

2020-2024

Strategic Plan

The New York Independent System Operator



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Message from the President and Chief Executive Officer

We are at a unique and exciting point in the history of the electric grid in New York State. At the New York Independent System Operator (NYISO), where we are responsible for reliably operating the bulk electric system and administering the wholesale electricity markets, we are taking action to help New York meet its clean energy goals.



The recently adopted Climate Leadership and Community Protection Act (CLCPA), seeks to achieve 70% of electric grid generation from renewables by 2030, and a 100% “zero-carbon” grid by 2040. To that end, the state seeks 9,000 megawatts in offshore wind, 6,000 megawatts of solar power, and 3,000 megawatts of battery storage. The NYISO expects regulatory policy initiatives to continue driving the shift to lower-emitting and renewable resources.

The NYISO views wholesale electricity markets as an essential, effective platform for achieving public policy. The 2020-2024 NYISO Strategic Plan highlights opportunities to adapt our market structure and prepare for a future grid that is less centralized, more resilient, and cleaner. As we transition to new technologies such as energy storage, distributed energy resources and renewable energy, the NYISO is hard at work implementing changes necessary to manage a future grid increasingly comprised of intermittent resources while maintaining reliability and cost effective service for consumers.

For instance, the NYISO continues to develop a portfolio of market enhancements that will position the NYISO markets as an industry leading platform to allow New York to drive towards a cleaner and more technologically advanced grid. Included in that strategy is a plan for adding carbon pricing to the wholesale electricity market. A social cost of carbon dioxide emissions, established by the state and reflected in wholesale electricity markets administered by the NYISO, would leverage the efficiency of wholesale markets and provide energy suppliers the incentive to invest in cleaner energy technologies. In that way, carbon pricing would promote clean energy technologies by dovetailing wholesale markets with state efforts to promote cleaner energy technologies.

Additionally, the NYISO remains committed to maintaining the highest level of reliability for the electric grid, recognizing that reliability is vital to New York’s economy and society. Providing the high degree of reliability that New Yorkers demand will be increasingly challenging as we transition to a more distributed and intermittent fleet of resources, but the NYISO is committed to dedicating our Planning and Operations resources to meet the needs of our customers.

We embrace the challenges and opportunities before us. We look forward to working collaboratively with our stakeholders, policymakers, and regulators on the changes necessary to develop the grid and markets of the future. It is our privilege to reliably serve New York’s energy needs.

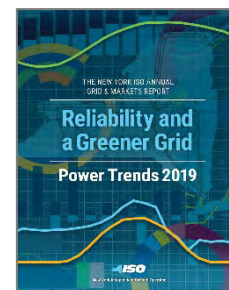
Sincerely,

Richard J. Dewey
President and CEO

Key Accomplishments

The past year was distinguished by several important accomplishments. In addition to maintaining expected system reliability, the NYISO added new critical infrastructure and continued to support New York State policies regarding the development and reliable integration of new renewable resources and distributed energy resources. Accomplishments include:

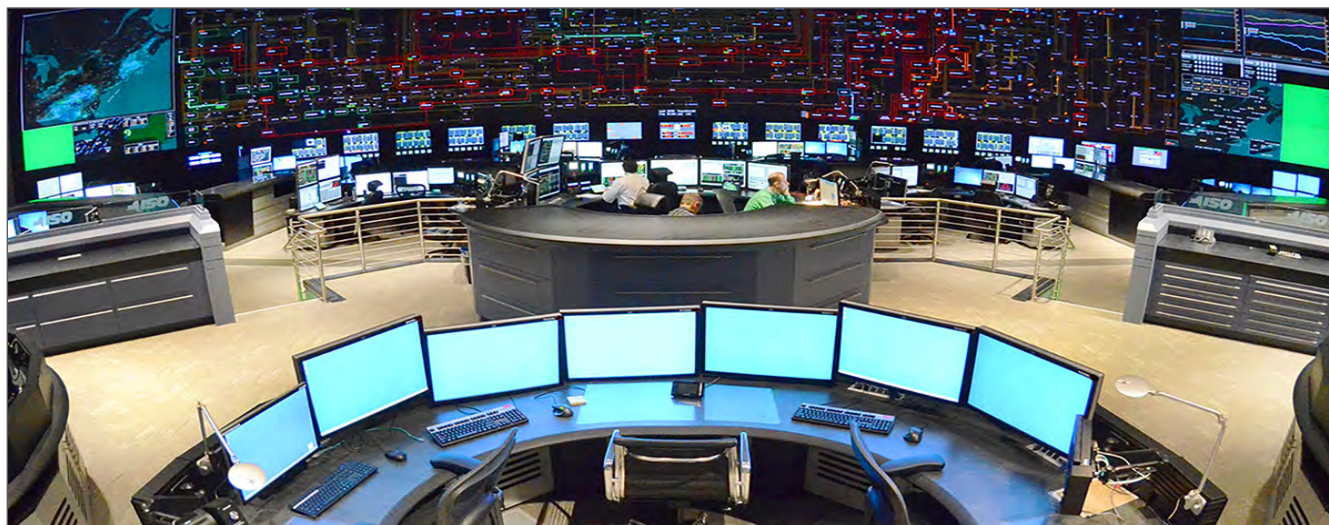
- Using the **Public Policy Transmission Planning Process**, the NYISO Board of Directors selected transmission upgrades in several regions of the state, critically needed to increase delivery of environmentally desirable power, relieve congestion and bolster system efficiency
- Implemented a new **Operating Reserve Region (J)** for New York City to provide more efficient resource scheduling and procurement, location-specific price signals and investment incentive
- Completed market design for **Energy Storage Resources (ESR)** and initiated software development
- Completed pioneering market design for **Distributed Energy Resources (DER)**
- Completed the development of a first-in-the-nation **Carbon Pricing Design** with stakeholders
- Expanding our role as an authoritative source of information on New York’s bulk electric power system, launched a new **Website** which provides stakeholders with easier access to publications, reports and studies
- Issued the **Reliability and Market Considerations for a Grid in Transition** whitepaper describing emerging reliability and economic challenges, identifying gaps and proposing next steps
- Released the **2018 Report of the Consumer Interest Liaison** analyzing the effects of changes to the wholesale electricity market on consumer costs, system reliability, the environment, and transparency of NYISO operations
- Negotiated and executed a new five-year **Budget Facility Loan** to fund capital investments, software development projects and other strategic initiatives
- Established a new five-year **Revolving Credit Facility** which serves as a cash flow management tool that provides liquidity to the NYISO-administered markets
- Published the **2019 Master Plan** providing a cohesive strategic vision for market design efforts over the next five years
- Published the **2019 Power Trends**, highlighting the challenge of integrating energy storage and DER into wholesale electricity markets, and of the development of a novel carbon pricing program. Widely circulated to influential policymakers, regulators, business leaders and stakeholders, the report received tremendously positive feedback



▶ To download these and other NYISO reports, visit www.nyiso.com/library

- Issued the **2019-2028 Comprehensive Reliability Plan** including a scenario developed in close coordination with transmission owners to proactively assess potential impacts to electric system reliability related to implementation of the Department of Environmental Conservation’s proposed “peaker” rule
- Conducted a **Fuel and Energy Security Study** assessing winter fuel/energy security for the New York Control Area under various assumptions and potential future scenarios
- Utilized **Alternative Locational Minimum Installed Capacity (LCR) methodology** to produce greater stability in the LCR and reduce procurement costs
- Implemented the **Modeling of certain 115 kV Constraints** in market solutions to better reflect the impacts and value of maintaining transmission system reliability into market prices for such facilities
- Continued the **IT Strategy** evolution to position the NYISO with the flexibility and agility to comprehensively respond to emerging industry trends through a modern software delivery methodology and expanded automated testing capability; increased IT Infrastructure automation; continued adoption of cloud computing infrastructure for targeted solutions
- Continued the **Cybersecurity Strategy** implementation of a fully functional Cybersecurity Operations Center (CSOC) providing a comprehensive 7 x 24 security operations capability

These key accomplishments build upon the organization’s ongoing commitment to lower grid management charges, improve compliance with applicable reliability standards, and facilitate industry compliance with and achievement of state policies, and lower the cost of electricity to consumers across New York.



The state-of-the-art, 64,000 square foot, NYISO Control Center.

The NYISO

Introduction

The NYISO, which began operating in 1999, is a not-for-profit corporation primarily regulated by the Federal Energy Regulatory Commission (FERC). The governance, structure and mission of the NYISO comply with the guiding principles in the FERC’s open access regulations — Order Nos. 888 and 2000. The NYISO is governed jointly by an independent Board of Directors and market participants (transmission owners, generation owners, other electric power suppliers, end-use consumers, public power and environmental sectors). In accordance with a rigorous code of conduct, NYISO board members and staff are required to be independent from the interests of market participants.

The NYISO is responsible for operating New York’s bulk electric system, administering wholesale electricity markets, and conducting system planning. The creation of the NYISO has resulted in reliability and economic benefits for New Yorkers while contributing to unprecedented environmental gains. For the past 20 years, the NYISO’s markets have worked to improve system efficiency, supporting a gradual shift toward cleaner sources of generation while upholding the nation’s most stringent reliability rules.

Core Values and Mission

The Core Values and Mission of the NYISO establish the foundation from which all of our responsibilities are delivered. Together, they provide the basis for the NYISO’s Strategic Objectives, as well as a reference point to guide decision making and actions at all levels of the organization.

Core Values

The core values of the NYISO form the foundation on which we conduct ourselves. The core values are the basic elements of how we go about our work every day in everything we do.



Mission

The mission of the New York Independent System Operator, 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
- Providing factual information to policymakers, stakeholders and investors in the power system

Reliable Operations

The NYISO manages the flow of electricity across more than 11,000 miles of high-voltage transmission lines serving New York on a minute-to-minute basis, balancing supply and demand throughout the state in accordance with the federal policy of open and non-discriminatory access to the grid. Working with transmission owners, the New York State Reliability Council (NYSRC), the Northeast Power Coordinating Council (NPCC), and the North American Electric Reliability Corporation (NERC), the NYISO adheres to the nation's strictest set of reliability standards, which include nearly 1,000 requirements designed to promote reliability for New York consumers. To provide the lowest-cost power available to reliably meet consumer needs, the NYISO conducts and monitors competitive auctions of wholesale electricity every five minutes, every day of the year.

The NYISO's primary power control center, opened in 2014, is among the most technologically sophisticated facilities of its kind in the world. The control center enables improved operator visibility of wide-area and local grid conditions, enhanced integration of new technologies, and provides many of the situational awareness displays and other tools needed to meet strict requirements for the monitoring and control of the bulk electric system.

Efficient Markets

As market administrator, the NYISO conducts a continuous series of auctions, in which load serving entities bid to purchase electric energy offered for sale by suppliers. Similarly, the NYISO administers markets to purchase balancing requirements and various ancillary services needed to maintain system reliability. The NYISO also operates markets that allow market participants to purchase the installed capacity needed to meet resource adequacy requirements established by the NYSRC. Energy service companies and end-use consumers can provide demand response resources and compete with other suppliers in several of these markets.

Pursuant to its tariff, the NYISO maintains credit requirements that seek to ensure that all market participants entering into transactions provide reasonable assurance to protect the market from the potential for payment defaults. The NYISO's independent market monitor and internal market mitigation and analysis group continually surveil the markets for attempts at manipulation, identify potential market improvements, and report any violations of the tariffs to FERC.

Comprehensive Planning

The NYISO's Comprehensive System Planning Process (CSPP) is a unique, "all source" planning process that evaluates transmission, generation and demand response on a comparable basis. It is the primary tool for the NYISO to inform transmission expansion and electric infrastructure investment

decisions in the New York Control Area (NYCA). Developed through its stakeholder governance process, the CSPP establishes a process for identifying reliability and economic needs, as well as transmission needs driven by public policy requirements. This process also establishes the procedures whereby solutions are proposed, evaluated and implemented in order to maintain the reliability of the bulk electric system, reduce system congestion, and respond to identified transmission needs driven by public policy.

Governance

The NYISO strives to achieve its strategic objectives with the guidance of government policy makers and regulators, and the direct involvement of market sector stakeholders. As it serves the greater interest of the state and the people of New York, the NYISO’s efforts are most visible in the forum it provides to share ideas on how to resolve issues and solve problems. With more than 400 market participants, the NYISO engages a wide spectrum of interests, including representatives from public power and environmental parties, end-use consumers, transmission owners, generation owners, and other suppliers.

The governance structure includes three standing committees — the Management Committee, the Business Issues Committee, and the Operating Committee. Each committee oversees its own set of working groups, subcommittees and task forces. The NYISO’s achievement of its objectives depends on the active involvement of participants in the shared governance process.

Responding to the Changing Grid

Historically, electric power flowed from generators across a vast network of transmission and distribution lines before reaching consumers. Energy usage and peak demand grew incrementally, year by year, and growing demand



for energy was met through physical expansion of the grid to increase its generating and delivery capacity.

While demand on the grid may no longer be growing at historical levels, planning and operating the grid has grown more complex. Technology, economic forces, and public policy are shaping a more dynamic grid. We are moving away from historical patterns of supply and demand, and towards emerging trends that reflect advances in how electricity is generated and consumed. Public policies are expediting this transformation.

This means historical, predictable demand patterns that characterized infrastructure planning over much of the last century are shifting. Consumers, increasingly empowered with intelligent digital technologies and advanced communications tools, are becoming active participants on the grid — adjusting their energy use patterns to reflect grid conditions, and tailoring their energy use to meet their own needs for economic and clean power.

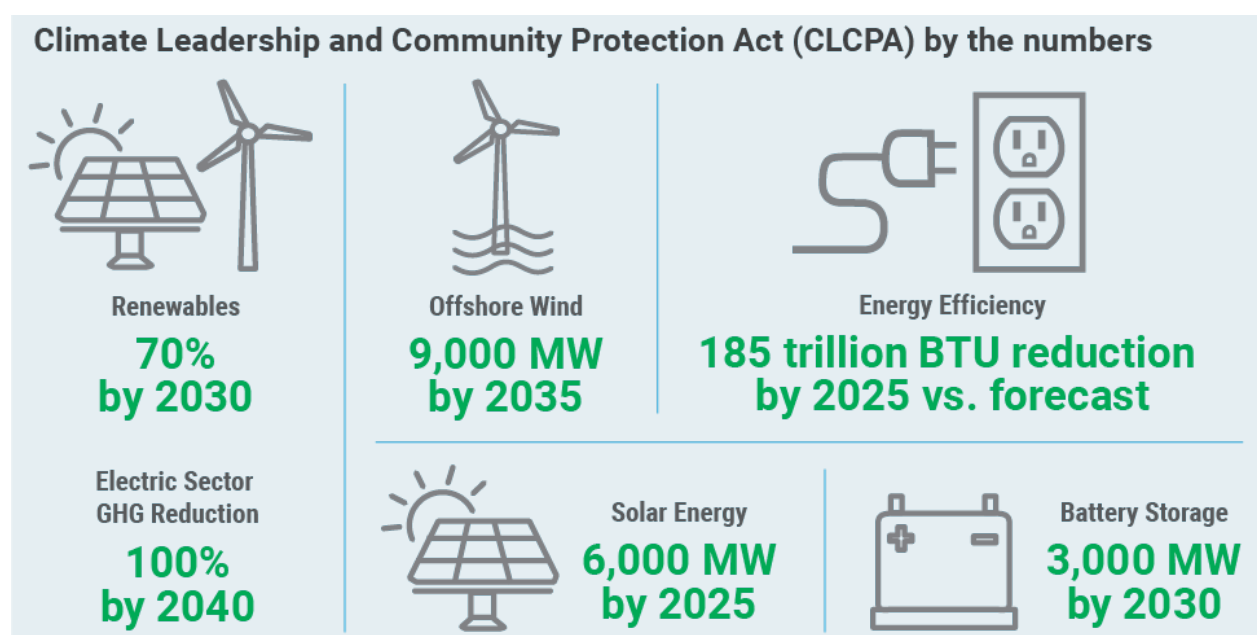
This dynamic introduces new variables that the NYISO is uniquely poised to meet through competitive wholesale electricity markets. In collaboration with policymakers, regulators and market participants, the NYISO will continue to leverage our expertise in operating New York's power grid through advanced market design and open, transparent system planning in order to reliably and efficiently respond to the energy needs of all New Yorkers.

2020-2024 Strategic Plan

Strategic Perspective

New York’s electricity industry is transforming rapidly, from traditional, controllable fossil fuel generation to non-emitting, weather-dependent intermittent resources, energy storage and distributed generation. These changes are driven by state policies and technological advancements that are expanding the possibilities of new resources and lowering their costs.

New York State’s recently passed Climate Leadership and Community Protection Act (CLCPA) calls for 70% of the electricity consumed by New Yorkers to come from renewable sources by the year 2030 and 100% zero-emission sources by 2040. As the State moves to a largely renewable resource base, it is anticipated that the electrification of technologies across end-use sectors, including transportation, heating and industry, will occur on a wide-scale.



The central question arising from these changes will be how the wholesale electricity market in New York can continue to provide pricing and investment signals necessary to reflect system needs and to attract and retain enough controllable and flexible resources to balance the electric system and provide grid services necessary for reliability. Moreover, from an operational perspective, it also must be resolved how market-based operations can continue to maintain high levels of reliability at least-cost without the need for frequent and costly out-of-market interventions. The NYISO is working to develop a successful plan to meet the future challenges expected to arise from a grid characterized with high levels of intermittent renewable resource and distributed generation penetration.

Two principles guide the NYISO as these questions are examined: (1) all aspects of grid reliability must be maintained; and (2) competitive electricity markets should continue to maximize economic efficiency and minimize the cost of maintaining reliability. The key is to anticipate the needs for existing and new grid reliability services and proactively evolve the wholesale market design to accomplish those needs.

Wholesale electricity markets must continue to reflect all grid reliability services needed through defined products, with product pricing that reflects the marginal cost to serve or forego (when supply is scarce) the reliability need. Prices can thereby serve as an effective and powerful control signal. They rise where and when necessary to attract and make available essential grid services, and fall where and when the grid reliability service is not needed or when there is ample supply. In this way, and by fostering competition, prices help to maintain grid reliability at the lowest cost.

The initial NYISO assessment of emerging reliability challenges indicates that the immediate challenge arises from the variability and unpredictability of wind and solar generation. As the penetration of those technologies increases, the grid will likely need more load-following capability, and possibly more fast-response and flexible resources that provide operating reserves to address expected and unexpected changes in net load. The grid will also need a substantial amount of installed reserve capacity that is available to serve load when wind and/or solar generation output is insufficient for periods that may range from minutes to several days. Additionally, it will be important to examine the need for strategic transmission investments that enhance the operational flexibility of the grid and accommodate the integration of high levels of intermittent renewable generation.

Strategic Objectives

Six strategic objectives underlay the various initiatives of the NYISO and provide guidance for the allocation of human, financial, and technological resources. These objectives instill discipline to the use of resources, helping to evaluate and prioritize NYISO investments toward those activities that best meet the goals articulated by each objective.

1. A Leader in Reliability

- Promote resource adequacy and transmission security now and in the future.
- Sustain and enhance reliable operation of the bulk electric system and the wholesale electricity markets.
- Provide a secure environment to protect the NYISO cyber, physical, and personnel resources.

2. A Leader in Market Design and Performance

- Develop enhancements to the wholesale electricity markets that increase reliability and market efficiency and create value for consumers.
- Foster a market environment conducive to new investments in the wholesale electricity markets that attract and retain resources needed in the state.

3. Authoritative Source of Information on Key Issues

- Take a proactive leadership role in providing an independent, unbiased source of information on the operation of the bulk electric system and wholesale electricity market in New York, and identifying future needs by analyzing the reliability, environmental and cost attributes of policy and technology choices.
- Conduct stakeholder outreach activities in leadership forums, national and international conferences, as well as professional and standard setting groups.

4. Excellence in Execution

- Sustain a culture that promotes and strives for flawless performance in all that we do and engenders customer confidence in our operations, markets and planning.

5. Sustain and Enhance Robust Planning Processes

- Strengthen planning capabilities to effectively implement the CSPP, which includes reliability, economic, and public policy planning studies and other planning initiatives in New York.
- Coordinate with market participants, state and regional planning agencies and other key stakeholders to complete studies and to analyze reliability, operations and market impacts of a broad range of energy-related federal and state policy goals, including environmental, fuel diversity, energy efficiency and renewable integration.

6. A Leader in Technology Innovation

- Work with regulators and other stakeholders to promote state-of-the-art technologies in order to advance the transformation of the power grid.
- Develop innovative market products, advanced reliability tools, and information architecture utilizing modern industry capabilities and applicable technology advances.
- Develop advanced technologies to maintain reliable, optimally performing and secure operation of existing systems.
- Reinforce and enhance cybersecurity protocols and best practices.



Strategic Initiatives

To meet evolving regulatory requirements, and expected technical, financial and market challenges, the NYISO has identified key strategic initiatives in addition to its core responsibilities and ongoing project plans. These initiatives provide guidance for projects and resource allocations in 2020 and in the future.

Grid Reliability and Resilience

- Maintaining power system reliability is the NYISO's primary responsibility, and the role of wholesales markets is critical in carrying out this responsibility. The changing portfolio of resources serving the electric needs of New York will require a comprehensive review of the NYISO's existing market products and operational and planning practices to ensure the continued ability to efficiently and reliably serve New York's electricity requirements. Significant study work is needed to take a deeper dive into evolving focus areas.

Efficient Markets for a Grid in Transition

- The addition of renewable resources, energy storage, and DER will create a more dynamic grid, where supply is increasingly comprised of weather-dependent renewable resources and flexible resources will be needed to balance intermittent generation. Incenting resource flexibility, which includes the ability to respond rapidly to dynamic system conditions, providing controllable ramp with fast response rates, and providing frequent startup/shutdown capability, will be key to future market enhancements at the NYISO.

New Resource Integration

- Technological advancements and public policies, particularly New York State's CLCPA and Reforming the Energy Vision (REV), are encouraging greater adoption of DER and energy storage to meet consumer energy needs. DER and energy storage offer the potential to make load and supply resources more dynamic and responsive to wholesale market price signals and system needs, potentially improving overall system efficiencies. The NYISO believes that opening its markets to DER and energy storage will improve the strength and efficiency of the electric grid.

Integration of Public Policy

- The CLCPA sets the stage for aggressive state action to reduce greenhouse gas emissions and promote expansion of renewables, distributed energy, and storage resources. It is imperative that the NYISO accelerate development of steps to harmonize wholesale electric power market design with state public policy goals.

Technology and Infrastructure Investment

- The capabilities outlined in the NYISO IT Strategy and technology investments in various projects will position the NYISO with the flexibility and agility to comprehensively respond to emerging industry trends like the integration of renewables, energy storage and distributed resources, and at the same time, continue to maintain reliable operations of grid and market systems while being responsive to increased security risks.

Efficient and Flexible Business Model

- The NYISO strives to maximize the value that we deliver to our stakeholders through the execution of reliable, cost effective service. In the current rapidly changing environment, continuous process improvement, product and service expansion, and business model refinement will shape the NYISO value proposition. The NYISO will improve organizational effectiveness; modernize systems for faster, more flexible response to market and regulatory changes; and continuously scrutinize cost of operations. In addition, the NYISO will continue to emphasize our brand value while delivering premium service to our customers.

Timeline of Anticipated Projects Supporting Strategic Initiatives

Initiative	2020 Projects	2021 Projects	2022 Projects	2023-2024 Projects
Grid Reliability and Resilience	<ul style="list-style-type: none"> Enhancing Fuel and Energy Security Climate Change Impact and Resilience Study Comprehensive System Planning Process Improvements Operational Situational Awareness Reserve for Resource Flexibility Enhancements to IRM/LCR Models 	<ul style="list-style-type: none"> Climate Change Impact and Resilience Study Comprehensive System Planning Process Improvements Operational Situational Awareness Reserve for Resource Flexibility Capacity Zone Creation and Elimination Solar on Dispatch Enhancements to IRM/LCR Models 	<ul style="list-style-type: none"> Climate Change Impact and Resilience Study Capacity Zone Creation and Elimination Solar on Dispatch Enhancements to IRM/LCR Models 	<ul style="list-style-type: none"> Climate Change Impact and Resilience Study Capacity Zone Creation and Elimination Flexible Transaction Scheduling Enhancing Fuel and Energy Security
Efficient Markets for a Grid in Transition	<ul style="list-style-type: none"> Enhanced Fast Start Pricing Ancillary Services Shortage Pricing Tailored Availability Metric Demand Curve Reset Comprehensive Mitigation Review Expanding Capacity Eligibility 	<ul style="list-style-type: none"> Ancillary Services Shortage Pricing Reserve Enhancements for Constrained Areas Constraint Specific Shortage Pricing Tailored Availability Metric Comprehensive Mitigation Review Expanding Capacity Eligibility Improving Capacity Price Formation 	<ul style="list-style-type: none"> Reserve Enhancements for Constrained Areas Constraint Specific Shortage Pricing Capacity Value Study Improving Capacity Price Formation 	<ul style="list-style-type: none"> Reserve Enhancements for Constrained Areas Demand Curve Reset Capacity Value Study Improving Capacity Price Formation
New Resource Integration	<ul style="list-style-type: none"> DER Participation Model Dual Participation Meter Service Entity NYISO Pilot Framework Energy Storage Resource Participation Model Hybrid Storage Model 	<ul style="list-style-type: none"> DER Participation Model Dual Participation Hybrid Storage Model 	<ul style="list-style-type: none"> Hybrid Storage Model 	<ul style="list-style-type: none"> Hybrid Storage Model
Integration of Public Policy	<ul style="list-style-type: none"> Carbon Pricing Public Policy Transmission Expansion Planning for Environmental Impacts 	<ul style="list-style-type: none"> Carbon Pricing Public Policy Transmission Expansion Planning for Environmental Impacts 	<ul style="list-style-type: none"> Public Policy Transmission Expansion Planning for Environmental Impacts 	<ul style="list-style-type: none"> Public Policy Transmission Expansion Planning for Environmental Impacts
Technology and Infrastructure Investment	<ul style="list-style-type: none"> EMS/BMS System Upgrade Enterprise Information Management – Data Integration Access Management Application Platform Upgrade Database Upgrade and Platform Migration IT Infrastructure Automation IT Service Management Improvements Network Infrastructure Upgrade Cloud Computing Cybersecurity Protection Strategies Cybersecurity Operations Center Transmission and Generation Scheduling System Replacement 	<ul style="list-style-type: none"> Enterprise Information Management – Data Integration Advanced Test Automation Cloud Computing Cybersecurity Protection Strategies Cybersecurity Operations Center Market Platform Modernization IT Infrastructure Automation IT Service Management Improvements Database Upgrade and Platform Migration Transmission and Generation Scheduling System Replacement 	<ul style="list-style-type: none"> MIP Upgrade Advanced Test Automation Cloud Computing Cybersecurity Protection Strategies Cybersecurity Operations Center Market Platform Modernization IT Infrastructure Automation Database Upgrade and Platform Migration 	<ul style="list-style-type: none"> Advanced Test Automation Cloud Computing Cybersecurity Protection Strategies Cybersecurity Operations Center Market Platform Modernization IT Infrastructure Automation Database Upgrade and Platform Migration
Efficient and Flexible Business Model	<ul style="list-style-type: none"> Oracle Financials Upgrade Rate Schedule 12 Settlement Customer Relationship Management Enhancements Financial Risk Assessment and Scoring Enhancements 	<ul style="list-style-type: none"> Financial Risk Assessment and Scoring Enhancements Settlement Systems Redesign Credit Management System and Consolidated Invoice Data Integration Meter Services Entity Administration 	<ul style="list-style-type: none"> Financial Risk Assessment and Scoring Enhancements Settlement Systems Redesign Budget Management and Reporting Tools Oracle Financials and Settlement System Data Integration Electronic Payments 	<ul style="list-style-type: none"> Financial Risk Assessment and Scoring Enhancements Settlement Systems Redesign Procure to Pay Enhancements Electronic Payments Credit Management System Enhancements

Strategic Technologies

Managing grid reliability and the system planning processes that support long-term grid reliability are a strategic focus area for the NYISO. This strategy recognizes that the NYISO will need to continue to advance our capabilities in both of these areas in order to effectively manage an increasingly complex grid.

The NYISO is making a strategic investment in grid reliability and market operations software with the implementation of the new EMS/BMS system. This new system establishes a long-term platform for growth, offers higher levels of availability, and improves security of critical systems supporting grid reliability. It is expected that this new EMS/BMS platform will serve the NYISO for the next ten years, and provide a software architecture that will be able to integrate the new market and grid reliability capabilities that will keep the NYISO at the forefront of system operators around the globe.

The NYISO has also introduced technology improvements to expand capabilities related to the development of reliability, economic, and public policy planning studies. The recent migration of key system planning applications to a new cloud computing environment provides a highly flexible computing platform for our system planning engineers. This new computing environment can quickly scale in response to dynamic system planning study workloads, and helps position the System Planning group to be even more responsive to NYISO's stakeholders.

Over the next few years, the introduction and proliferation of DER and energy storage is expected to drive the need for more rapid changes in the NYISO's market systems. Grid reliability applications will also need new capabilities that allow the NYISO's Operations personnel to effectively manage an increasingly complex portfolio of energy resources.

NYISO market applications must provide customers with flexibility and options to adjust their market participation model as their blend of resources change. With the integration of DER and energy storage, grid resources will become more dynamic. Aggregations of resources will vary the blend of storage, generation, and load reduction capabilities over time.

These fundamental changes in the business model call for more modern software delivery processes and contemporary architectural designs to respond to market changes. Implemented together, modern software delivery pipelines and application architecture changes can significantly improve the NYISO's ability to respond quickly to needed market changes, and deliver these new functions to the market with greater efficiency.

Beyond the need for market system agility, new information delivery capabilities will be needed by market participants as both traditional resource and distributed resource operators increasingly automate their activity with on-demand systems. These advanced systems will require improved access to NYISO information and timely notification of key market or grid reliability events. Systematic access to NYISO information and notification of important system events will be critical for large-scale management of distributed resources. It will be a challenge to scale the NYISO's current data services architecture to the levels sufficient to meet the likely future needs of

market participants. The NYISO will need to add new channels for data access and subscription-based event notifications to support robust, scalable business-to-business integration.

The strategic IT objectives listed below, implemented collectively and in collaboration with our business partners, will provide a significant improvement in the NYISO's ability to respond more quickly to changing market needs while also maintaining the high quality that market participants expect.

Modernize Delivery Capabilities and Application Architecture

- Strategic initiatives to integrate DER and ESR into our wholesale markets highlight the increasing demands to adapt IT systems more quickly to meet rapidly changing business needs. Modern software delivery approaches and more contemporary systems architecture provide an opportunity to significantly improve IT responsiveness to emerging business needs.

Increase Infrastructure Automation and Enhance IT Service Management

- Increased adoption of new technologies, changing development methodologies and advancing security practices all contribute to a more complex IT Infrastructure. This complex environment will create additional resource pressure and demand for increased agility from the IT organization. A strategic emphasis on increased automation and improved IT service management processes is required to effectively support the new, modern operating environment.

Mature the Enterprise Cloud Management Framework

- With the adoption of cloud computing, significant change has been introduced to IT support and operational structures. In order to ensure that we can successfully integrate and manage cloud computing, existing practices will continue to evolve as we implement new operational models and integration methods.

Advance Cyber Security Risk Management Capabilities

- Cyber-attacks are becoming more prevalent and attackers are adapting and evolving the methods they employ in innovative ways. Continuing the development of a comprehensive security program ensures a heightened ability to detect, respond to, and mitigate cyber security risks.

Corporate Governance

Board of Directors

Ave M. Bie, Board Chair

Partner in the law firm of Quarles & Brady and former Chair of the Wisconsin Public Service Commission

Daniel C. Hill, Board Vice Chair

Former Senior Vice President and Chief Information Officer of Exelon Corporation

Michael B. Bemis

Former President of Exelon Power and President of Energy Delivery for the Exelon Corporation, Chief Executive of London Electricity, and Executive Vice President for Entergy Corporation

Robert A. Hiney

Former Executive Vice President for Power Generation of the New York Power Authority

Roger B. Kelley

Former President and CEO of the New York Power Authority, and former President and CEO of Fortistar Renewables

Mark S. Lynch

Former President and CEO of New York State Electric and Gas Corporation and Rochester Gas and Electric Corporation, and former President and CEO of the New York Independent System Operator

James V. Mahoney

President and CEO of Energy Market Solutions, former President and CEO of DPL, and former President and CEO of EarthFirst Technologies

Teresa F. Marrinan

Former Senior Vice President, US SBU Commercial for The AES Corporation, former officer for the Dayton Power and Light Company, and a former Founding Partner of Hanover Strategy Advisors LLC

Thomas F. Ryan, Jr.

Former President and Chief Operating Officer of the American Stock Exchange

Richard J. Dewey

President and CEO of the New York Independent System Operator

Corporate Officers

Richard J. Dewey

President & CEO

Robert E. Fernandez

Executive Vice President, General Counsel & Chief Compliance Officer

Emilie Nelson

Executive Vice President

Rick Gonzales

Senior Vice President & Chief Operating Officer

Rana Mukerji

Senior Vice President, Market Structures

Douglas L. Chapman

Vice President & Chief Information Officer

Diane L. Egan

Corporate Secretary & Board Secretary

Cheryl L. Hussey

Vice President & Chief Financial Officer

Kevin Lanahan

Vice President, External Affairs & Corporate Communications

Robb Pike

Vice President, Market Operations

Zachary G. Smith

Vice President, System & Resource Planning

Wesley J. Yeomans

Vice President, Operations

NYISO by the numbers

An Authoritative Source Informing New York's Energy Future

Since 1999, the New York Independent System Operator (NYISO) has provided factual information to policymakers, stakeholders and investors in the power system in support of reliable grid operations and efficient, competitive markets.



19.8M
New Yorkers served

NYISO Footprint



435
Market Participants



11,173
circuit miles
of transmission
managed and
monitored



161,114
total electric energy
usage, in GWh, for 2018

Supply & Demand

33,956

record peak
demand, in MW,
July 2013



700+

power
generating
units



26%

of electric energy
from renewables
in 2018



Clean Energy

1,985

nameplate
capacity for
wind energy
in 2019



16.9%

power grid's contribution
to CO₂ emissions in NYS



56%

energy produced from
zero-emitting generation,
statewide

Reduced Emissions Rates

Source: U.S. EPA Air Markets Program data since NYISO launched competitive markets



51%

Carbon
Dioxide CO₂



89%

Nitrogen
Oxide NO_x



98%

Sulfur
Dioxide SO₂





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