluates and schedules market area-to-market area interchange transactions;
- Provides nodal energy price signals, known as Locational-Based Marginal Prices (LBMPs) for resources;
- Provides zonal energy price signals for consumers (or demand);
- Provides regional price signals for operating reserves;
- Provides state-wide price signals for regulation services; and
- Provides transmission congestion price signals for transmission constraints that limit the flow of economic energy.

The Energy Market consists of a day-ahead and real-time market, known as a two-settlement market, and settles all services nominally every five minutes in real-time. This structure incentivizes resources that clear day-ahead to be available in real-time or risk selling any unfulfilled schedule at real-time prices. It also allows customers to hedge real-time price volatility by purchasing services at day-ahead prices.

The Energy Market is set up to simulate expected actual operating conditions and schedules resources to support the reliable delivery of energy to customers every second of every day. It also supports the coordination of energy purchases and sales between neighboring regions. As the operation of New York's power system becomes more complicated with the addition of intermittent, limited duration, and transmission-constrained resources, the market tools and market products will also need to evolve to be able to continue to simulate expected actual operating conditions and mitigate new risks to reliable electricity.

Managing Intermittency

The operating characteristics of the power system are changing with the introduction of large quantities of renewable and duration-limited resources. The sudden loss of large amounts of energy due to rapid changes in weather conditions and the uncertainty surrounding predicting how much energy to

count on from these resources introduces operational challenges that must be addressed.

These challenges will require having resources on standby to provide energy when the availability of the renewable fleet diminishes. This concept of having resources on standby is not new. However, the timeframes and duration needs must be better defined to provide clearer signals on the standby resource capabilities needed. Previously, what mattered was how quickly a resource could start, but with new duration-limited resource technologies, it becomes more important to define the duration needs of standby resources.

The ***Balancing Intermittency*** project is focused on expanding existing ancillary service products to better account for resource and net load uncertainty to operate the changing power system. Uncertainty is generally exacerbated with the introduction of additional renewable resources, and net load uncertainty can mostly be attributed to the development of large amounts of behind-the-meter solar. The NYISO believes that New York has approximately 6 GW of behind-the-meter solar in operation today. Future efforts will focus on identifying and developing new ancillary service products to better define the standby resource needs of the system.

The addition of new products and expanded use of existing products also suggests that great care should be taken when scheduling resources to provide these products and pricing these products. The ***Balancing Intermittency*** project will also give consideration to these issues.

Today's ancillary service products and the new products being considered as part of the ***Balancing Intermittency*** project have requirements that are defined through an offline study and set to the same value, with minor exceptions, every hour of every day. This methodology has worked well as the largest risk to the power system could be defined as the loss of the largest generator, which was a nuclear reactor that generally runs every day at its designed maximum capability. The addition of large quantities of offshore wind, greater than 9 GW expected, off Long Island and New York City, and the addition of large transmission lines that terminate in New York City load centers create additional reliability risks that ancillary service product requirements must change to address.

Although continuing the practice of statically defining these product requirements as the renewable resource fleet grew and risks increased would, in theory work, it is expected that this would be an inefficient design. The NYISO instead considered the idea of dynamically determining the product requirements based on the expected or actual operation resources and is working on this concept as part of the ***Dynamic Reserves*** and ***More Granular Operating Reserves*** projects.

Dynamically determining where and how many reserves to procure will improve the efficiency of any

new products developed under the ***Balancing Intermittency*** project. These projects are sequenced to avoid duplication of efforts and allow for the introduction of this mathematically challenging concept in a measured way before expanding its use to consider resource and load forecast uncertainty and potentially other use cases.

The ***Balancing Intermittency, More Granular Operating Reserves,*** and ***Dynamic Reserves*** projects are expected to improve the effectiveness and efficiency of the Energy Market, thereby improving how the Energy Market supports power system operations.

Improving Price Formation

Improving the ability of the Energy Market to reflect the physical characteristics of the grid will better align pricing and scheduling outcomes with the physical capabilities of the grid. The ***Ambient Adjusted Transmission Line Ratings*** project that was directed by FERC will support more frequent representation of transmission line transfer criteria, allowing for power transfers based on actual system conditions. The ***Improving Duct Firing Modeling*** project will improve the modeling of available combined-cycle generator capability and may also help with the modeling of hybrid resource aggregations that would make more functional reserves available to the market.

The ***Review of Real-Time Market Structure*** project will assess the existing real-time market structure and settlements to determine if changes are needed to maintain reliable operation in real time, in coordination with ***Balancing Intermittency Phase 2*** which will review a longer look-ahead reserves product to manage new uncertainties. The project will review the current real-time market and settlement structure, the risks associated with a grid characterized by high levels of intermittent renewable resources and Energy Storage Resources (ESRs) and will review potential alternative structures. This study will evaluate if the current structure and optimization horizons of the Real-Time Commitment (RTC) and Real-Time Dispatch (RTD) are designed to best manage the challenges of the future grid.

Financial Instruments to Support Efficient Markets

As the grid continues to evolve, financial instruments will need to be designed and enhanced to continue to allow efficient market outcomes and allow market participants to hedge risk. Enhancements to the Transmission Congestion Contracts ("TCC") market will be considered in the ***Reserving Capacity for TCC BoP Auctions*** and ***Time Differentiated TCCs*** projects. Developing the capability to allow single-sided transactions to or from the market to a Trading Hub will be the focus of the ***Market Purchase Hub Transaction*** project.

System Upgrades to Support Future Markets

While significant work is anticipated to support evolving the Energy and Ancillary Services Markets, underlying software systems supporting and operating these markets will need to be revised and enhanced to support rapid implementation of the market evolutions. The ***NM Upgrade*** project is a major effort to improve the underlying software systems to better support future market changes while continuing to keep the system up to date.

As the grid continues to evolve, system operators will need enhanced tools to support the deployment of limited duration resources, such as energy storage, under a dynamic grid. The ***Capacity Analysis and Commitment Tool***, deployed in 2024, will continue to be enhanced to provide grid operators with visibility about expected future conditions of the grid to facilitate reliable operations. The ***Advanced Storage Modeling*** project will automate requesting resources be available during identified portions of the day to meet anticipate reliability needs identified the Capacity Analysis and Commitment Tool.

Energy Market Plan

	2024	2025	2026	2027	2028	2029
		Market Vision 2024				
Energy Market						
Reserve Markets for the Future						
Balancing Intermittency						
Phase 1 - Modify Existing Product(s) for Uncertainty	MDC	DC	DEP			
Phase 2 - New Product(s)			MDC	FR	DC	DEP
Dynamic Reserves						
Phase 1 - Transmission Headroom	FR	SDS	DC	DEP		
More Granular Operating Reserves			CP	FR	DC	DEP
Improve Price Formation						
Improve Duct Firing Modeling	FR	DC	DEP			
Review of RT Market Structure			ID	Continue Based on Findings		
Ambient Adjusted Transmission Line Ratings		SC	SDS	DC	DEP	
Financial Instruments						
Reserving Capacity for TCC BoP Auctions				SDS	DC	DEP
Time Differentiated TCCs				ID	SC	MDC
Market Purchase Hub Transactions	CP	MDC	DEP			
System Upgrades to Support Future Markets						
Capacity Analysis and Commitment Tool	DEP	Continued Enhancements				
Advanced Storage Modeling		SDS	DC	DEP		
NM Upgrade		DEP			SDS	DC

Figure 5. Energy Market 5-year Plan

New Resources and Market Participation

Public policies are driving the research and advancement of new technologies. As these new technologies become commercially viable, there is a need to consider their operational characteristics to allow them to be incorporated into the wholesale market as efficiently and effectively as practicable.

Enabling New Resources and Capabilities

New technologies have the potential to diversify the system resource mix, support New York's clean energy and de-carbonization objectives, and make load more dynamic and responsive, providing an opportunity to improve overall system efficiency. Some of these newer resources also depend on the weather for their fuel. It is imperative to consider investment and innovation in new clean energy technologies with long-duration energy output capabilities that are dispatchable. Integration of new resources will ultimately support New York's clean energy objectives, as well as support compliance with FERC Order Nos. 719, 745, 841, and 2222 and other FERC efforts that aim to facilitate the integration of new resources such as hybrid storage resources into the market. While some new market participation models may be required to fully integrate new resources, looking for opportunities to enhance existing models first will help integrate new resources while minimizing the operational matrix of market rule sets.

As new assets are developed and built, there is an accompanying desire to couple assets of different technology types to participate as a combined resource in the wholesale markets. This desire provides an opportunity to leverage the complementary characteristics of different technology types such as coupling intermittent, renewable generation with energy storage to reduce the generation volatility. Additionally, state and federal programs and procurement initiatives provide incentives for developers to couple storage and intermittent renewable assets. Recognizing these opportunities for developers and the associated benefits to the wholesale market, in 2020, the NYISO developed the Co-located Storage Resource (CSR) Model that enables grid-scale wind or solar and energy storage resources to participate as co-located resources behind a single interconnection point.

The NYISO will build on this framework via the ***Hybrid Aggregation Storage Model*** (HSR), which aims to allow energy storage resources to aggregate with one or more Intermittent Power Resources (Solar, Wind and Landfill gas) and/or Limited Control Run of River Hydro generators that are all co-located behind the same point of interconnection to form a single resource. The resources in this type of aggregation will share a single point identifier (PTID). In addition, the NYISO will update the CSR model to allow Combustion Turbines (CTs), Landfill gas, and Limited Control Run of River Hydro generators as additional generator types in the model.

Historically, most electricity demand has been considered inelastic or uncontrollable by system operators. However, as deployments of intermittent resource generation increase, so does the opportunity for more flexible demand. Flexible demand will play a role in both balancing intermittent supply from variable energy resources and in providing ancillary services to the NYISO markets. The ***Engaging the Demand Side*** project seeks to broaden avenues for market participation by flexible loads by informing the demand side about where and when to consume power and improving incentives to follow those instructions. This alignment may require improvements to consumer metering, communication platforms, close coordination with utilities, modifications to retail rate structures or expanded application/availability of retail rate structures reflecting real-time wholesale market prices, and wholesale market enhancements to further enable the participation of flexible load.

Effectively, Engaging the Demand Side could result in more robust price formation by reflecting consumers' willingness to purchase energy in addition to suppliers' willingness to provide energy. Although the NYISO markets currently feature demand side participation opportunities through various wholesale demand response programs, price responsive load bids in the Day-Ahead Market, and the Distributed Energy Resource (DER) participation model, the emergence of new technologies provides a strong use case for price-responsive demand in the real–time 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, and the integration of a wide array of emerging load-shifting and distributed-resource technologies. As identified in the 2024 Reliability Needs Assessment, the flexibility of large loads will play an increasing role in maintaining system reliability. The ***Flexible Load Models – Large Loads*** project will look to facilitate load participation, both co-located and stand alone, in the wholesale markets, leveraging the work done under the Clean Hydrogen project.

The NYISO's ***FERC Order 2222 Compliance*** project is the next step toward animating load in the wholesale markets. This participation model builds upon the NYISO's experience with demand response programs, and it will be key to enabling demand-side technological advancements that may be needed in the near future. By creating additional opportunities for DER participation in the wholesale market, the NYISO hopes to maintain rules universally applicable to small resources desiring to participate in aggregate. This initiative directly supports compliance with FERC Order No. 2222, improving access to wholesale electricity markets for small, distribution-connected assets.

The ***Enhanced Storage Integration*** project will look to better understand how energy storage operates and participates in the NYISO after substantial interconnection of these assets. The project will

look to enhance the opportunities for storage to participate and remove or reduce restrictions to facilitate more efficient usage of the resources by updating and enhancing the market rules that energy storage resources participating in the market must follow.

Unique characteristics allow energy storage assets to potentially provide many services to grid operators. In some instances, storage used exclusively as a transmission asset could provide a faster and cheaper option for providing the same or similar services as traditional alternatives. In Western Grid, the FERC accepted the provision of cost-based rate recovery for electric storage resources through transmission rates based on the proposed uses exclusively for transmission services in that case. The eligibility of an electric storage resource to provide transmission service for which it is technically capable has been reiterated in a FERC Policy Statement in PL17-2-000.

In New York, there is currently no pathway by which a storage project could be evaluated through the interconnection process as a transmission asset, and no method to operate a storage asset as transmission. Furthermore, market rules for such projects would need to consider how to avoid double payment while allowing for flexibility and reducing revenue requirements through traditional rate-basing mechanisms. The ***Storage as Transmission*** project has two primary components. The first component would have the NYISO consider a process by which a storage project could progress through the interconnection queue while being considered and evaluated as a transmission asset, including options for cost recovery. The second component would have the NYISO explore rules and methods for operating storage as a transmission asset, taking multi-use and double payment issues into consideration, as well as the various use cases.

New York established a tier 4 renewable energy credit program designed to support renewable resource development in New York City or support the delivery of renewable energy to New York City. This program selected two projects, Champlain Hudson Power Express (CHPE) and Clean Path New York. CHPE is being developed to deliver energy from Quebec to New York City, while the Clean Path New York project is under development to deliver energy from central New York to New York City.

The ***Integrating Champlain Hudson Power Express*** project will focus on any modification to the interchange scheduling market rules to support the operation and open use of the new Champlain Hudson Power Express high voltage direct current transmission line. Clean Path New York will be New York's first internal high voltage direct current transmission line, and the ***Internal Controllable Lines*** project is focusing on how best to incorporate an internal controllable transmission line into the power system operation and the wholesale market.

New Resources Plan

	2024	2025	2026	2027	2028	2029
		Market Vision 2024				
New Resources and Technologies						
Enabling New Resources and Capabilities						
FERC Order 2222 Compliance	FR	SDS	DEP			
Engaging the Demand-Side: Phase 1 - SCR Program Enhancements	CP	DEP				
Engaging the Demand-Side: Phase 2 - Alt. Telemetry			CP	DEP		
Engaging the Demand-Side: Phase 3 - Small DER				SC	MDC	DC
Hybrid Aggregation Model	DC		DEP			
Enhanced Storage Integration			SC	MDC	DEP	
Flexible Load Models - Large Loads	CP		MDC	FR	DC	DEP
Integrating Champlain Hudson Power Express (CHPE)	SC	DC	DEP			
Internal Controllable Lines	FR	SDS	DC	DEP		
Storage as Transmission	CP	MDC	Continue Based on Proposal			

Figure 6. Advancing and Integrating New Resources 5-year Plan

Conclusion

A tremendous amount of change is happening in New York's energy system. This *2024 Market Vision* highlights the breadth of issues that need to be addressed. We must look for solutions to address policy, reliability, and market needs, as New York's power system is nearing a tipping point. Every option must be on the table.

Our history has proven that the best solutions to our challenges have come from engagement and collaboration. The NYISO looks forward to working together with stakeholders, market participants, and policymakers to move these efforts forward and to support New York's vision of transforming the power system. Thank you.