

2021-2040

System & Resource Outlook

Executive Summary

[In Progress]

1. State of NYISO System & Resource Planning

The System & Resource Outlook (“The Outlook”) represents the primary report produced by the Economic Planning Department with System & Resource Planning. The Outlook provides a comprehensive overview of system resources and transmission constraints throughout New York, highlighting opportunities for transmission investment driven by economics and public policy. The Outlook is developed through the Economic Planning Process, which is part of the NYISO’s Comprehensive System Planning Process (“CSPP”). Through the CSPP, numerous assessments, evaluations, and plans are developed and relied upon by the NYISO to conduct transmission system planning processes, including the following: demand forecast & analysis, Short-Term Reliability Process, Reliability Planning Process, Public Policy Transmission Planning Process, interregional planning, and Interconnection Studies.

1.1. Demand Forecast & Analysis

The NYISO published the *2022 Load & Capacity Data Report (“Gold Book”)*¹ on April 28, 2022. This report presents the NYISO load and capacity data for 2022 and future years, including historic and future energy and peak forecasts through 2052, existing and proposed generating capacity projected through 2032, and existing and proposed transmission facilities. Three load forecasts are produced, specifically the baseline forecast, the high load scenario, and the low load scenario. The two scenarios differ from the baseline forecast in assumptions on adoption of electric vehicles, building electrification, behind-the-meter solar (BTM-PV), and energy efficiency programs. Over a 30-year horizon, the NYCA baseline energy and summer peak demand forecast growth rates both increased compared to 2021, as shown in the following table:

	Average Annual Growth Rates							
	Baseline Energy Usage				Baseline Summer Peak Demand			
	Years 1-30	Years 1-10	Years 11-20	Years 21-30	Years 1-30	Years 1-10	Years 11-20	Years 21-30
2021 Gold Book (2021-51)	0.96%	-0.28%	1.15%	1.88%	0.20%	-0.24%	0.44%	0.39%
2022 Gold Book (2022-52)	1.04%	0.22%	2.25%	0.49%	0.39%	0.14%	0.68%	0.32%

Peak load and energy demand remains stable over the first decade of the forecast, as energy efficiency and behind-the-meter photovoltaic (BTM-PV) installations offset expected econometric load growth.

¹ <https://www.nyiso.com/documents/20142/2226333/2022-Gold-Book-Final-Public.pdf/>

Demand increases in the latter decades as increased adoption of electrification end uses in the building and transportation sector more than offset continued load reductions from energy efficiency and BTM-PV. Due to these forecasted changes, the NYCA system is expected to transition from a summer to a winter peaking system, driven principally by electrification of space heating, in the mid-2030s. The actual loads experienced by the electric system will depend on assumptions related to load flexibility and adoption rates of electrification across scenarios.

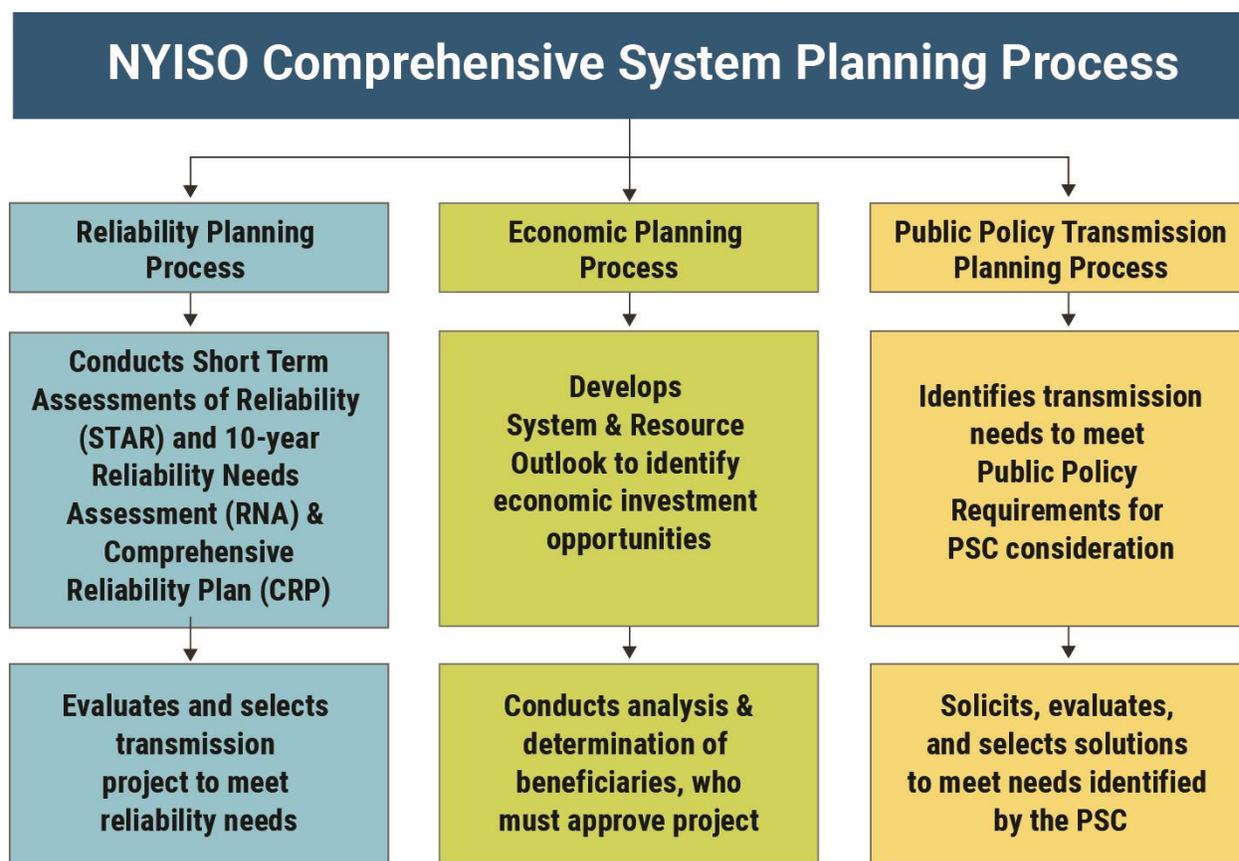
Total Resource Capability in NYCA for the summer of 2022 is projected to be 41,060 MW, which is a decrease of 11 MW compared to the information provided for summer 2021 in the 2021 *Gold Book*. This total includes 37,431 MW of NYCA generating capability, 1,164 MW of SCR, and 2,465 MW of net long-term purchases and sales with neighboring control areas. The NYCA generating capability includes 6,470 MW of renewable resources, including 4,274 MW of hydro, 1,818 MW of wind, 52 MW of large-scale solar PV, and 326 MW of other renewable resources. Since the publication of the 2021 *Gold Book* in April 2021, there has been a reduction of 1,091 megawatts (MW) of summer capability that has been deactivated. Over the same period, there has been an increase of 33 MW in summer capability due to new additions and updates, and a decrease of 92 MW of summer capability due to ratings changes. As a result, net summer capability as of March 15, 2022 is 37,520 MW, a decrease of 1,150 MW. The NYCA generating capability for summer 2022 is projected to be 359 MW lower than the capability reported for summer 2021 in the 2021 *Gold Book*. Additionally, the Gold Book reports on proposed generation, which includes 10,158 MW of wind, 7,109 MW of grid-connected solar, 4,302 MW of energy storage, and 3,262 MW of natural gas or dual-fuel projects.

1.2 Transmission Additions. The 2022 Gold Book also reports on proposed transmission facilities. Transmission additions include the Smart Path Connect Project, a priority transmission project approved by the New York Public Service Commission (“NYPSC”) under New York’s Accelerated Renewable Energy Growth and Community Benefit Act. Three public policy transmission projects have been added, as selected by the NYISO Board of Directors. Three public policy transmission projects have been selected to date: Western New York (Empire State Line by NextEra Energy Transmission New York, Inc.), AC Transmission Segment A (Segment A Double Circuit by LS Power Grid New York, LLC and NYPA), and AC Transmission Segment B (Segment B Knickerbocker-PV by National Grid and New York Transco). The selected developers have received siting approval of their transmission facilities from the NYPSC under Article VII of the Public Service Law, and all selected projects have commenced construction.

1.3 Comprehensive System Planning Process. Understanding the impacts to the generation, transmission, and load components of the bulk electric system is critical to understanding the challenges

to reliable electric service in the coming years. The NYISO is evolving its Comprehensive System Planning Process (“CSPP”) to match the pace of change on the grid while continuing to find needs and opportunities for investment to promote reliable and efficient operations.

The CSPP establishes the rules by which the NYISO solicits, evaluates, and selects the more efficient or cost-effective solutions to address reliability, economic, and public policy-driven transmission needs in New York. The NYISO’s CSPP has four components—the Local Transmission Planning Process, the Reliability Planning Process/Short-Term Reliability Process, the Economic Planning Process, and the Public Policy Transmission Planning Process. In concert with these four components, interregional planning is conducted with the NYISO’s neighboring control areas in the United States and Canada under the Northeastern ISO/RTO Planning Coordination Protocol.



1.3.1 Reliability Planning Process

The Reliability Planning Process is composed of four components:

1. Each transmission owner conducts a public Local Transmission Planning Process for its transmission district that feeds into statewide planning;
2. The quarterly Short-Term Assessments of Reliability (STARs) address near-term needs, with a focus on needs arising in the next three years. The Short-Term Reliability Process includes assessing the potential for reliability needs arising from proposed generator deactivations;
3. The Reliability Needs Assessment (RNA) focuses on longer-term reliability needs for years four through ten of a ten-year, forward looking study period; and
4. The Comprehensive Reliability Plan (CRP) integrates all of the planning studies into a ten-year reliability for New York.

Together, these processes enable the NYISO to nimbly identify reliability needs ranging from localized needs to broader statewide needs arising over the next decade.

The 2021-2030 Comprehensive Reliability Plan (CRP)² completed the NYISO's 2020-2021 cycle of the Reliability Planning Process. The 2020 Reliability Needs Assessment (RNA)³, approved by the NYISO Board of Directors in November 2020, was the first step of the NYISO's 2020-2021 Reliability Planning Process. The CRP followed the 2020 RNA and post-RNA updates and incorporates findings and solutions from the quarterly Short-Term Reliability Process. The study concluded that the New York State Bulk Power Transmission Facilities as planned will meet all currently applicable reliability criteria from 2021 through 2030 for forecasted system demand in normal weather. Some risk factors to system reliability are noted, namely tightening reserve margins due to additional loss of generation, any delays in planned transmission projects, and extreme weather events such as heatwaves or storms.

The CRP also notes that the mandates in New York's Climate Leadership and Community Protection Act ("CLCPA") of 70% of electricity from renewable resources by 2030 and 100% carbon free electricity by 2040 mark significant changes to the electric system, and that understanding the impacts of these mandates is critical to understanding the challenges of maintaining system reliability. Transmission will play a key role in moving power from the renewable resources to the load centers. Several transmission

² <https://www.nyiso.com/documents/20142/2248481/2021-2030-Comprehensive-Reliability-Plan.pdf/>

³ <https://www.nyiso.com/documents/20142/2248793/2020-RNAREport-Nov2020.pdf>

projects have been approved across upstate to accommodate delivery of renewable energy from northern New York. The NYISO is currently evaluating transmission solutions to address the NYSPSC-identified need for facilities to deliver power from offshore wind. Even with the potential benefits provided by these projects, several renewable generation pockets across the state are projected to persist, which could constrain output from renewable resources, including production from offshore wind. As the level of renewable resource generation increases, the grid will need sufficient flexible and dispatchable resources to balance variations in wind and solar output. The integration of batteries will help store energy for later use on the grid, which will aid with the short duration and daily cycles of reduced renewable output.

Looking ahead to 2040, the policy for a zero-emissions electricity demand system will also require the development of new technologies to maintain the supply demand balance. Substantial zero emission dispatchable resources will be required to fully replace fossil fuel-fired generation, which currently serves as the primary balancing resource. Long-duration, dispatchable, and emission free resources will be necessary to maintain reliability and meet the objectives of the CLCPA. Resources with this combination of attributes are not commercially available at this time but will be critical to future grid reliability.

1.3.2 Public Policy Transmission Planning Process

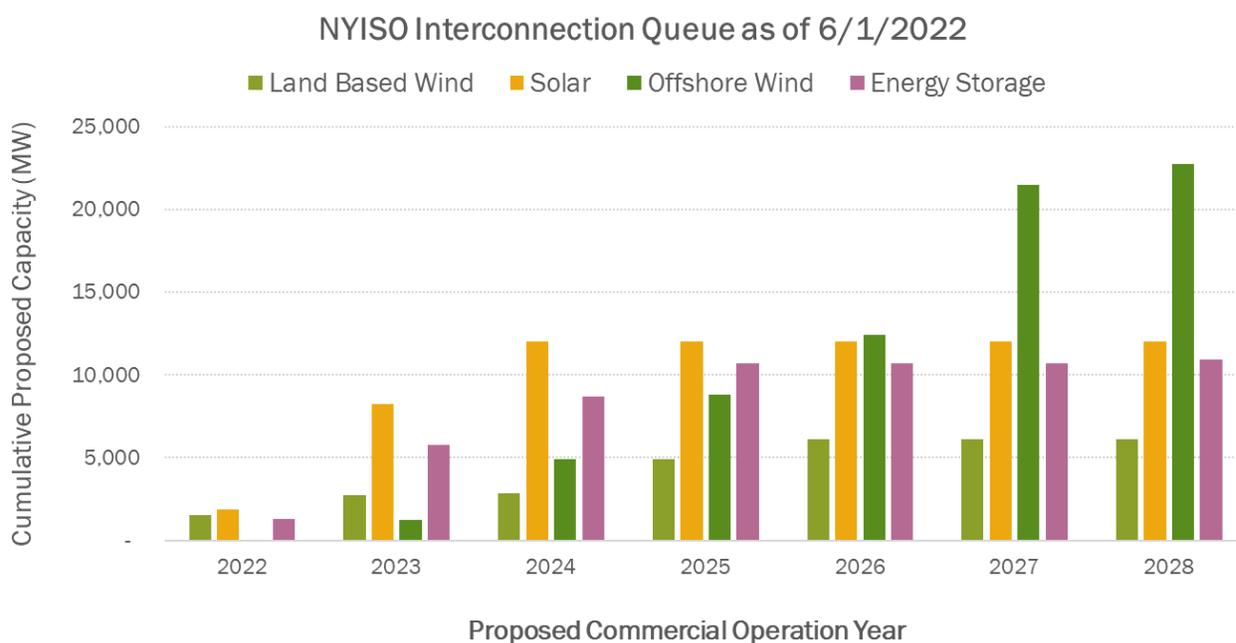
The Public Policy Transmission Planning Process (PPTPP) is a two-year process performed in parallel with the RNA and the CRP. It occurs in two phases: Phase I, Identify Needs and Assess Solutions; and Phase II, Transmission Evaluation and Selection. In Phase I, the NYISO solicits transmission needs driven by Public Policy Requirements, and the NYSPSC identifies transmission needs and defines additional evaluation criteria. The NYISO then holds a Technical Conference and solicits solutions to address the identified needs. Lastly, the NYISO performs the Viability and Sufficiency Assessment (VSA) on those solutions. In Phase II, the NYISO evaluates the viable and sufficient transmission solutions and recommends the more efficient or cost-effective solution. Thereafter, the NYISO Board may select a transmission solution for purposes of cost allocation and recovery under the NYISO Tariff.

In August 2020, the NYISO solicited transmission needs and received 15 proposals for transmission needs driven by Public Policy Requirements, including the CLCPA and the Accelerated Renewable Growth and Community Benefit Act, and submitted those proposals to the NYSPSC. Eleven of those proposals, associated with the development of transmission in support of offshore wind generation, were also submitted to the Long Island Power Authority for consideration. In its comments to the NYSPSC, the NYISO expressed its support for declaration of Public Policy Transmission Needs to deliver renewable energy to consumers from upstate generation pockets, offshore wind facilities connected to Long Island, and offshore wind facilities connected to New York City.

In March 2021, the NYSPSC issued an order declaring that offshore wind goals are driving the need for additional transmission facilities to deliver that renewable power from Long Island to the rest of New York State. The NYSPSC referred the identified need to the NYISO to solicit potential solutions. Nineteen projects were proposed by four developers, sixteen of which were found to be Viable and Sufficient. The Evaluation and Selection phase for these projects is ongoing.

1.4 Interconnection Studies

The NYISO’s Interconnection processes⁴ are crucial to facilitating the development and interconnection of proposed generation, transmission, and load facilities to the NYCA system. The interconnection planning process supports grid reliability in that it identifies potential adverse impacts due to proposed interconnection projects, and requires coordination between the NYISO, developers, and associated transmission owners throughout the process. These ongoing processes are necessary to accommodate the significant portfolio of new projects that developers are proposing to interconnect to the grid in response to state policies. Of note, a significant portion of the new projects are renewable energy and energy storage resources, as shown below in [placeholder for figure] to help address these policies.



⁴ <https://www.nyiso.com/interconnections>

Similar to other NYISO Planning Studies, the NYISO's Interconnection planning process is key to the generation and load assumptions in the 2021-2040 System and Resource Outlook study. As it pertains to the Outlook study, the NYISO's Interconnection Queue was used as a reference in each of the three cases, Base, Contract, and Policy Cases, for purposes of generation placement in the NYCA. The Base and Contract Cases include proposed generation and load based on the NYISO's Interconnection Queue, as applicable to each cases' inclusion rules. Specific to the Policy Case, projects proposed in the Interconnection Queue were informative in guiding the process of translating the generation expansion results from the capacity expansion model at a zonal level into discrete generators at the nodal level in production cost modeling. Additional information on the generator placement process for the Policy Case is included in [section placeholder].

2. System & Resource Outlook Overview

In 2020, the NYISO undertook a comprehensive review of its Economic Planning Process to determine how the studies, tools, and metrics in that process could be enhanced. The impetus for the review arose, in part, from the rapidly shifting resource landscape toward renewable resources driven by the CLCPA and other state clean energy policies. This changing landscape led the NYISO to engage stakeholders to examine how the NYISO's economic planning studies could be enhanced to identify the most economic and efficient locations for the construction of renewable resources, the transmission needed to deliver energy to consumers from onshore and offshore renewable resources, and the impact of the renewable resources on the transmission system. The enhancements developed extend the study outlook to 20 years and broaden the benefits considered in evaluating potential projects to address congestion, such as the deliverability of energy output from new renewable resources and capacity cost savings associated with transmission expansion. These enhancements were approved by stakeholders and were accepted by FERC in April 2021.

For the first time, the NYISO is compiling a 20-year System & Resource Outlook ("Outlook"). The Outlook provides a comprehensive overview of system resources and transmission constraints throughout New York, highlighting opportunities for transmission investment driven by economics and public policy. Together, the Comprehensive Reliability Plan and the System & Resource Outlook provide a full power system outlook to stakeholders, developers, and policymakers.

The Outlook provides a wide range of potential future system conditions and enables comparisons between possible pathways to an increasingly greener resource mix. By forecasting transmission congestion, the NYISO will:

- Identify regions of New York where renewable generation may be heavily curtailed due to transmission constraints;
- Quantify the extent to which these constraints limit delivery of renewable energy to consumers; and identify potential transmission opportunities that may provide economic operational benefits.

This new Outlook process provides transmission developers and resources the ability to request their own studies using the NYISO tools to identify the most economic opportunities for investment. Moreover, if a developer proposes a regulated transmission project to address constraints identified in the Economic Planning Process, the NYISO will perform an evaluation of the proposed project. Load serving entities ("LSEs") identified by the NYISO as the project beneficiaries must approve the selection of a proposed regulated transmission project by a super-majority vote. If a project is approved, it is eligible for cost

allocation and recovery through the NYISO tariffs.

[In Progress]

3. Base Case Findings

[In Progress]

4. Contract Case Findings

[In Progress]

5. Policy Case Findings

[In Progress]

6. Operational Analysis

[In Progress]

7. Conclusions

[In Progress]

8. Next Steps

[In Progress]

APPENDIX

[In Progress]