New York ISO
Independent System Operator

System & Resource Outlook Report

Economic Planning Department

Business Issues Committee (BIC)

Wednesday August 17th, 2022 - WebEx

Agenda

- NYISO's Economic Planning Process: Overview
- System & Resource Outlook Report: Key Findings Review
- Next Steps

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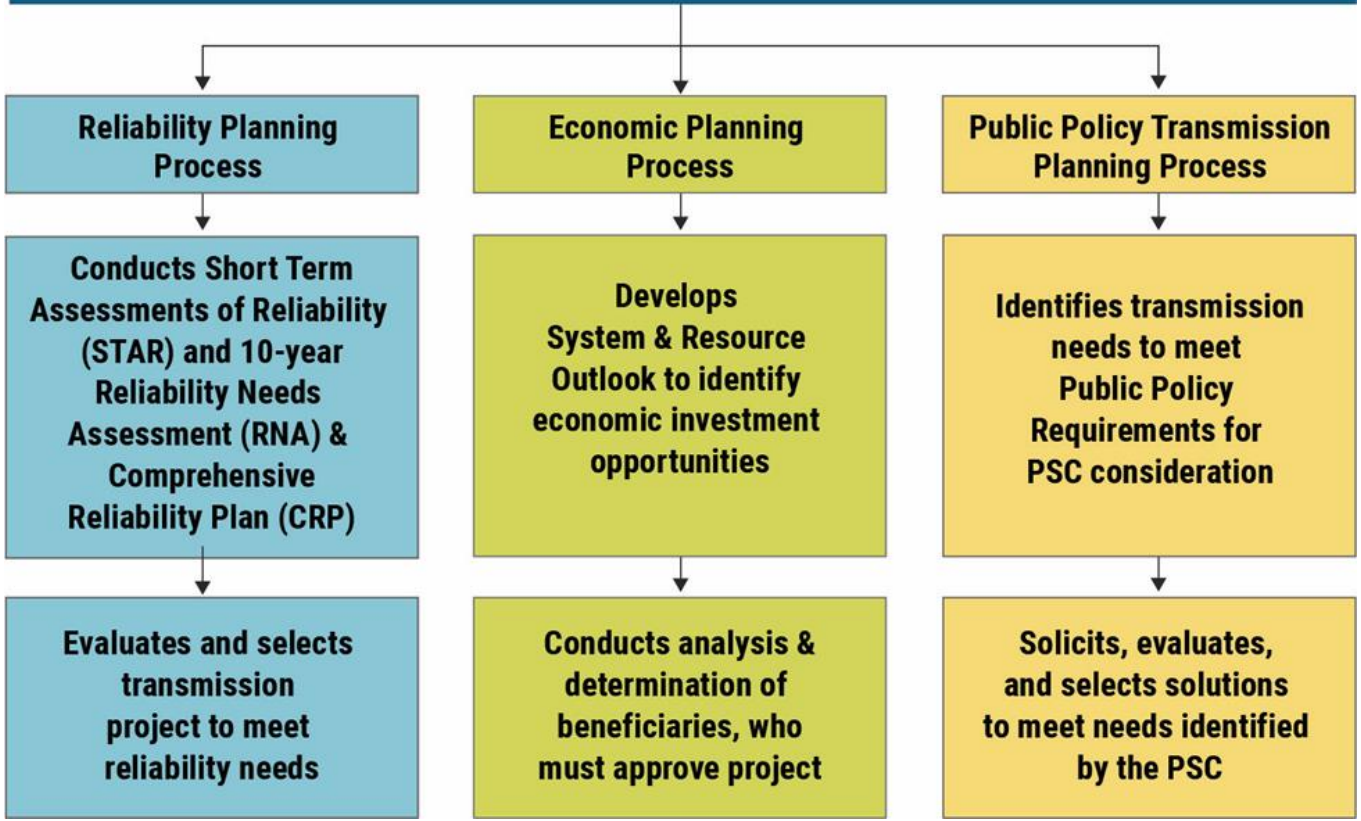
Background and Objectives: NYISO's Economic Planning Process

NYISO Comprehensive System Planning Process



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System & Resource Outlook: Objectives

1. Create a biennial report that summarizes the current assessments, evaluations, and plans in the biennial Comprehensive System Planning Process
2. Produce a twenty-year projection of system conditions for demand, generation, and transmission across the New York transmission system
3. Identify, rank, and group congested elements
4. Assess the potential benefits of addressing congestion
5. Develop informative scenario cases
6. Perform technical analyses to inform internal and external stakeholders

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System & Resource Outlook Scope

Model Development

- Reference cases
- Sensitives and Scenarios

Congestion Assessment

- Historic & Future Transmission Congestion
- Congestion Relief Analysis

- Renewable Pocket Formation
- Energy Deliverability Assessment

- Projected Operations & Market Impact Analysis

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System & Resource Outlook Report: Key Findings

Key Findings

Critical Factors for New York's CLCPA Success

Add New Resources

To meet policy objectives, over 95 GW of new zero-emission resources will be required by 2040, at least 20 GW needs to be added in the next 7 years

Expand Transmission

The current New York transmission system, at both local and bulk levels, is inadequate to achieve currently required policy objectives.

Maintain Reliability

Dispatchable emission-free resources must be developed and deployed throughout New York.

The NYISO Will

Review Its Wholesale Market Rules

and the related electric system reliability rules needed to reliably operate the electric system and to facilitate the orderly transition of replacement resources by providing investment and resource retention incentives consistent with the reliability needs.

Identify Needs & Opportunities

Continue to assess the evolving system and identify the challenges and opportunities associated with achieving state policies in an economic and reliable manner

Solicit Stakeholder Feedback

on Public Policy Transmission Needs

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Key Finding 1:

✓ **The pace of renewable project development is unprecedented and requires an increase in the pace of transmission development**

Every incremental advancement towards policy achievement matters on the path to a greener and reliable grid in the future, not just at the critical deadline years such as 2030 and 2040. In general, resource and transmission expansion take many years from development to deployment.

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Key Finding 2:

✓ **Coordination of project additions and retirements is essential to maintaining reliability and achieving policy.**

Coordination of renewable energy additions, commercialization and development of dispatchable technologies, fossil fuel plant operation, and staged fossil fuel plant deactivations over the next 18 years will be essential to facilitate an orderly transition of the grid.

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Key Finding 3:

✓ **Significant new resource development will be required to achieve CLCPA energy targets.**

The total installed generation capacity to meet policy objectives within New York is projected to range between 111 GW and 124 GW by 2040. At least 95 GW of this capacity will consist of new generation projects and/or modifications to existing plants. Even with these additions, New York still may not be sufficient to fully meet CLCPA compliance criteria and maintain the reliable electricity supply on which New York consumers rely. The sheer scale of resources needed to satisfy system reliability and policy requirements within the next 20 years is unprecedented.

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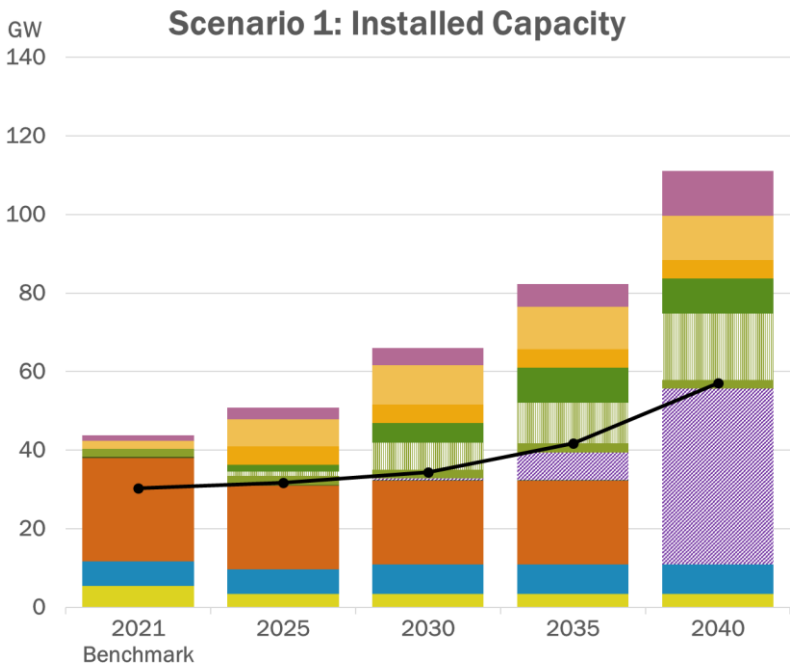
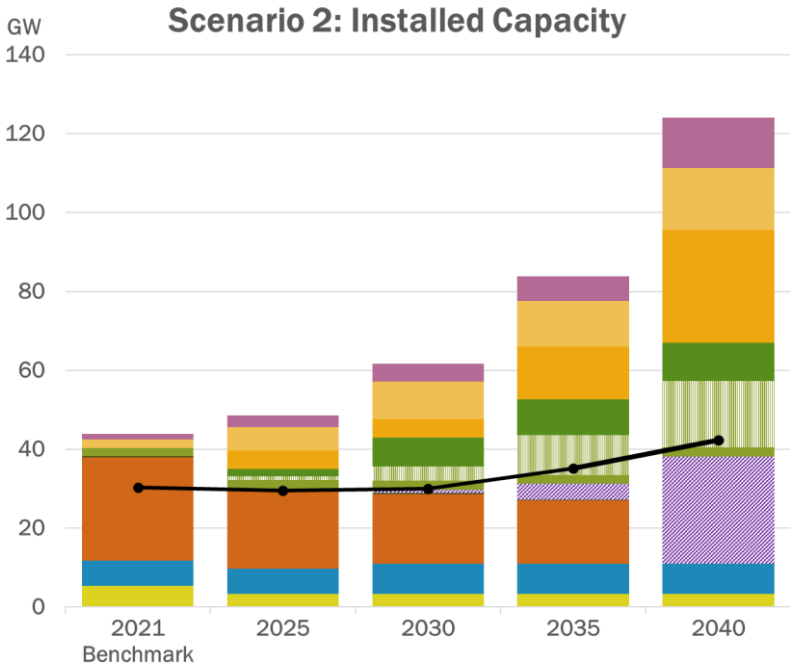
New York Generation Resource Mix Scenarios and Demand Forecast





ExistingNuclear | NewNuclear | Hydro | ExistingFossil | NewFossil | Other | DEFR
ExistingLBW | NewLBW | OSW | UPV | BTM-PV | ESR | Peak Load

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Key Finding 4:

✓ **To achieve an emission-free grid, dispatchable emission-free resources (DEFRs) must be developed and deployed throughout New York.**

DEFRs that provide sustained on-demand power and system stability will be essential to meeting policy objectives while maintaining a reliable electric grid. While essential to the grid of the future, such DEFR technologies are not commercially viable today. DEFRs will require committed public and private investment in research and development efforts to identify the most efficient and cost-effective technologies with a view towards the development and eventual adoption of commercially viable resources. The development and construction lead times necessary for these technologies may extend beyond policy target dates.

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Key Finding 5:

✓ **As the energy policies in neighboring regions evolve, New York's imports and exports of energy could vary significantly due to the resulting changes in neighboring grids.**

New York is fortunate to have strong interconnections with neighboring regions and has enjoyed reliability and economic benefits from such connections. The availability of energy for interchange is predicted to shift fundamentally as policy achievement progresses. Balancing the need to serve demand reliably while achieving New York's emission-free target will require continuous monitoring and collaboration with our neighboring states.

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Key Finding 6:

✓ **Transmission limitations prevent full delivery of renewable energy.**

A minimum of 5 TWh of renewable energy in 2030 and 10 TWh in 2035 is projected to be curtailed due to transmission limitations in renewable pockets. This equates to roughly 5% less renewable energy that can be produced, and thus may not be counted toward the CLCPA targets.

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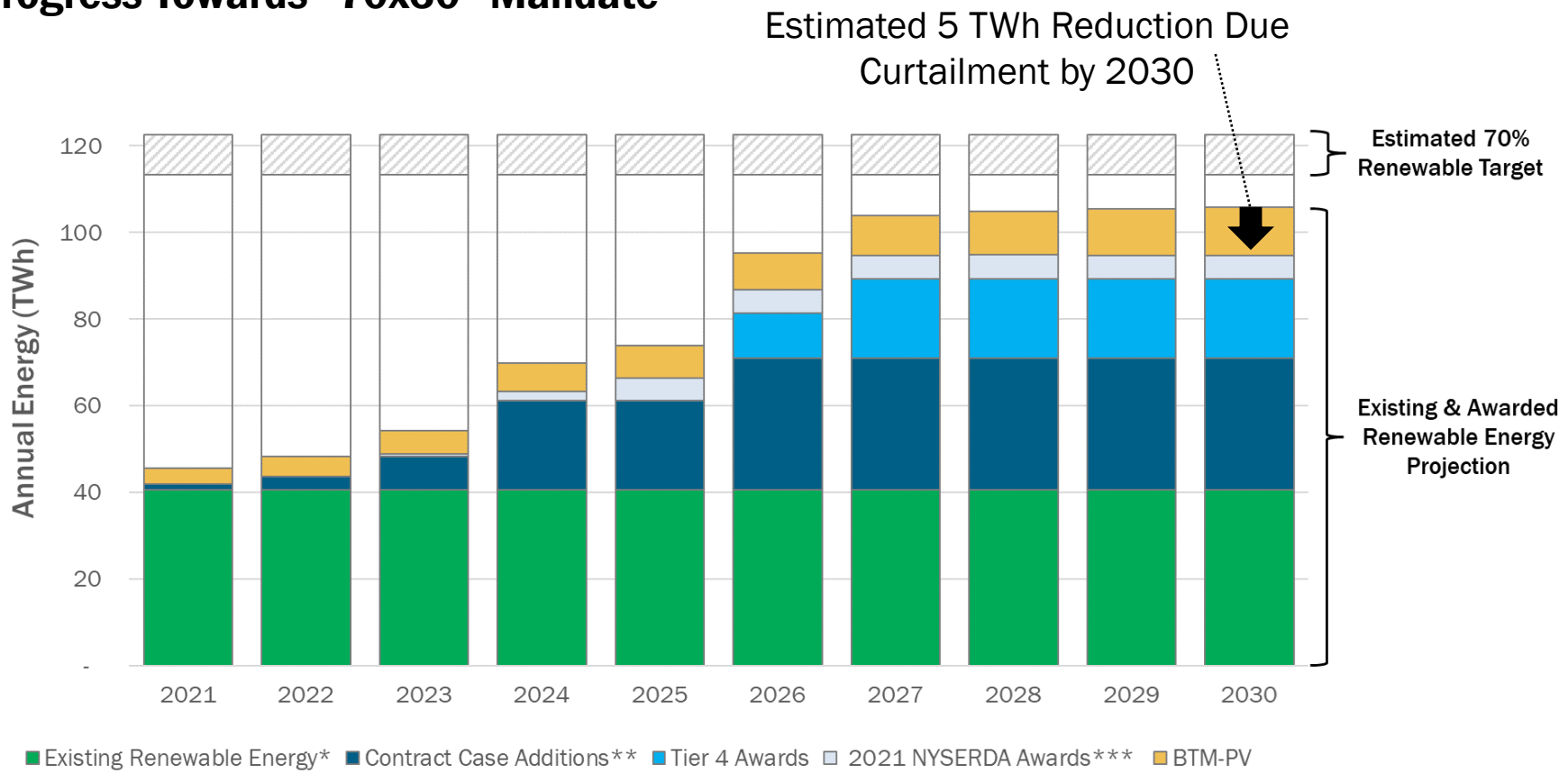
Progress Towards “70x30” Mandate



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Key Finding 7:

✓ **Transmission expansion is critical to facilitating efficient CLCPA energy target achievement.**

The current New York transmission system, at both local and bulk levels, is inadequate to achieve currently required policy objectives. Some renewable generation pockets throughout the State already face curtailments, more curtailments will be experienced in the future and will become more constrained as an increasing number of intermittent generation resources interconnect.

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Key Finding 8:

✓ **Four pockets will particularly benefit from transmission expansion.**

The Finger Lakes (Z1), Southern Tier (Z2), Watertown (X3), and Long Island. Without investment in transmission, these areas of the New York grid will experience persistent and significant limitations to deliver the renewable power from these pockets to consumers in the upcoming years.

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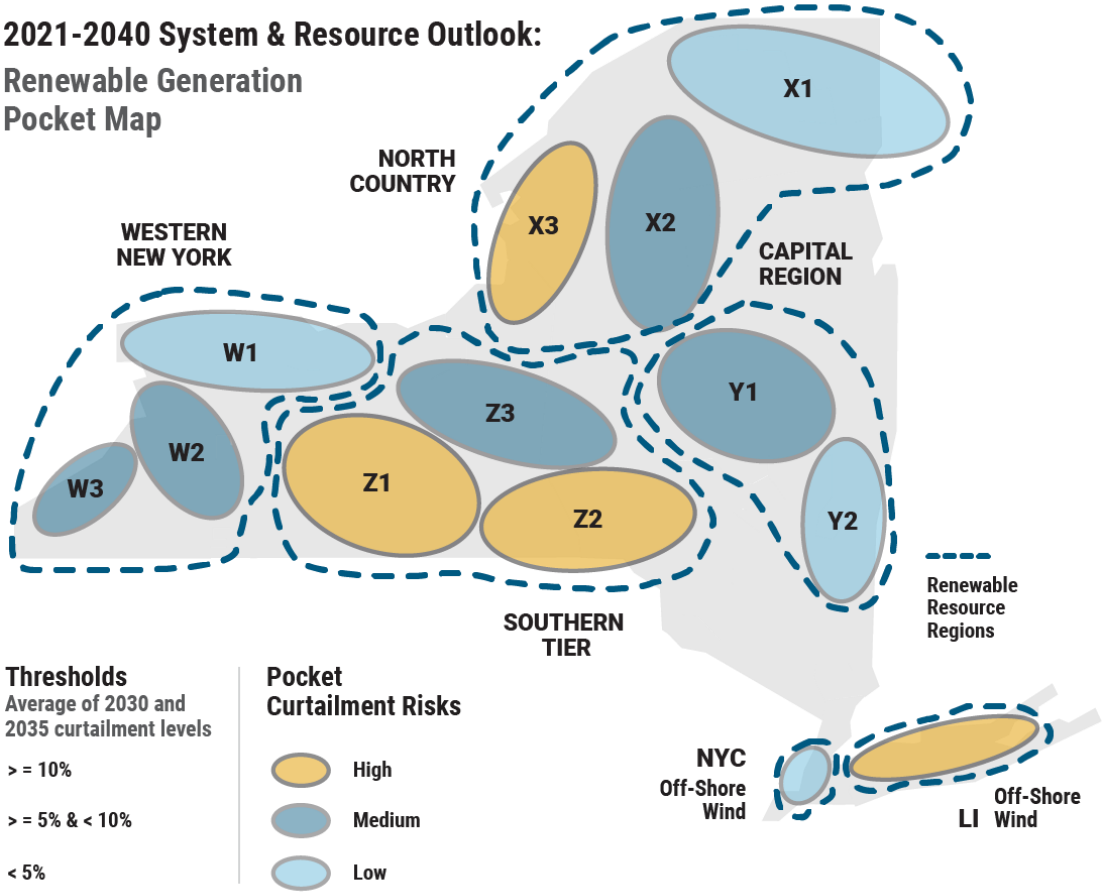
2021-2040 System & Resource Outlook:

Renewable Generation Pocket Map



Thresholds
Average of 2030 and 2035 curtailment levels

- > = 10%
- > = 5% & < 10%
- < 5%

Pocket Curtailment Risks

- High
- Medium
- Low

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Next Steps

Next Steps

- Post Comments from Independent Market Monitor
- Seek Management Committee Approval on August 31
- Seek Board of Directors Approval in September
- Public Information Session After Board Approval

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Questions, Feedback, Comments?

Email additional feedback to:
JFrasier@nyiso.com

2021-2040 Outlook Data Catalog

ESPWG/TPAS Presentations

May 20, 2021
- Model Benchmark Results

September 22, 2021
- System & Resource Outlook Update

October 25, 2021
- Capacity Expansion Model Primer
- System & Resource Outlook Update

November 19, 2021
- System & Resource Outlook Update

December 19, 2021
- System & Resource Outlook Update

January 25, 2022
- System & Resource Outlook Update

February 9, 2022
- System & Resource Outlook Update
- Base & Contract Case Results

February 25, 2022
- System & Resource Outlook Update

March 8, 2022
- System & Resource Outlook Update

March 24, 2022
- System & Resource Outlook Update
- Contract Case Congestion Analysis

April 1, 2022
- System & Resource Outlook Update

April 26, 2022
- System & Resource Outlook Update

May 23, 2022
- System & Resource Outlook Update

June 2, 2022
- System & Resource Outlook Update

June 8, 2022
- System & Resource Outlook Update
- Updated 6/2 Presentation

June 21, 2022
- System & Resource Outlook Update

August 8, 2022
- System & Resource Outlook Update

Reports

2022 Release

- 6/7 – Draft Report Chapter 1
- 6/16 – Draft Report Chapters 1-4
- 6/21 – Draft ES + Chapters 1-5
- 7/14 – Draft Report
- 7/14 – Draft Appendix
- 7/26 – Draft Appendix
- 8/8 – Draft Report
- 8/8 – Draft Appendix

Data Posted to ESPWG

- Assumptions Matrix v1
- Capacity Expansion Assumptions Matrix v1
- Contract Case Renewable Projects
- Emissions Price Forecast
- Fuel Price Forecast
- Capacity Expansion Assumptions Matrix v2 (Redline)
- Capacity Expansion Assumptions Matrix v3 (Redline)
- Production Cost Assumptions Matrix v2 (Redline)
- Capacity Expansion Assumptions Matrix v4 (Redline)
- Capacity Expansion Assumptions Matrix v5 (Redline)
- Policy Case Hourly Load Forecasts
- Policy Case Zonal Capacity Expansion Preliminary Results
- Capacity Expansion Assumptions Matrix v6 (Redline)
- Capacity Expansion Assumptions Matrix v7 (Redline)
- S1 & S2 New Generator Additions
- Hourly Load Forecasts
- Capacity Expansion Assumptions Matrix – Final
- Production Cost Assumptions Matrix - Final

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Our Mission & Vision

Mission

Ensure power system reliability and competitive markets for New York in a clean energy future

Vision

Working together with stakeholders to build the cleanest, most reliable electric system in the nation

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