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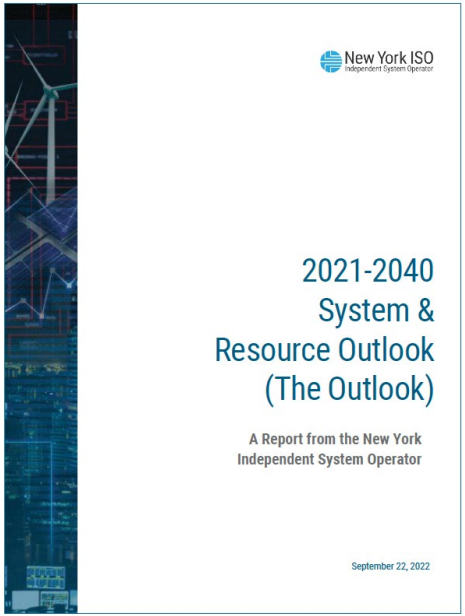
Independent System Operator

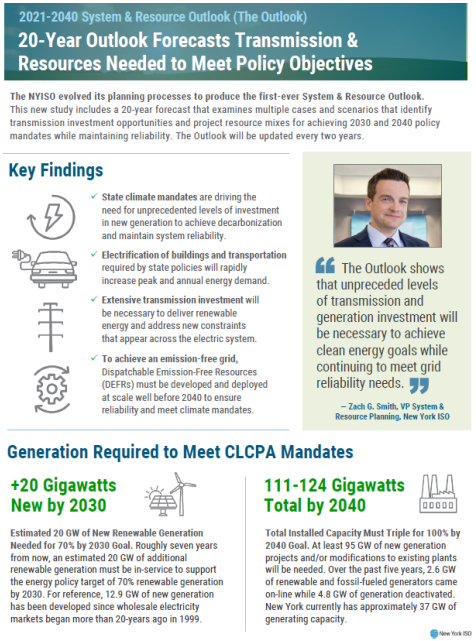
# 2021–2040 System & Resource Outlook (The Outlook)

Zach Smith – VP System & Resource Planning

# Report and Datasheet




Link: 2021-2040 Outlook Report (nyiso.com)




Link: 2021-2040 Outlook Datasheet (nyiso.com)

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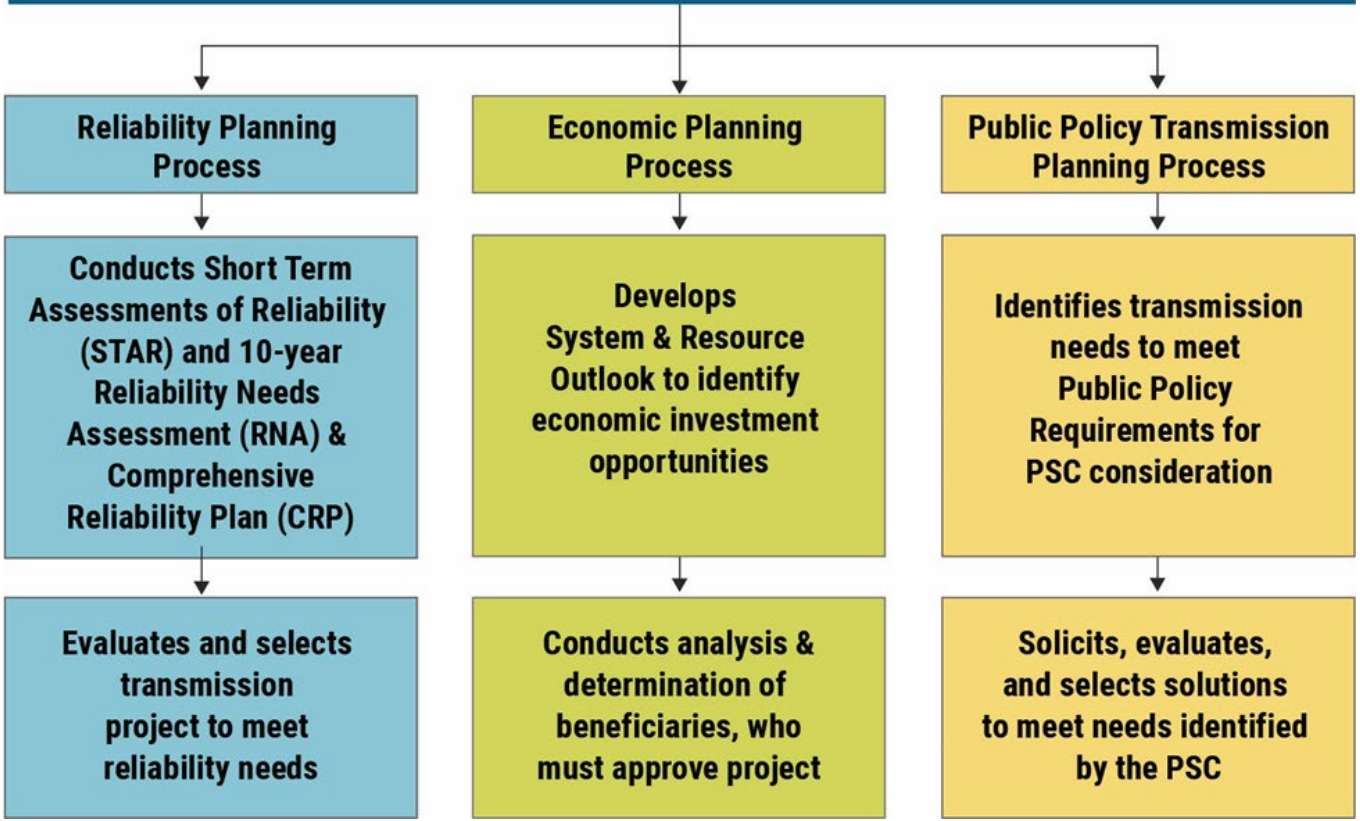
# NYISO's Economic Planning Process

# 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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# 2021 – 2040 System & Resource Outlook: Key Findings

# Reference Cases

- **Baseline Case** – The Baseline is a "business-as-usual" type scenario that aligns with the Reliability Planning Process to define the demand, generation, and transmission assumptions. Strict inclusion rules limit the number of new projects that are assumed to be completed in this case for consideration, and generic future generation is added to meet reliability requirements through 2030, if needed. The Baseline utilizes the demand and energy forecasts from *the 2021 NYISO Load & Capacity Data Report* (Gold Book).
- **Contract Case** – This case builds upon the Baseline Case by adding incremental renewable generation projects that have been the announced recipients of project awards and financial contracts with the state (e.g., NYSERDA Renewable Energy Certificates (REC) contracts) and thus have a higher likelihood of completion, even though they do not yet meet Baseline Case inclusion rules.
- **Policy Case** – Assumptions in the Policy Case reflect the federal, state, and local policies that impact the New York power system. Examples of policies modeled in this case include the 70 x 30 renewable mandate and the 2040 zero-emissions directive. To align policy-based review, this system representation will also be utilized as part of the Public Policy Process, including evaluation of the Long Island Offshore Wind Export Public Policy Transmission Need.

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# Policy Case Scenarios

The NYISO utilized a capacity expansion model to estimate possible system resource mixes over the next 20 years. Two specific generation buildout scenarios were selected from the multitude of capacity expansion simulations performed to reasonably bound impacts and formulate a detailed nodal production cost simulation model.

- Scenario 1: Utilizes industry data and NYISO load forecasts, representing a future with high demand (57,144 MW winter peak and 208,679 GWh energy demand in 2040) and assumes less restrictions in renewable generation buildout options.
- Scenario 2: Utilizes various assumptions more closely aligned with the Climate Action Council Integration Analysis and represents a future with a moderate peak but a higher overall energy demand (42,301 MW winter peak and 235,731 GWh energy demand in 2040).

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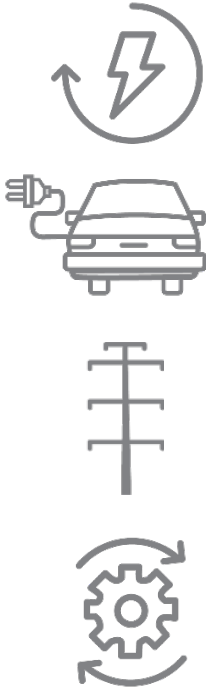
# Key Findings



- ✓ **State climate mandates** are driving the need for unprecedented levels of investment in new generation to achieve decarbonization and maintain system reliability.
- ✓ **Electrification of buildings and transportation** required by state policies will rapidly increase peak and annual energy demand.
- ✓ **Extensive transmission capability** will need to be added to deliver renewable energy and address new constraints that appear across the electric system.
- ✓ **To achieve an emission-free grid,** Dispatchable Emission-Free Resources (DEFRs) must be developed and deployed at scale well before 2040 to ensure reliability and meet climate mandates.

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# Generation Required to Meet CLCPA Mandates

## +20 Gigawatts New by 2030

Roughly seven years from now, an estimated 20 GW of additional renewable generation must be in-service to support the energy policy target of 70% renewable generation by 2030. For reference, 12.9 GW of new generation has been developed since wholesale electricity markets began more than 20-years ago in 1999.

## 111-124 Gigawatts Total by 2040

Total Installed Capacity must triple for 100% by 2040 Goal. At least 95 GW of new generation projects and/or modifications to existing plants will be needed. Over the past five years, 2.6 GW of renewable and fossil-fueled generators came on-line while 4.8 GW of generation deactivated. New York currently has approximately 37 GW of generating capacity.

# Key Finding 1:

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

Each incremental advance towards policy achievement matters on the path to a greener and reliable grid in the future, not just at the critical deadline years. While the policy mandates targets years 2030 and 2040, resource and transmission expansion has historically taken many years from development to commercial 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 grid integration of new, dispatchable, emission free 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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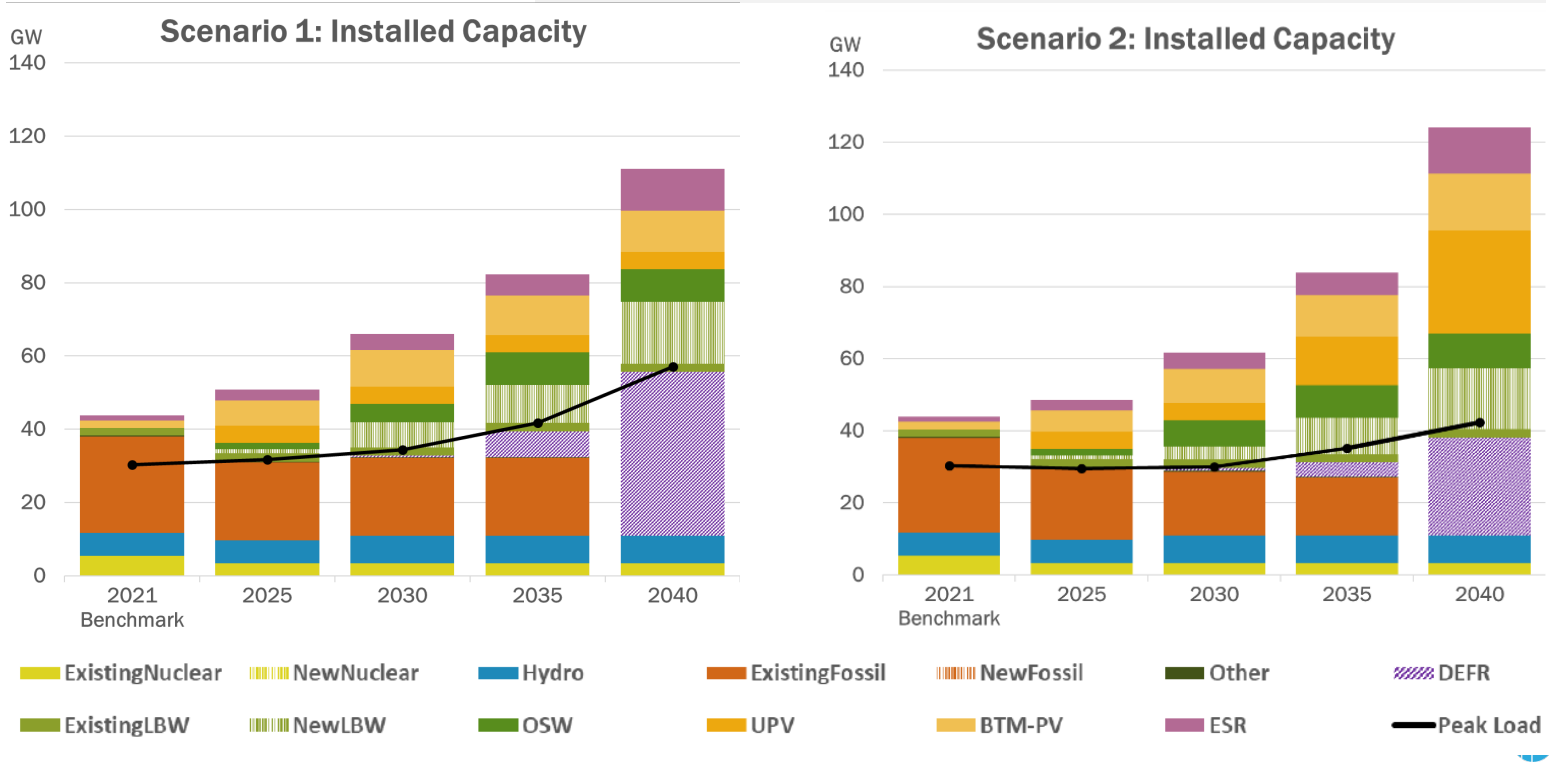
# Key Finding 3:

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



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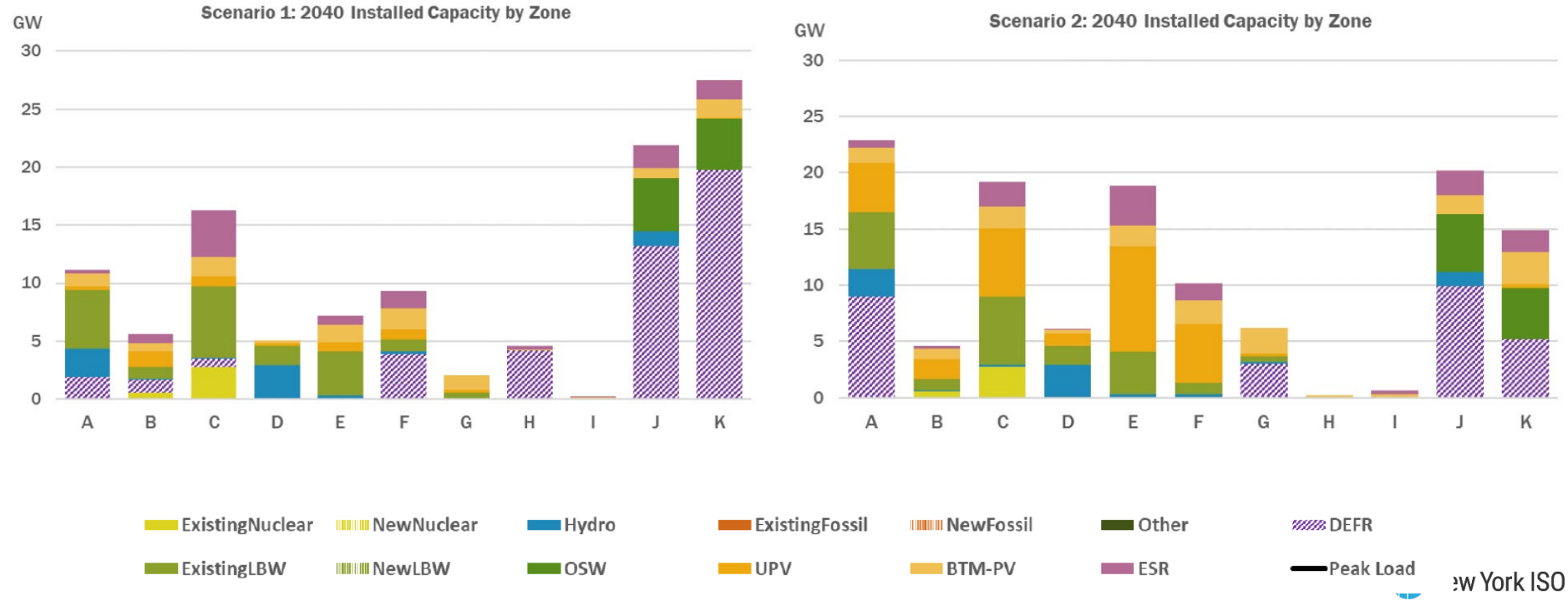

# Key Finding 4:

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

Innovation of DEFRs that provide sustained on-demand power and system stability will be essential to meeting policy objectives while maintaining a reliable electric grid. Today DEFR technologies are not commercially viable at the utility scale required to transition to the grid of the future. Success requires committed public and private research and development efforts to identify efficient and cost-effective technologies with a view towards the development and eventual adoption of commercially viable, market-based resources.

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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 counted toward the CLCPA targets.

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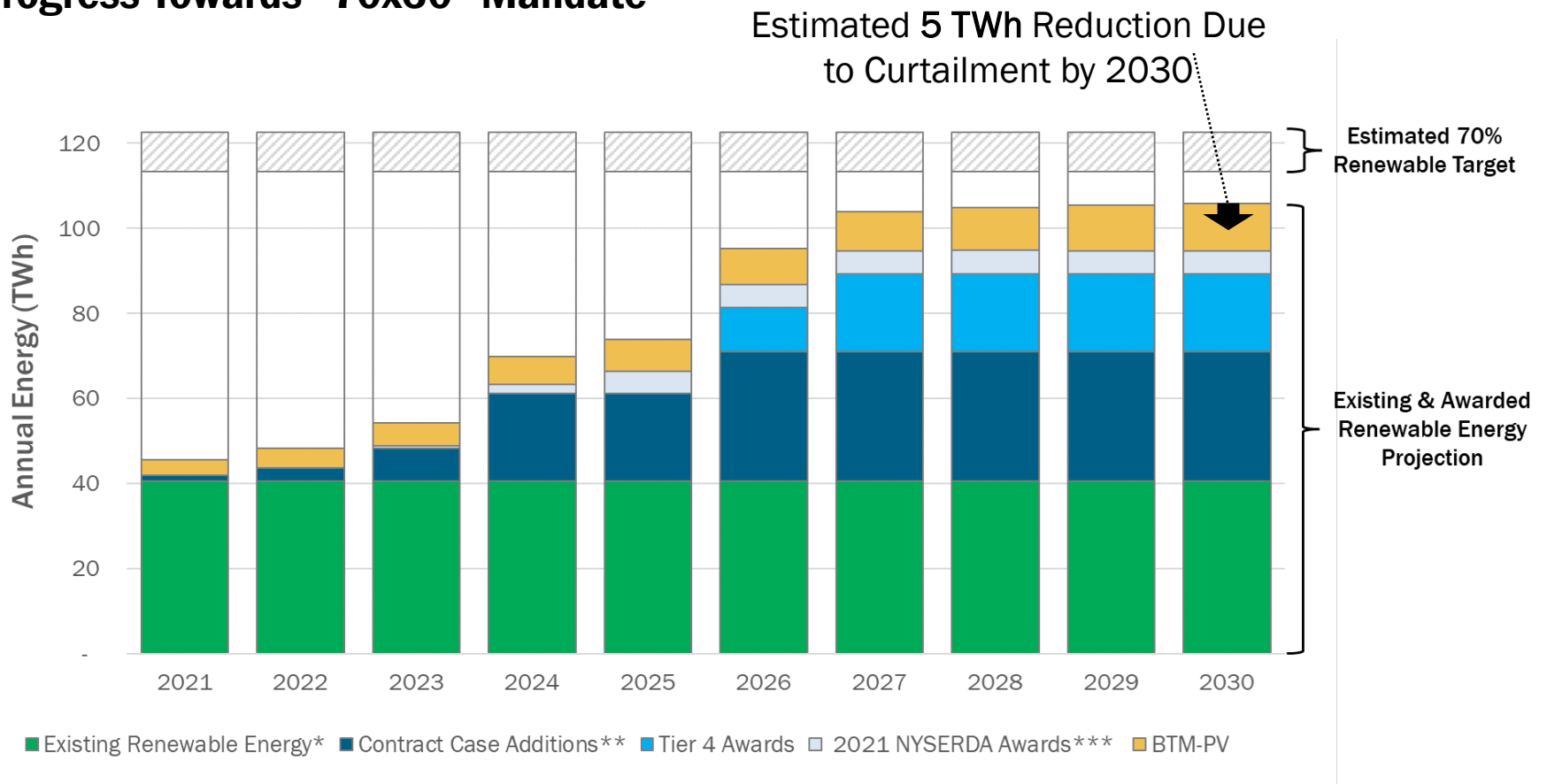
# Progress Towards “70x30” Mandate

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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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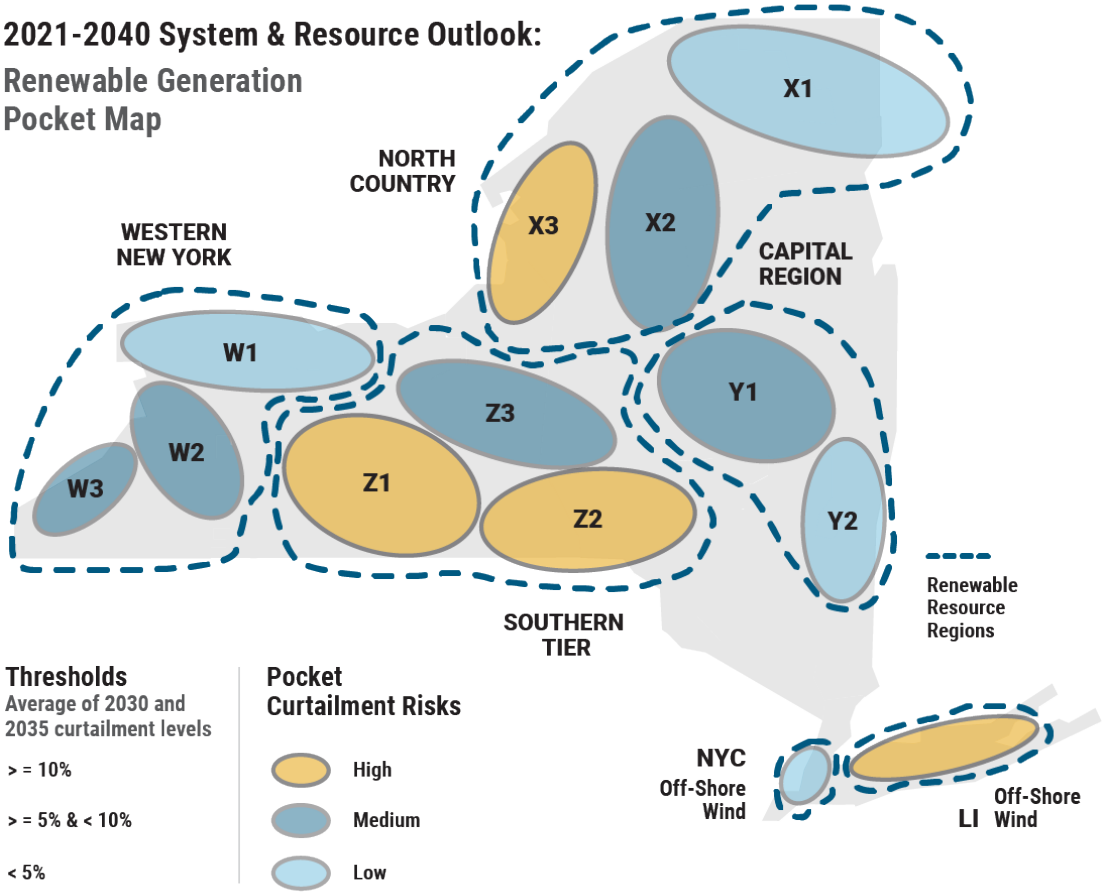
# 2021-2040 System & Resource Outlook:

## Renewable Generation Pocket Map

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# Questions?

# 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

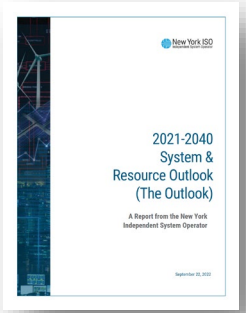
**June 21, 2022**
- System & Resource Outlook Update

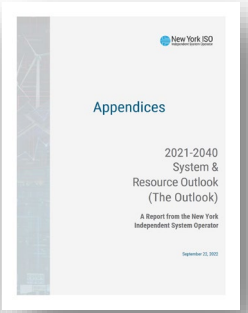
**August 8, 2022**
- System & Resource Outlook Update

**August 17, 2022 (BIC)**
- System & Resource Outlook Update

**August 31, 2022 (MC)**
- System & Resource Outlook Update

## Reports




## 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
- Detailed Model Output Data File

### DRAFT REPORTS

- **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
- 8/17 – Draft Report
- 8/17 – Draft Appendix
- 8/31 – Draft Report
- 8/31 – Draft Appendix

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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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