U.S. NORTHEASTERN RTOs ISO-NE/NYISO/PJM INTER-REGIONAL TRANSMISSION PLANNING LANDSCAPE

MAY 13, 2024

PREPARED FOR

New England States Committee on Electricity

PREPARED BY

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TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

LIST OF ACRONYMS & TERMS

AGC	automatic generation control
BPTF	NYISO Bulk Power Transmission Facilities
CLCPA	New York's Climate Leadership and Community Protection Act
Commission	Federal Energy Regulatory Commission
CSPP	NYISO Comprehensive System Planning Process
EE	energy efficiency
FERC	Federal Energy Regulatory Commission
IESO	Ontario's Independent Electricity System Operator
IPSAC	Inter-regional Planning Stakeholder Advisory Committee
ISO-NE	ISO New England
JIPC	Joint ISO/RTO Planning Committee
METU	ISO-NE Market Efficiency Transmission Upgrades
NESCOE	New England States Committee on Electricity
NJBPU	New Jersey Board of Public Utilities
NPCP	The Amended and Restated Northeastern ISO/RTO Planning Coordination Protocol
NYISO	New York ISO
NYPSC	New York Public Service Commission
OATT	Open Access Transmission Tariff
PAC	ISO-NE Planning Advisory Committee
Parties	ISO-NE, PJM, and NYISO
PJM	PJM Interconnection
Planning Protocol	The Amended and Restated Northeastern ISO/RTO Planning Coordination Protocol
PTO	ISO-NE Participating Transmission Owners
QTPS	ISO-NE Qualified Transmission Project Sponsor
RNA	NYISO Reliability Needs Assessment
RPS	Renewable Portfolio Standard
RTEP	PJM Regional Transmission Expansion Plan
RTO	Regional Transmission Organizations
SAA	PJM State Agreement Approach
SQTPSA	Selected Qualified Transmission Project Sponsor Agreement
TEAC	PJM Transmission Expansion Advisory Committee
TO	Transmission Owners
TransEnergie	Hydro-Quebec

I. INTRODUCTION

New England States Committee on Electricity (NESCOE) retained Daymark Energy Advisors (Daymark) to document and assess regional and inter-regional transmission planning practices across the three northeastern U.S. Regional Transmission Organizations (RTO): ISO New England (ISO-NE), New York ISO (NYISO), and PJM Interconnection (PJM). The goal of this paper is to help NESCOE and other policymakers better understand how an inter-regional transmission project – one that would provide benefits to two or three of the Northeastern RTOs – could or would find its way through the collective inter-regional planning processes in New England, New York, and PJM.[1]

State laws and policies across the northeastern U.S. are driving large-scale clean energy resource development in many forms. This development, in turn, requires transmission not only to interconnect new facilities, but also to ensure economic delivery of clean energy to customers, both locally and across neighboring regions. Preferably when one region has excess clean energy production, rather than curtail output, that excess would be transmitted via inter-regional transmission facilities to neighboring regions, maximizing the value of the clean energy resource investments made. A key question is: *do the interregional planning processes support the identification and development of interregional transmission projects that would benefit the collective clean energy objectives of the states within the three northeastern RTOs?*

The RTOs have processes in place for the development and implementation of regional transmission plans. Implementation of these plans has resulted in significant transmission expansion over the past twenty years, mainly to address system reliability needs. However, because each RTO's regional transmission planning process focuses primarily on its own needs, with inter-regional planning treated largely as an adjunct activity, no meaningful inter-regional projects have been proposed. As the need for clean energy enabling transmission continues to grow across the three RTO regions, additional alignment of the inter-regional planning processes in New England, New York, and eastern PJM could help the broader region to capture more fully policy public, economic, reliability, and operational flexibility benefits from new or enhanced inter-regional transmission facilities.

[1] This paper was produced prior to ISO-NE submitting its Long-Term Transmission Planning Phase II tariff with FERC and the issuance of FERC Order No. 1920.

Overview of paper

The three RTOs have developed a joint planning coordination agreement (a.k.a., the Northeastern ISO/RTO Planning Coordination Protocol) to align their regional and inter-regional transmission planning processes with each other, and address FERC Order 1000[2] requirements. This report provides an overview of the Northeastern ISO/RTO Planning Coordination Protocol and describes the procedures and processes through which ISO-NE, PJM, and NYISO coordinate system planning activities (Section III). Following that, Sections IV, V, and VI provide a high-level overview of transmission planning procedures of each of the three RTOs. The last two sections (VII and VIII) discuss benefits of development of inter-regional transmission across the New England/New York/eastern PJM footprint and barriers to identification of inter-regional transmission projects.

[2] *Order no. 1000 - transmission planning and cost allocation*. Federal Energy Regulatory Commission. (2021, November 9). https://www.ferc.gov/electric-transmission/order-no-1000-transmission-planning-and-cost-allocation

II. FERC ORDER 1000

FERC established guidelines for interregional planning with Order 1000. FERC Order 1000 required that transmission providers implement planning procedures to share information about transmission needs with their neighboring regions as well as jointly identify and evaluate potential inter-regional transmission facilities that address those needs. The goal of this planning activity was to move beyond the affected system studies that are conducted when system changes in one region adversely impact and require upgrades in a neighboring region to include a broader view of reliability, efficiency, and public policy projects that might be more efficiently undertaken jointly.

As regards inter-regional planning to support public policy, FERC Order 1000 required the RTOs to adopt the following in their Open Access Transmission Tariffs:

- A process for surfacing inter-regional reliability, efficiency, or public policy transmission needs and identifying projects that meet those needs.
- A standard cost allocation rule that would apply to planned projects.

III. NORTHEASTERN ISO/RTO PLANNING COORDINATION PROTOCOL

A. Overview

ISO-NE, NYISO and PJM (Parties) established *The Amended and Restated Northeastern ISO/RTO Planning Coordination Protocol* (Planning Protocol/NPCP) to coordinate interregional system planning activities.[3] Ontario's Independent Electricity System Operator (IESO), Hydro-Quebec (TransEnergie), and New Brunswick Power are not parties to the Planning Protocol, but they participate in the data exchange and transmission planning studies. The Planning Protocol describes "procedures for identification and evaluation … of potential inter-regional transmission projects that can address regional needs in a manner that is more efficient or cost-effective than separate regional solutions."[4]

B. Committee structure

The Planning Protocol established two standing committees: (1) the Joint ISO/RTO Planning Committee (JIPC), which includes representatives of the Parties, and (2) the Inter-regional Planning Stakeholder Advisory Committee (IPSAC). The membership of the IPSAC includes representatives of the Parties, market participants, governmental agencies, regional state committees, provincial entities, regional reliability councils, and any other party interested party. The roles and responsibilities of the committees are illustrated in Figure 1.

[3] Amended and Restated Northeastern ISO/RTO Planning Coordination Protocol (July 13, 20150 https://www.nyiso.com/documents/20142/1406358/Northeast_Planning_Protocol_FINAL_SIGNED_VERSION.pdf

[4] *id*

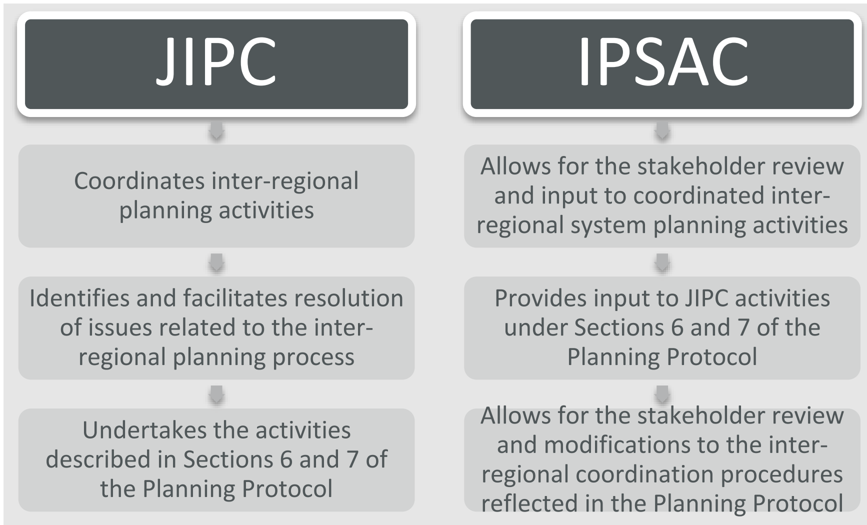


Figure 1. The Northeastern Planning Protocol's JIPC and IPSAC committee roles and responsibilities[5]

C. Inter-regional affected system process

Interconnection of resources in one RTO may impact a neighbor. In this case, the neighboring RTO is referred to as an affected system and the nature and extent of impact needs to be studied to determine what, if any, upgrades are required to mitigate adverse impacts. The following summarizes the inter-regional affected system process. Refer to Figure 2.

5 *id*

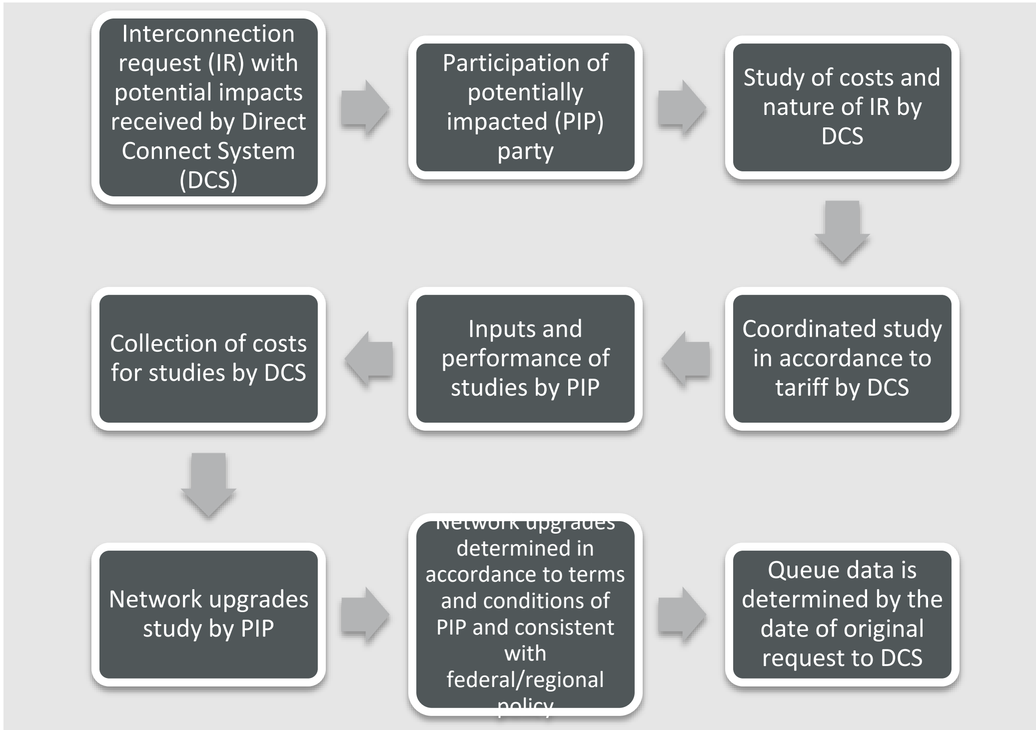


Figure 2. Inter-regional affected system process[6]

D. Identification of inter-regional transmission projects

Regional transmission needs are reviewed annually by JIPC with input from IPSAC. Potential inter-regional projects that might address reliability, economic, or public policy requirements are identified. To date this process has not identified an economic or public policy project.

The process is summarized in Figure 3.

[6] *id*

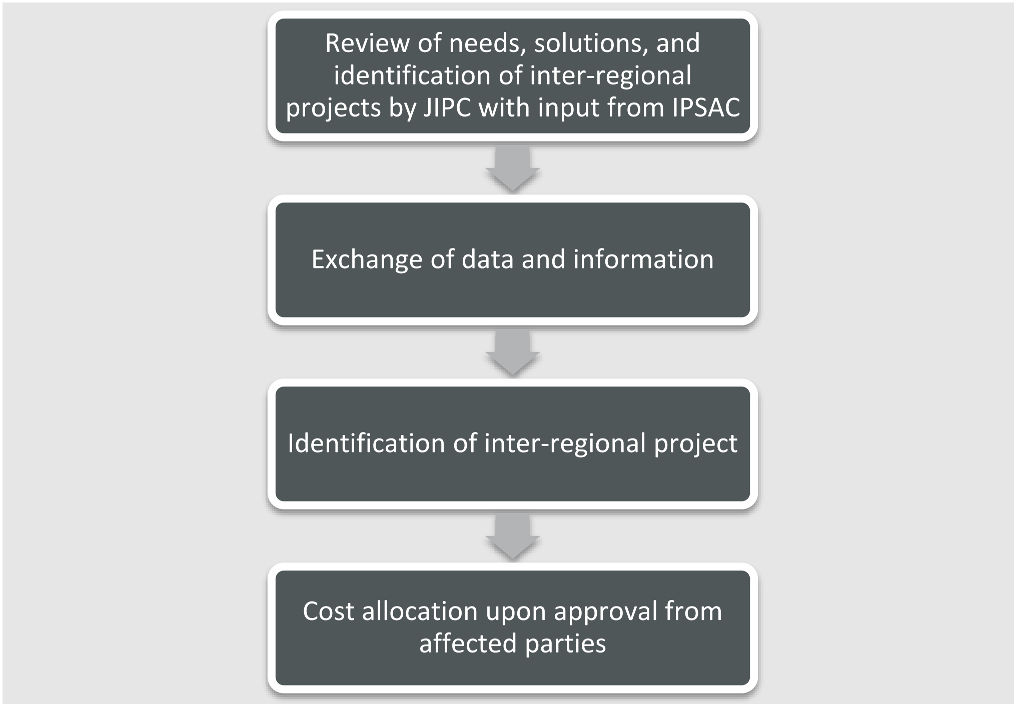


Figure 3. Identification and evaluation of potential inter-regional transmission projects process[7]

E. Cost allocation

Cost allocation for inter-regional projects is performed according to joint operating agreements[8,9] between each pair of Protocol Parties, consistent with the six principles of cost allocation described in FERC Order 1000.[10]

[7] *id*

[8] NYISO and PJM Joint Operating Agreement- Updated December 15, 2023 by joint filing in ER24-686-000, effective February 14, 2024 https://www.pjm.com/~/media/documents/agreements/nyiso-joa.ashx

[9] Coordination Agreement Between ISO New England Inc. And The New York Independent System Operator, Inc. Effective Date: 5/4/2021 - Docket #: ER21-1278-000 https://www.iso-ne.com/static-assets/documents/regulatory/tariff/attach_f/attach_f.pdf

[10] The Order No. 1000 cost allocation principles are: (1) the cost of transmission facilities selected in a regional transmission plan for purposes of cost allocation must be allocated to those within the transmission planning region that benefit from those facilities in a manner that is at least roughly commensurate with estimated benefits; (2) those that receive no benefit from transmission facilities, either at present or in a likely future scenario, must not be involuntarily allocated any of the costs of those transmission facilities; (3) a benefit to cost threshold ration, if adopted, cannot exceed 1.25 to 1; (4) costs must be allocated solely within the transmission region unless another entity outside the region voluntarily assumes a portion of those costs; (5) the method for determining benefits and identifying beneficiaries must be transparent; and (6) there may be different regional cost allocation methods for different types of

FERC allows each RTO a fair amount of discretion regarding its chosen cost allocation rules, save it must be consistent with the six principles. The rules to allocate the costs of inter-regional projects in a region do not have to be the same as the regional cost allocation rules. Also, the rules used to allocate the costs of inter-regional projects within each region can differ by region. Importantly, no party that is not a cost causer (direct beneficiary) can be an involuntary payer. Cost allocation has frequently been at root of transmission development disputes within RTO regions, but as no inter-regional economic or public policy projects have been proposed the inter-regional cost allocation frameworks in place have not been tested.

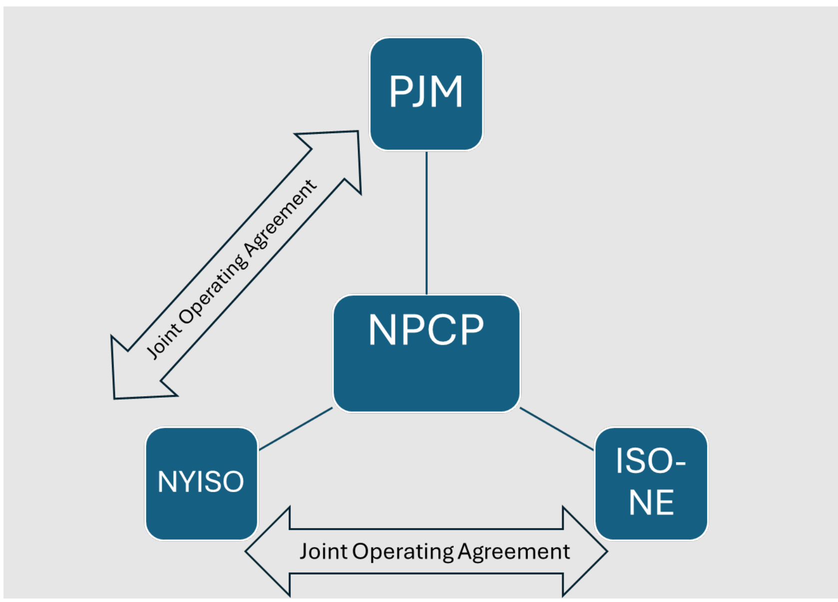


Figure 4. Regional transmission project cost allocation agreements between different parties

transmission facilities, such as those needed for reliability, congestion relief, or to achieve public policy requirements. FERC Order No. 1000, Section IV. Proposed Reforms: Cost Allocation, Parts D-E.

IV. BARRIERS TO INTER-REGIONAL TRANSMISSION

A. Regional versus inter-regional focus

The JIPC, through the Planning Protocol, periodically shares regional transmission planning information to, amongst other goals, identify opportunities for inter-regional projects. The flowchart shown in Figure 5 summarizes the process through which inter-regional projects are identified, evaluated, and approved. The process starts with JIPC's annual review of the regional transmission plans of each of the three RTOs. Stakeholder input regarding potential inter-regional projects is provided to JIPC by IPSAC. If a proposed inter-regional project as modeled is shown to address the needs of two or more RTOs more efficiently or cost-effectively than an RTO could, if pursuing a project on its own, the interregional project is included in the planning process of the benefiting RTOs.

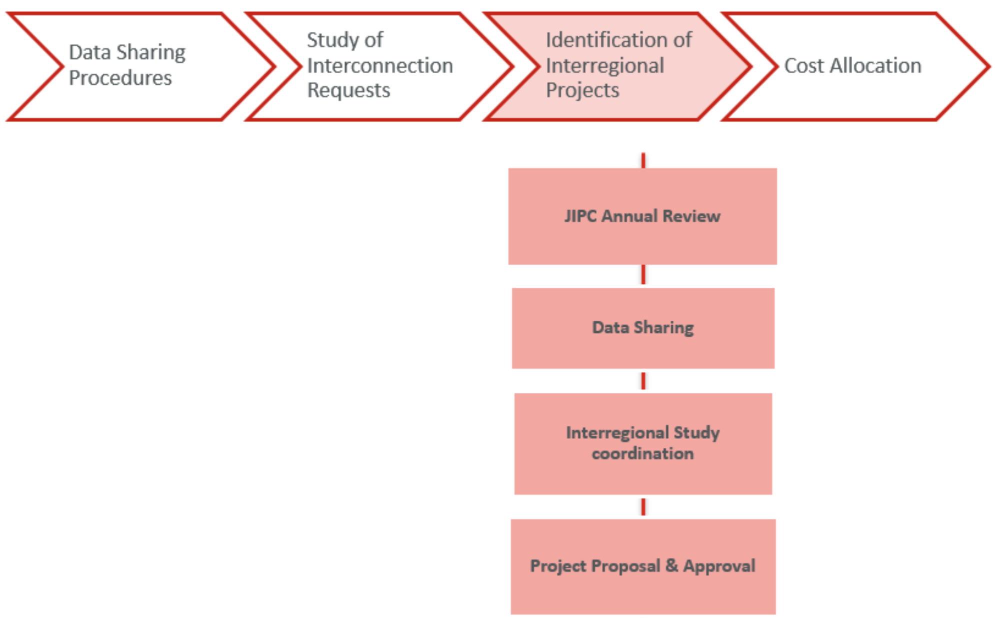


Figure 5 Planning Protocol's process for the identification of inter-regional projects among and between ISO-NE, NYISO, and PJM

While the three RTOs' regional planning process and key activities and outputs are similar, they do operate according to different schedules and stress different planning objective (refer to Table 1).

Table 1. The three ISO/RTOs' transmission planning activities[11]

Key Activity that Affects Interregional Planning	ISO/RTO		
	NYISO	PJM	ISO-NE
Reliability needs	Continuously; summarized in a report every even year	Continuously identified and reported to stakeholders throughout the year; summarized in an annual report	Continuously; summarized in a report the fourth quarter of every odd year
Reliability solutions	Continuously; summarized in a report every odd year	Potential solutions identified, evaluated, and selected throughout the year in a transparent process with stakeholders	Continuously; summarized three times per year in a project list; summarized in a report every odd year
Economic needs	Continuously; summarized in a biennial report	Identified midyear of year one of two-year cycle and reviewed with stakeholders Q3 and Q4	Continuously
Economic solutions	Continuously; summarized in a report for each proposed project	Potential solutions identified November 1 of year one of the two-year cycle through February of second year; solutions evaluated and selected in the second year	Continuously; summarized three times per year in a project list; summarized in a report every odd year
Public policy needs	As regional needs are identified	As regional needs are identified	At least once every three years (last evaluated 2020)
Public policy solutions	Following identification of a public policy transmission need	Following identification of a public policy transmission need	Following identification of a public policy transmission need

Even as the inter-regional planning protocols feed some information into the RTOs' planning processes, the RTOs' regional plans are effectively developed independently and focus on each region's own needs. *The integration of these separate plans – which include projects that are focused on meeting regional reliability, market economics, and public policy needs – into a common super-regional plan has not happened and no inter-regional project has been identified by JIPC since the Planning Protocol was amended in 2015.*

The existing process is reasonably good at identifying relatively straightforward reliability projects at the border. For example, consider how the process has worked between NYISO and ISO-NE. Assume that ISO-NE has identified a reliability concern in Pittsfield, Massachusetts (far western Massachusetts along the Massachusetts-New York border). Assume also that NYISO has identified a reliability concern in Albany, New York (eastern

[11] NYISO Comprehensive System Planning Process (CSPP); PJM Regional Transmission Expansion Plan (RTEP); ISO-NE Transmission Planning- the Regional System Plan (RSP).

New York along the New York-Massachusetts border). These two areas are roughly adjacent, and it makes sense to look at a possible cross-border project that may solve both reliability concerns. A cross-border project would be selected if it addressed both concerns more efficiently and cost effectively than two separate projects, one on either side of the border. The existing inter-regional process is not designed to look much beyond this type of opportunity. Certainly, looking at potential public policy benefits across two or three RTOs goes well beyond this conceptual framework.

Inter-regional needs are not a prime consideration when the RTOs identify their transmission needs. This is a major barrier to identifying inter-regional needs. However, if specific common tariff provisions were adopted by each RTO that required joint study of inter-regional solutions that would improve reliability and efficiency across the three markets, then the process may yield beneficial projects. Additionally, a common public policy protocol for the three regions could be adopted to facilitate planning of public policy projects that benefit states in the three regions. Some possible enhancements are summarized in the figures below in the blue text.

The regional public policy transmission planning processes of NYISO and ISO-NE are summarized in Figure 6 and Figure 7, respectively.

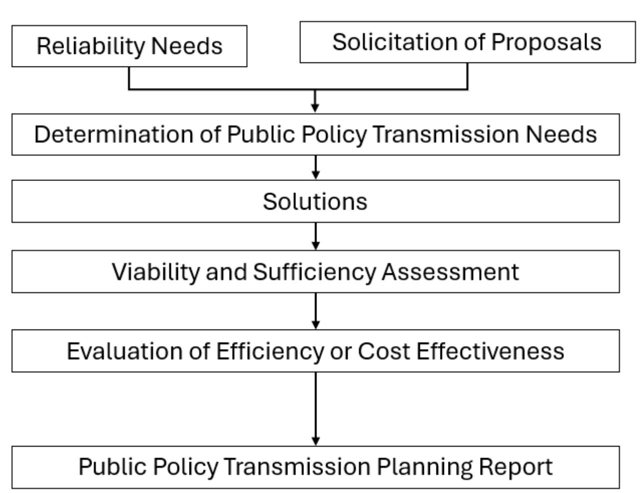


Figure 6. NYISO Public Policy Transmission Planning Process[12]

[12] NYISO Public Policy Transmission Planning Process Manual https://www.nyiso.com/documents/20142/2924447/M36_Public%20Policy%20Manual_v1_0_Final.pdf.

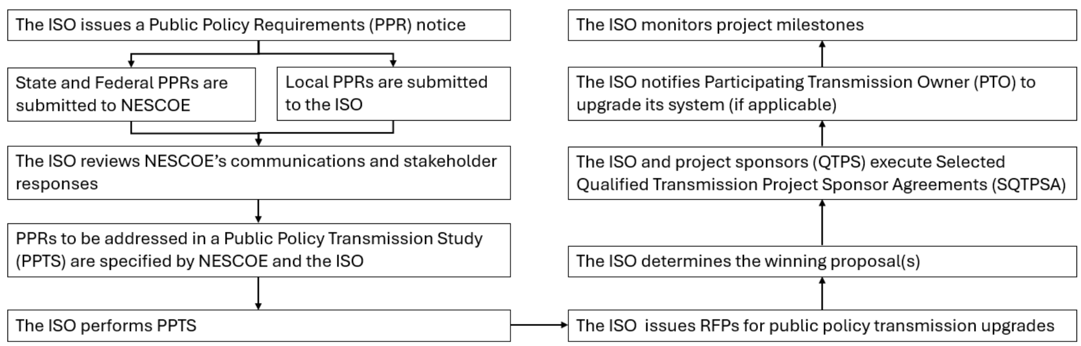


Figure 7. ISO-NE Public Policy Transmission Planning Process[13]

Figure 8 and Figure 9, summarize potential process modifications to ISO-NE's and NYISO's respective regional public policy process to incorporate inter-regional considerations, while determining regional public policy plan and projects to facilitate JIPC's coordination of inter-regional transmission planning process.

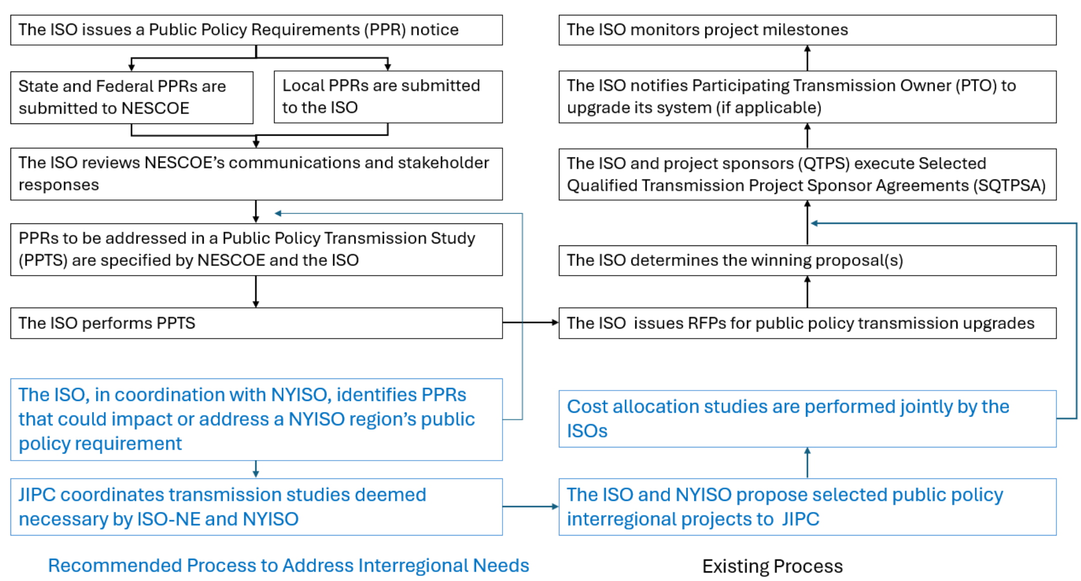


Figure 8. ISO-NE Public Policy Transmission Planning Process—process modification to coordinate inter-regional projects with NYISO

[13] ISO-NE Public Policy Transmission-- https://www.iso-ne.com/system-planning/transmission-planning/public-policy-transmission.

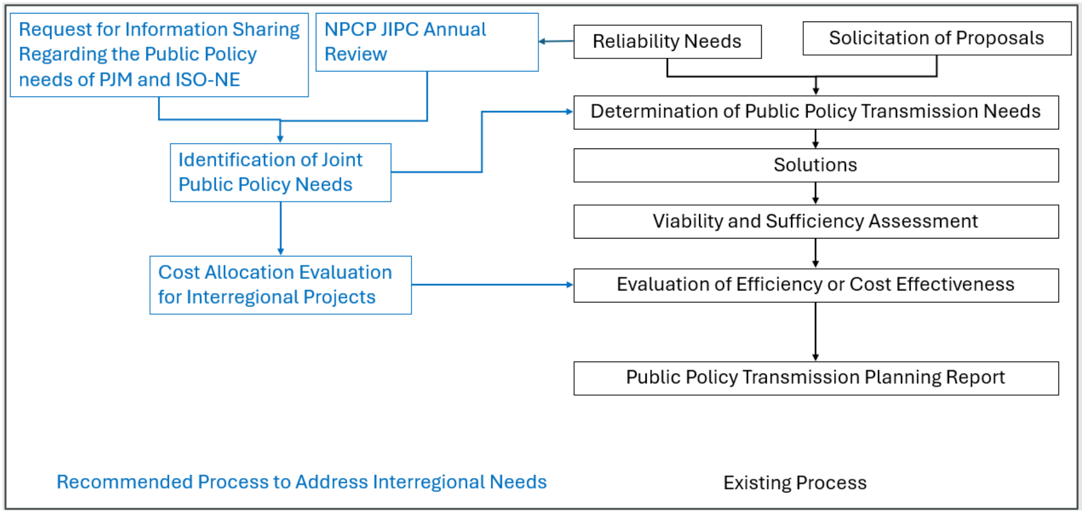


Figure 9 NYISO Public Policy Transmission Planning Process—process modification to coordinate inter-regional projects with ISO-NE and PJM

B. Barriers to high voltage transmission

Siting high voltage transmission requires navigating the siting processes of each state and local jurisdiction through which it traverses. The time required to develop a high voltage transmission facility, complete all planning and system studies, gain needed approvals, and complete construction can take ten years. Moreover, a mutually agreed to net-benefits framework and cost recovery and cost allocation rules could materially reduce the uncertainty associated with pursuing inter-regional projects. Although inter-regional planning on its own will not address these barriers, a robust process that is aligned with and supports the states' public policy needs could reduce friction and speed the development timeline for new inter-regional projects.

V. ISO-NE REGIONAL TRANSMISSION PLANNING PROCESSES

ISO-NE operates and plans the power system for the six New England states. ISO-NE's regional system planning process is described in Attachment K of Section II of the ISO New England Transmission, Markets and Services Tariff[14] and in the ISO-NE Transmission

[14] New England Transmission, Markets and Services Tariff. https://www.iso-ne.com/participate/rules-procedures/tariff/

Planning Process Guide document.[15] Figure 10 shows the map of transmission system of ISO-NE. The transmission planning process is discussed below.

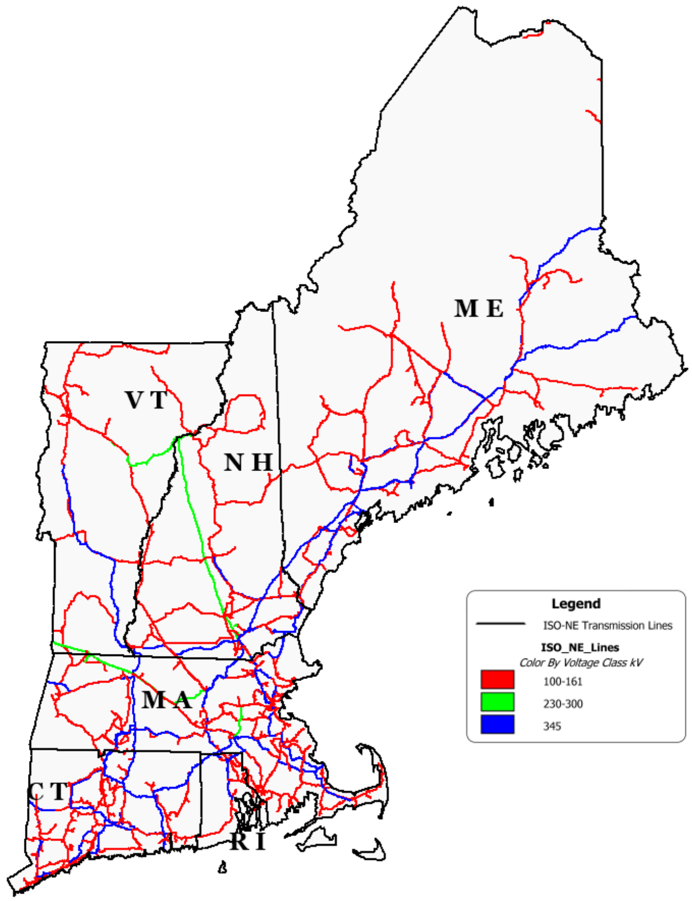


Figure 10 ISO-NE Transmission System

A. Process for addressing reliability needs

Overview

Through an open stakeholder process, ISO-NE develops long range plans for the region's bulk electric system to address system needs over a ten-year planning horizon. ISO-NE coordinates its planning activities with the region's transmission owners and a stakeholder group called the Planning Advisory Committee (PAC). The process has the

[15] ISO-NE Transmission Planning Process Guide (September 08, 2023). https://www.iso-ne.com/static-assets/documents/2023/09/2023_09_08_pac_transmission_planning_process_guide.pdf

following steps: (1) Needs Assessment, (2) Solutions Study, (3) Competitive Solution analysis, and (4) Review/Approval of Proposed Projects or Plans.

Needs assessment

The Needs Assessment that ISO-NE performs focuses on the ability of the bulk electric system to perform reliably over the planning horizon while promoting the operation of an efficient wholesale electricity market. The Needs Assessment is focused only on reliability and market efficiency and does not address elective or public policy needs. The Needs Assessment is developed collaboratively with the PAC and goes through several iterations from initial scope to final study. The outcome of the Needs Assessment will direct the ISO to pursue either a Solutions Study or a Two-Phase Competitive Solution Process. The competitive process has been used once since Order 1000 was implemented.

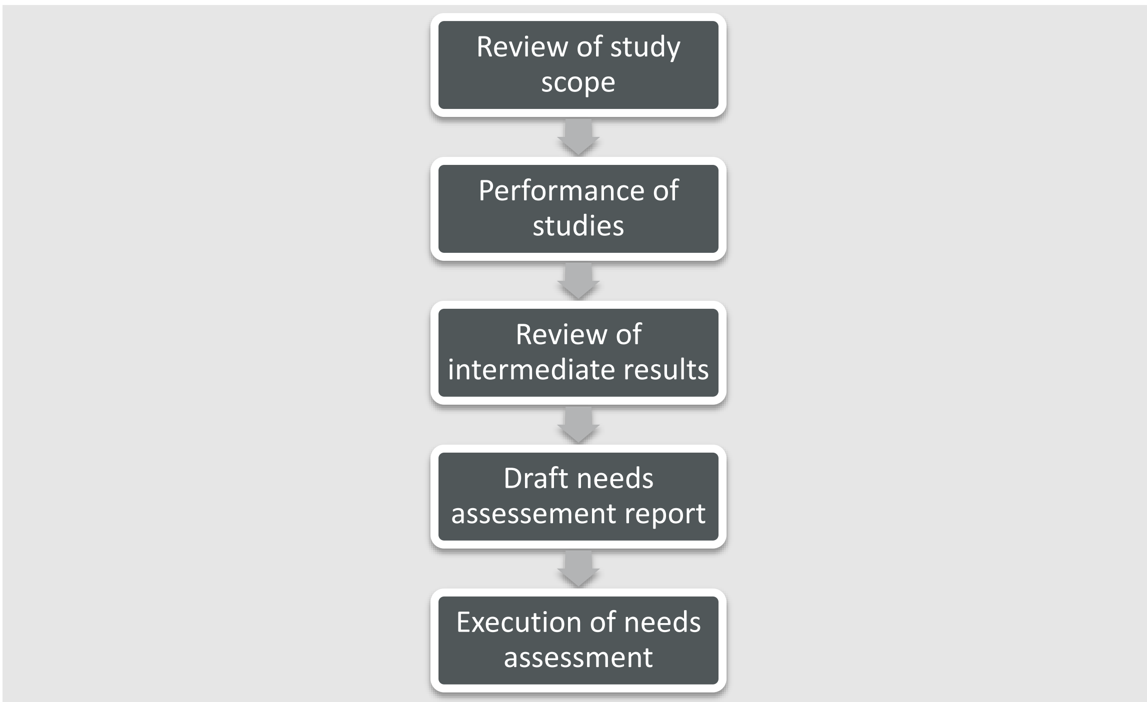


Figure 11. A high-level Needs Assessment process protocol[16]

[16] Created from the steps mentioned in ISO-NE Transmission Planning Process Guide. Look into [14] for more information.

Solution study

When ISO-NE identifies reliability needs that must be addressed within three years, it moves directly to perform a Solution Study. The Solution Study identifies projects that address the reliability need in the timeframe at lowest cost. The transmission owner(s) that will build and own the project are in the middle of proposing the solution and stakeholders weigh in on the proposed solutions via the PAC.

Market Efficiency Transmission Upgrades

Market Efficiency Transmission Upgrades (METUs) are upgrades designed primarily to provide a net reduction in total production cost to supply the system load. These upgrades are identified by ISO New England where the reduction in cost to supply system load exceeds the cost of the transmission upgrade. If a Market Efficiency Transmission Upgrade is likely to be the solution for a need, then the competitive solution process is followed regardless of the year of need. There has not been such an upgrade in New England.

Competitive Solution Study Process

If the identified reliability need does not have to be addressed within three years, then the competitive solution process is used to develop and select the solution. ISO-NE issues an RFP for project proposals from qualified transmission developers to address the identified transmission system need. ISO-NE selects the project that meets the need and performs best across a set of quantitative and qualitative evaluation criteria. This process has been used once. The process is summarized in Figure 12.

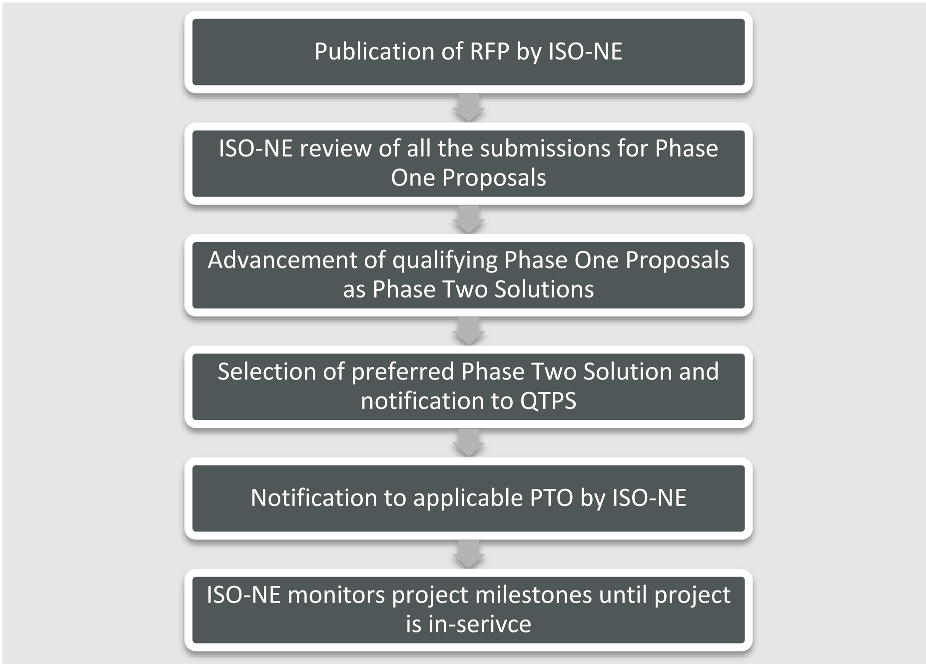


Figure 12. Simplified ISO-NE Competitive Solution Study Process[17]

B. Planning for public policy

At least every three years, ISO-NE will issue a notice requesting Public Policy driven transmission needs be submitted to NESCOE and ISO-NE for consideration. If a public policy need is identified, ISO-NE will perform a study to determine the parameters of transmission project. The ISO will then issue an RFP to qualified transmission developers to bid to develop, build, and own the project. This process has never been used. The process is depicted in the flowchart shown in Figure 13.

[17] Competitive Transmission Projects in New England. https://www.iso-ne.com/system-planning/transmission-planning/competitive-transmission

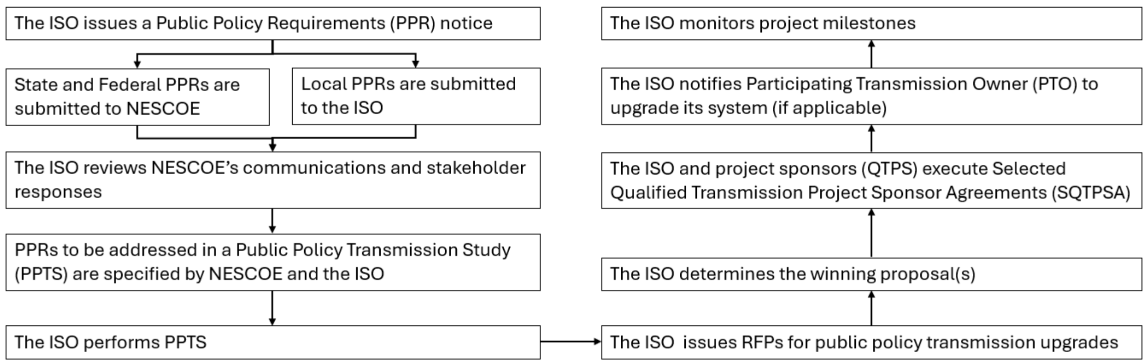


Figure 13. ISO-NE Public Policy Transmission Planning Process[18]

ISO-NE's public planning process does not specifically determine/classify projects as interregional/regional. ISO-NE develops its regional plan-- JIPC annually reviews this plan along with the plans of the other two RTOs and determines if there is an opportunity for replacing any of these regional projects with interregional projects. If so, the impacted RTOs then replace their regional projects with interregional project(s) in their regional plan.

18 ISO-NE Public Policy Transmission-- https://www.iso-ne.com/system-planning/transmission-planning/public-policy-transmission

VI. NYISO COMPREHENSIVE TRANSMISSION PLANNING PROCESSES

NYISO operates and plans the power system for the State of New York. NYISO's regional system planning process, referred to as the Comprehensive System Planning Process (CSPP), is described in Attachment Y[19] of the NYISO Tariff. Figure 14 shows the map of transmission system of New York and the transmission process is summarized in Figure 15, which depicts the interactions among the reliability, economic, and public policy components of the process.

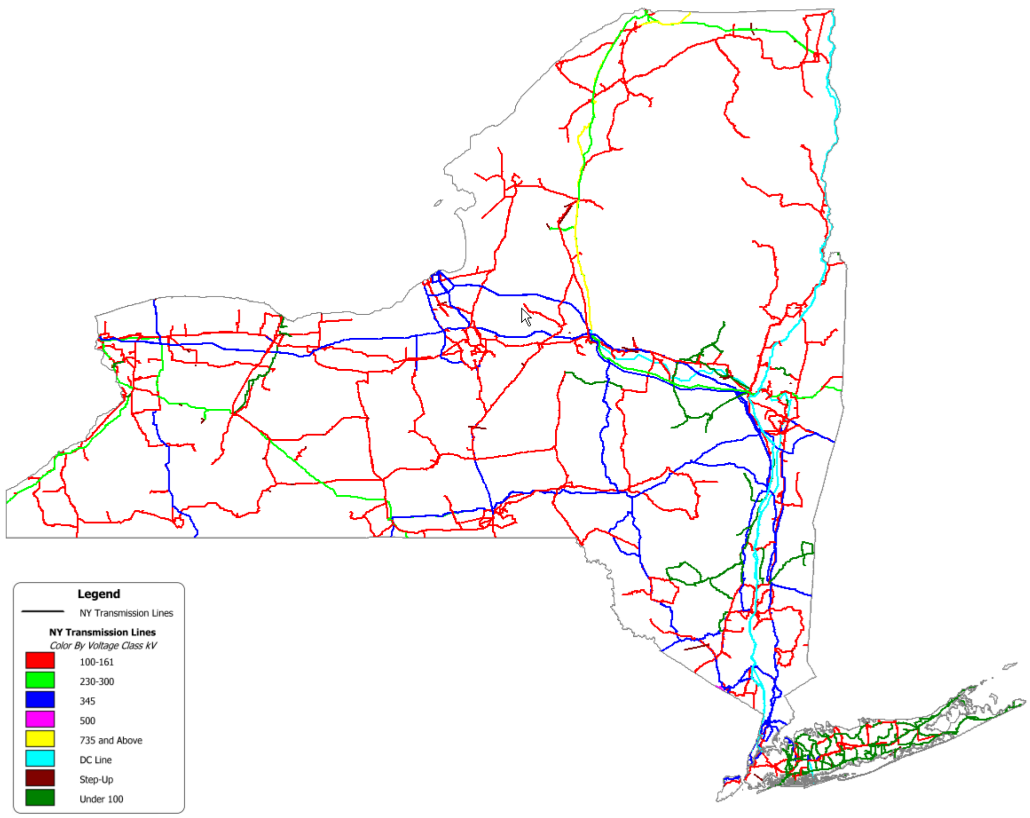


Figure 14 New York ISO Transmission System[20]

[19] New York Independent System Operator, Inc. NYISO OATT—Attachment Y

[20] Created using Hitachi's Velocity Suite GIS mapping tool

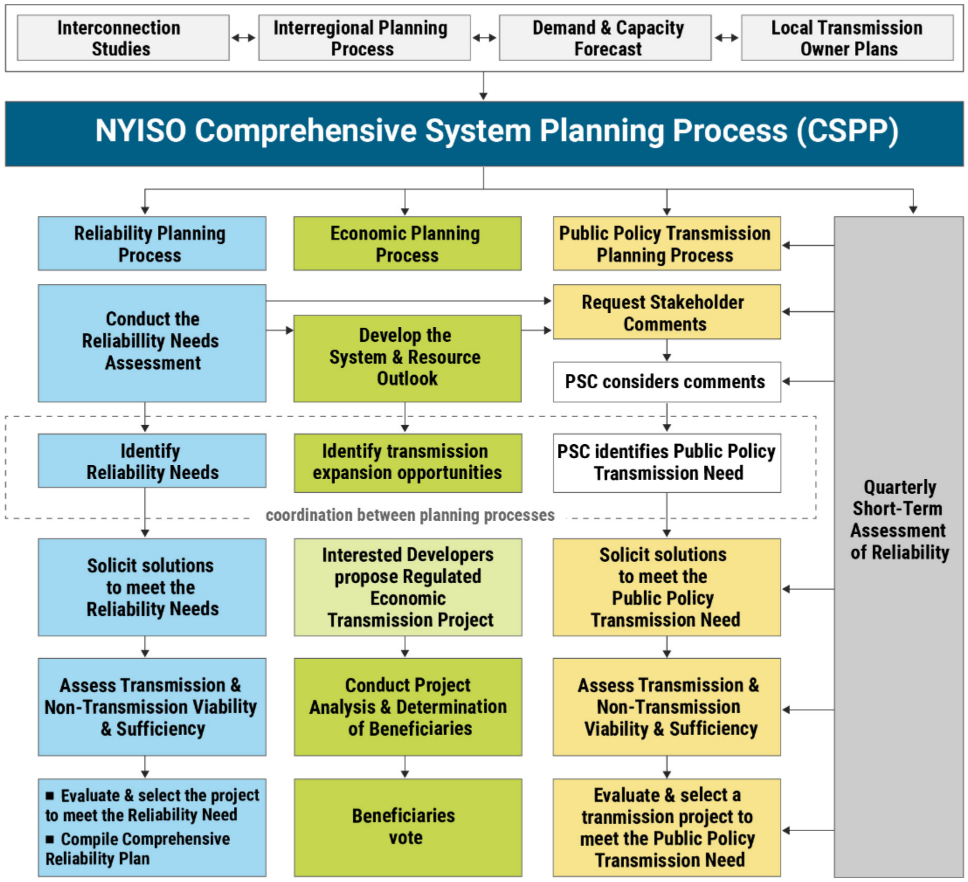


Figure 15. NYISO Comprehensive System Planning Process[21]

A. Reliability planning process

NYISO performs a Reliability Needs Assessment (RNA) to identify reliability needs of the bulk electric system (referred to in the NYISO tariff as the Bulk Power Transmission System or BPTF).[22] The reliability planning process includes:

- Evaluating Reliability Needs of BPTF
- Identifying factors and issues that may adversely impact reliability of BPTF
- Providing solutions, evaluating them on a comparable basis, and implementing them
- Selecting the most efficient or cost-effective solution to satisfy Reliability Need
- Providing an opportunity for market-based solutions

21 NYISO Comprehensive System Planning Flowchart. https://www.nyiso.com/csppf

22 Sections 31.2.1-13 of Attachment Y

- Coordinating reliability assessments with neighboring control areas

B. Economic planning process

The economic planning process provides information to the market regarding likely future congestion issues so that parties might bring forward market-based or cost-allocated transmission solutions.[23] The NYISO documents its analysis and findings in the System and Resource Outlook. The development of the modeling assumptions, discussions of methods, and the vetting of the results happen within the stakeholder process. The final report:

- Summarizes current assessments
- Projects congestion over a 20-yr period
- Identifies, rank, and group congested elements
- Assesses potential benefits of addressing identified congestion

C. Public policy transmission planning process

NYISO's public policy transmission planning process[24] consists of three steps: (1) identification of public policy transmission needs, (2) request for proposed public policy projects, and (3) selection of the most efficient or cost-effective projects. The Public Policy Transmission Planning Process is conducted on a two-year cycle. The public policy planning process is coordinated with the NY Public Service Commission (NYPSC). The process starts with interested parties (including the NYISO) proposing public policy transmission needs. The NYPSC then makes a determination of need. The NYISO determines the requirements of the solution and runs a solicitation and selects the project that best meets the identified public policy need. NYISO's public policy transmission planning process is summarized in Figure 16. A few projects of this type are:

- Propel NY Energy
- Empire State Line
- AC Transmission Project - Segment A
- AC Transmission Project - Segment B

[23] Sections 31.3.2 and 31.5.4 of Attachment Y.

[24] Section 31.4 of Attachment Y.

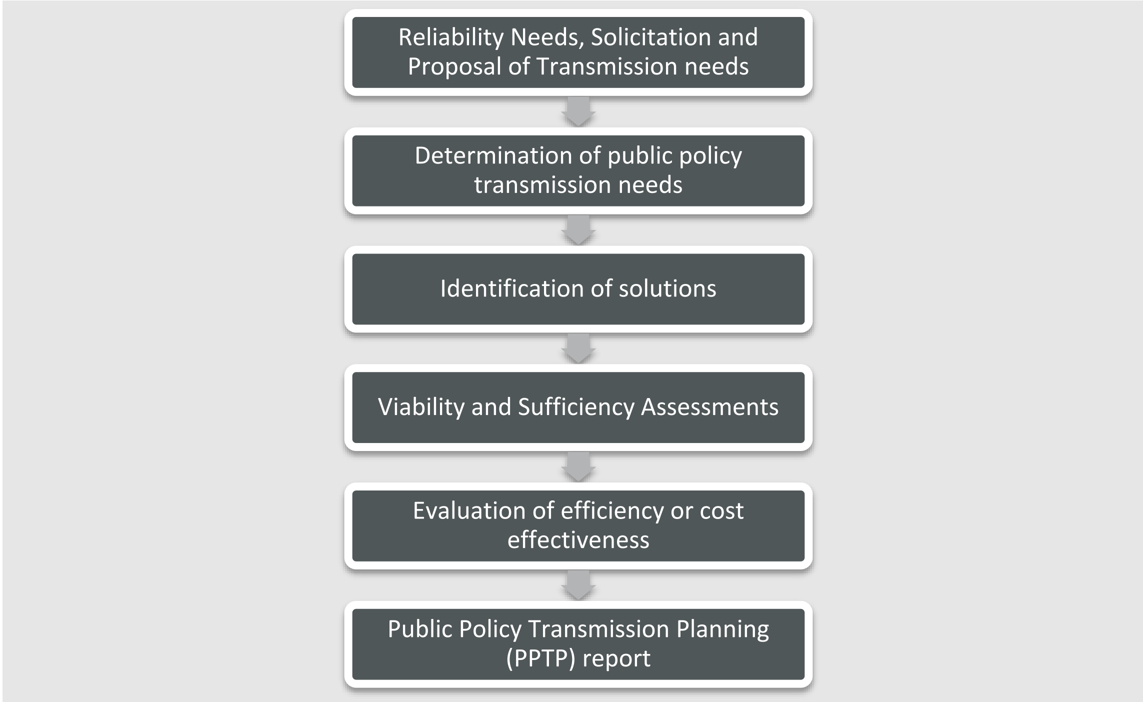


Figure 16. Simplified NYISO public policy transmission planning process[25]

D. Inter-regional planning process

NYISO's inter-regional transmission planning procedures require that NYISO, Transmission Owners, Market Participants, and other interested parties coordinate system planning activities with neighboring planning regions according to the Inter-regional Planning Protocol.[26]

VII. PJM TRANSMISSON PLANNING PROCESSES

PJM operates and plans the power system for 13 states and the District of Columbia. These states, which may be entirely or only partially within the PJM region, include Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.

The transmission planning process in PJM is referred to as the Regional Transmission Expansion Plan (RTEP). The planning process is primarily focused on addressing

[25] NYISO Public Policy Transmission Planning Process Manual. https://www.nyiso.com/documents/20142/1397429/agenda%206%20M-36_PPTPP%20Manual_Draft.pdf/54151f21-7da8-a2e8-1d40-88315bb3163c

[26] New York Independent System Operator, Inc. NYISO OATT— Attachment Y - New York ISO Comprehensive System Planning Process

reliability and economic efficiency project needs but does include a public policy component. PJM releases an annual RTEP report that outlines the 15-year planning process to identify transmission system upgrades required to maintain and enhance the larger system. Figure 17 below shows PJM's backbone transmission system.

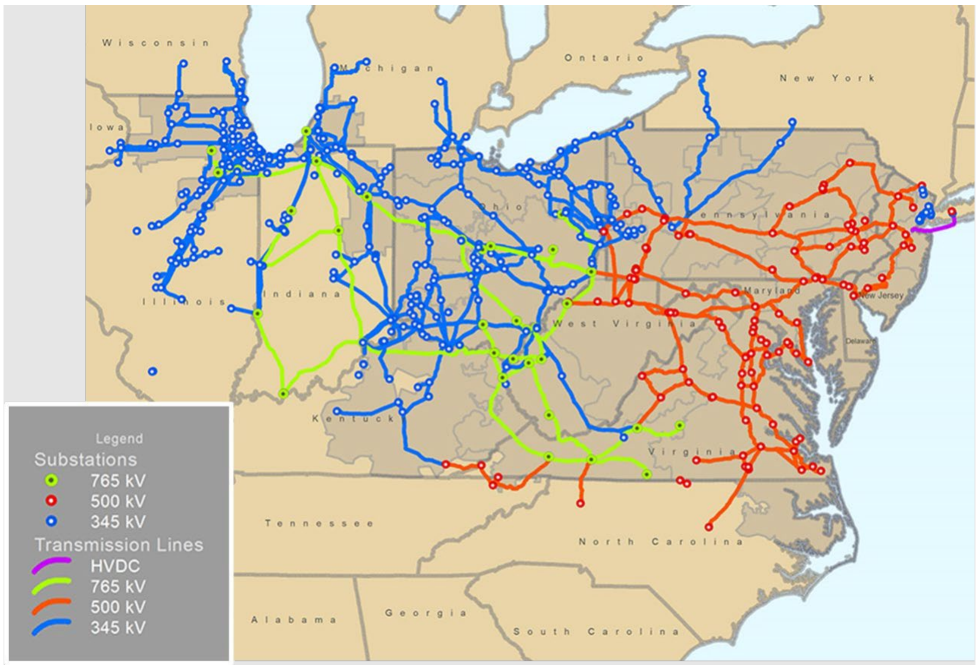


Figure 17. PJM's backbone transmission system[27]

PJM's planning process identifies three types of transmission projects: baseline, customer-funded, and supplemental.

- **Baseline projects** are cost-allocated projects that impact the reliability and performance of the bulk electric system and include reliability, market efficiency, and public policy projects pursued under a State Agreement Approach (SAA).
- **Customer-funded projects** are upgrades paid for by the project developer or the customers of the project and include merchant projects and voluntary upgrades.
- **Supplemental projects** are those required to meet the needs of service for Transmission Owners (TOs) and include local and condition related upgrades.

[27] https://learn.pjm.com/three-priorities/planning-for-the-future

The RTEP process engages stakeholders in several PJM committees develop assumptions the modeling assumptions and review results. Both near-term (five-year) and long-term (15-year) planning cases are developed to study solutions to identified criteria violations and evaluate the performance of the various project types. The RTEP planning timeline is outlined in Figure 18.

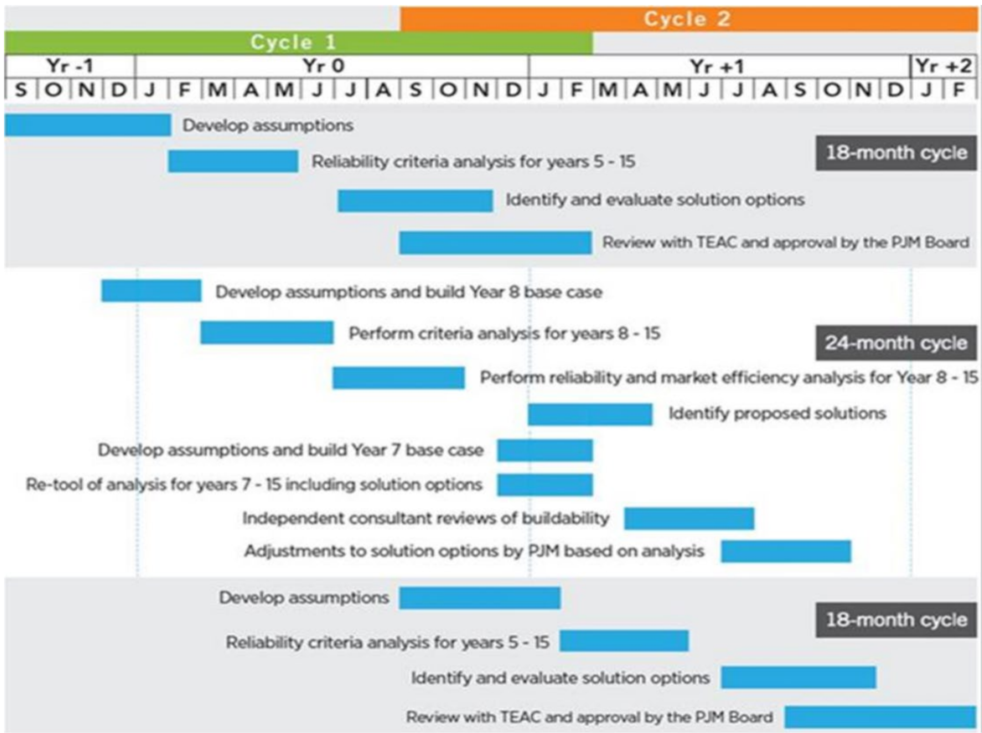


Figure 18. PJM RTEP timeline[28]

A. State Agreement Approach

PJM's Order No. 1000-compliant public policy transmission planning process is called the State Agreement Approach (SAA). The SAA provides a formal mechanism by which PJM incorporates public policy project needs identified by one or more of the states in the region into its RTEP process.[29] When PJM sought Commission approval of the SAA process, PJM noted that the SAA would allow states to provide PJM with "sufficient direction" to implement public policy goals like state renewable portfolio standards.[30]

28 PJM Regional Transmission Expansion Plan (RTEP) https://www.pjm.com/-/media/library/reports-notices/2023-rtep/2023-rtep-report.ashx

29 Operating Agreement, Schedule 6, section 1.5.9

30 PJM. (2024, February 2). *Re: PJM Interconnection, L.L.C., Docket No. ER24-1187-000 New Jersey State Agreement Approach 2.0 Study Agreement, SA No. 7156* . PJM. https://www.pjm.com/directory/etariff/FercDockets/7935/20240202-er24-1187-000.pdf.

The requesting state identifies the need, the PJM issues an RFP for projects to address the need, and PJM performs planning analysis to ensure the projects can be integrated into the system and the requesting state evaluates the projects on relevant public policy criteria. The state selects the project that best meets its needs, and the costs of the project are allocated to the state.[31]

SAA 1.0[32]

On November 18, 2020, New Jersey initiated the SAA process for the first time when it issued the New Jersey Board of Public Utilities (NJBPU) SAA 1.0 Request order. PJM then launched the "2021 Proposal Window to Support NJ OSW" (referred to as the SAA 1.0 Proposal Window), inviting project proposals aimed at integrating up to 7,500 MW of offshore wind power off the coast of New Jersey by 2035 into the PJM Transmission System. Over the span of about a year, PJM and the NJBPU reviewed 80 proposals submitted by 13 developers, including both established transmission owners and new developers. PJM furnished comprehensive reports to the NJBPU detailing the modeled performance of the proposed projects. Following this, the NJBPU issued an order selecting a set of projects, collectively referred to as the NJBPU-Selected SAA Project. PJM Board of Managers endorsed the NJBPU-Selected SAA Project and the associated cost distribution for integration into the PJM RTEP.

Figure 19 shows a typical SAA planning process duration and timeline for a high-level insight.

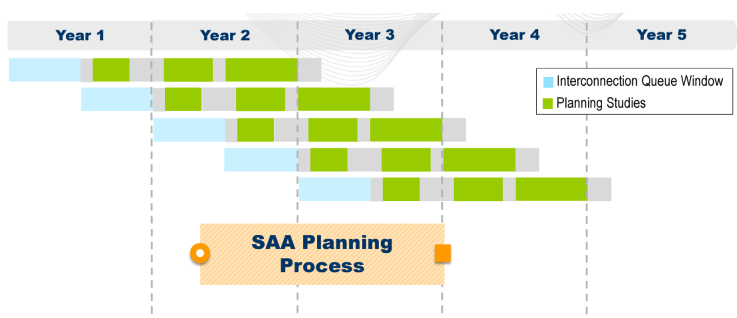


Figure 19. SAA planning process illustrative timeline[33]

[31] Ibid.

[32] Ibid.

[33] Sims, M. (2020, December 1). *State Agreement Approach*. PJM. https://www.pjm.com/-/media/committees-groups/committees/pc/2020/20201201/20201201-item-10-state-agreement-approach.ashx

SAA 2.0[34]

On April 26, 2023, the NJBPU issued the SAA 2.0 request order, formally requesting PJM to open a competitive proposal window process to determine "whether an integrated suite of open access transmission facilities, both onshore and potentially offshore, could best facilitate meeting the State's expanded [offshore wind] goals in an economically efficient and timely manner." The SAA 2.0 Study Agreement identifies New Jersey's public policy needs underlying the SAA 2.0 Request. The process will follow the same approach as SAA 1.0. The project solicitation is expected in summer, 2024.

34 Ibid.

VIII. BENEFITS OF DEVELOPMENT OF INTER-REGIONAL TRANSMISSION

State laws and policies across many northeastern U.S. states call for large amounts of new offshore wind resources. Alongside the development of offshore wind, each region has its own plans for continued investment in energy efficiency (EE) programs, solar photovoltaics, energy storage, and other clean energy resources. Taken together, these resources are transforming the supply of energy across this region of the country.

Expanding inter-regional transmission would allow greater access to the operational, reliability, economic and environmental benefits of the renewable investments being made in the three RTOs: ISO-NE, NYISO and PJM.

The following summarizes some of the benefits that may be realized across all three of these regions through inter-regional transmission development.

A. Inter-regional transfer capability

Limited ability to move power throughout the Northeast

Transfer capability amongst the three northeastern RTOs is limited. Maximum transfers between New York and New England over the high voltage AC system are in the 1,400 MW – 1,600 MW range. These limits have been in place for several decades, with only the addition of the 330 MW Connecticut – Long Island Cross Sound HVDC cable adding any significant new capability. Transfer capability from PJM to New York is approximately 2,225 MW while it is 1,200 MW from New York back to PJM. Figure 20 illustrates the transfer capabilities between these three market areas.

That transfer capability between RTOs has been small relative to the loads historically has not been an issue as internal resource adequacy and transmission planning has assumed and accommodated these limits. The regions' supply consisted primarily of controllable fossil-fuel-fired resources whose output was not dependent on the weather. However, that supply dynamic is quickly changing and building out the capacity required to meet renewable targets of the several states may result in more energy being produced at times than the load in an individual region can consume – this will be true even with battery storage. *To maximize the value of investments in renewables, expansion of inter-regional transmission capability will allow for the economic sale of surplus renewable power to neighboring regions, minimizing curtailed clean energy production, and improve the reliability of the entire region.*

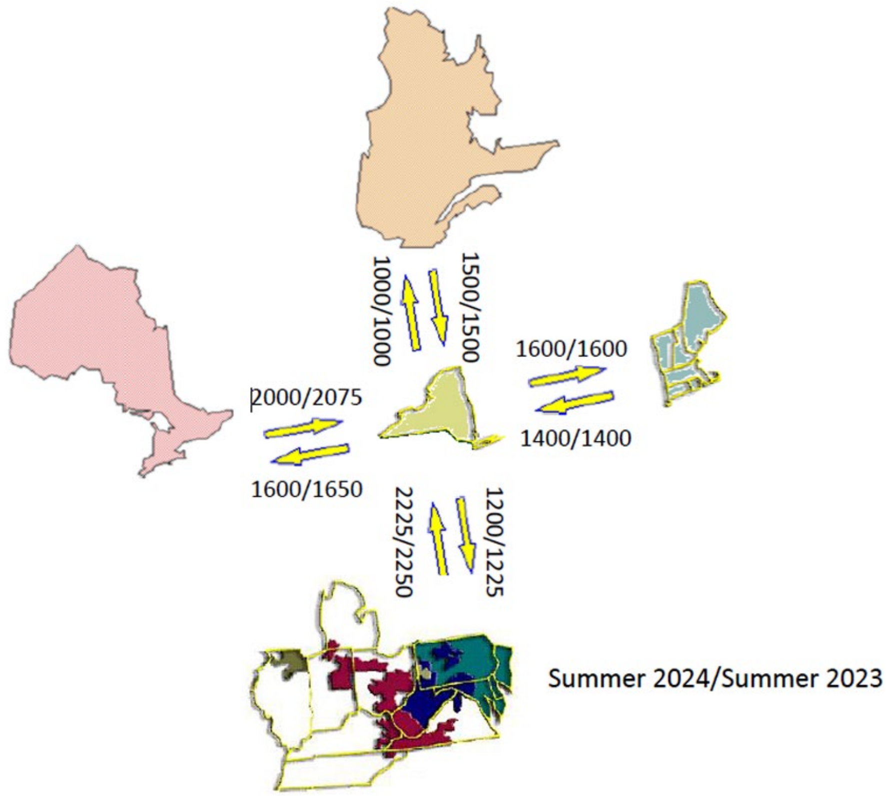


Figure 20. Inter-area thermal transfer capabilities[35]

B. The need for operational flexibility

The introduction of the large quantities of intermittent renewable production presents a new set of challenges for System Operators. A desire to maximize the output from these resources will require the ability to export the energy to neighboring systems at certain times when their operation would exceed local system demand. Increasing transfer capability, through inter-regional transmission planning and development between the three RTOs, could be a component in achieving this flexibility.

When added to land-based wind and solar, the 37.5 GW of offshore wind sought by 2035 in New England, New York, and eastern PJM will provide enough energy to, at times, meet or exceed the load in one or more market area. New inter-regional transmission capability would allow export of excess clean energy production to neighboring systems and minimize the amount of clean energy production curtailed.

35 NYISO Operating Study Summer 2024. NYISO. Retrieved from https://www.nyiso.com/documents/20142/44605820/08b_Summer2024_OperatingStudy_DRAFT_V2_050624.pdf/ddb20d1c-2722-b382-98ac-482f3e69e439

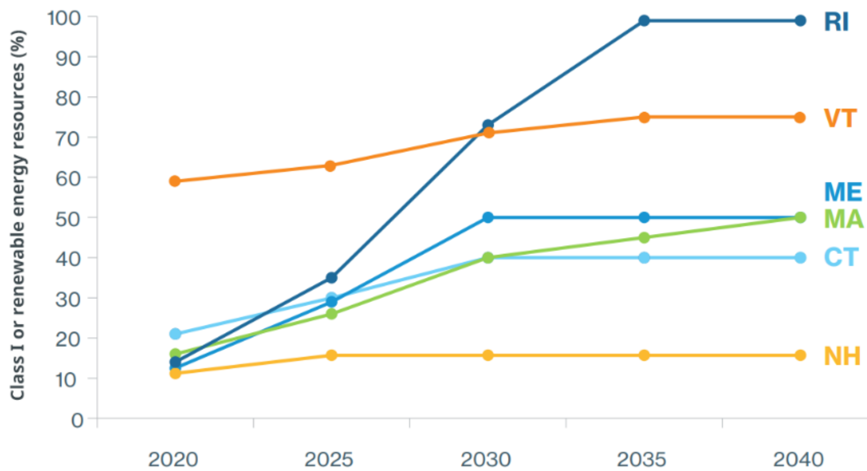
PJM projects as much as 94 GW of nameplate renewable resources by 2030.[36] As of October 2023, NYISO had 520 proposals for more than 117 GW of renewable supply resources, substantially more than the 20 GW needed to meet the Climate Leadership and Community Protection Act (CLCPA) target of 70% renewable energy by 2030. Further, Figure 21 shows the Renewable Portfolio Standards (RPS) goals for all six New England states; all are pursuing substantial renewable additions.

Table 2. PJM's renewable generation expectations[37]

Balance Sheet Summary (2022–2030)				
Retirements	**New Entry Wind/Solar[6]**	**New Entry Standalone Storage**	**New Entry Thermal**	**Load Growth**
40 GW **60% Coal** **30% Natural Gas** **10% Other**	**Low =** 48 GW-nameplate / 8 GW-capacity **High =** 94 GW-nameplate / 17 GW-capacity	**Low =** 3 GW **High =** 4 GW	**Low =** 4 GW **High =** 9 GW	**2023 Forecast =** 11 GW **Electrification Forecast =** 13 GW
Unless otherwise noted, thermal capacity values are expressed in ICAP, without adjustment for EFORd.				

[36] *Energy Transition in PJM: Resource Retirements, Replacements & Risks*. PJM. (2023, February 24). https://www.pjm.com/-/media/library/reports-notices/special-reports/2023/energy-transition-in-pjm-resource-retirements-replacements-and-risks.ashx

[37] Ibid.



Notes: State RPS requirements promote the development of renewable energy resources by requiring electricity providers (electric distribution companies and competitive suppliers) to serve a minimum percentage of their retail load using renewable energy. Connecticut's Class I RPS requirement plateaus at 40% in 2030. Maine's Class I/IA RPS requirement increases to 50% in 2030 and remains at that level each year thereafter. Massachusetts' Class I RPS requirement increases by 2% each year between 2020 and 2024, 3% each year between 2025 and 2029, reverting back to 1% each year thereafter, with no stated expiration date. New Hampshire's percentages include the requirements for both Class I and Class II resources (Class II resources are new solar technologies beginning operation after January 1, 2006). New Hampshire's Class I and Class II RPS requirements plateau at 15.7% in 2025. Rhode Island's requirement for 'new' renewable energy reaches 100% in 2033. Vermont's 'total renewable energy' requirement plateaus at 75% in 2032; it recognizes all forms of new and existing renewable energy and is unique in classifying large-scale hydropower as renewable.

Figure 21. Renewable Portfolio Standards of New England states[38]

C. Sharing resources to optimize dispatch

When a market area is excess renewable energy, increased inter-regional transfer capability can allow it to export to the other RTOs by expanding economic transaction scheduling to recognize the marginal cost relative marginal cost of resources across borders and the environmental benefits of transferring excess clean energy. This capability would be particularly important at times of light and shoulder load conditions when customer demand is low, excess amounts of clean energy are likely to occur, but the marginal resource is often a fossil-fuel-fired generator inefficiently operating at part-load. Renewable imports at these times could dramatically lower off-peak marginal emissions.

D. Sharing resources to optimize operating reserves

Offshore wind and other intermittent resources may increase real time volatility (intermittent resource production varies both temporally and geographically across the systems) and supplant dispatchable resources currently available to manage ramping provide, contingency reserves, and frequency regulation. With over 37.5 GW of offshore, plus significant amounts of solar PV and onshore wind, targeted to be added to the

[38] ISO-New England. *Resource Mix* - https://www.iso-ne.com/about/key-stats/resource-mix.

three systems by 2035, managing the system ramp real-time and addressing contingencies have presented new challenges to secure operations. In addition, the growing prevalence of intermittent resources may challenge existing system frequency control (i.e., regulation) schemes.[39] The three RTOs have been independently developing rules and systems to address their individual exposure to these evolving operational risks. Expanding transfer capability between the regions would expand the pool of resources, thereby reducing the apparent volatility that is currently being considered individually by each RTO. The RTOs could then jointly develop provisions to manage system ramps, share operating reserves, and schedule regulating resources more efficiently.

E. Addressing the 1,200 MW single-source loss limit

Under the single-source limit the maximum output of resources in New England is limited to 1,200 MW in real under certain power system conditions in New York and PJM and at the New York-New England border. As the contemplated offshore wind build out is completed, it is easy to imagine that changes in aggregate wind output, both up and down, may exceed this 1,200 MW threshold. With the scale of offshore wind development, all three systems will need to address infrastructure limitations and operational issues to manage production swings of this magnitude as part of normal day to day operations. Part of the infrastructure plan is increased inter-area transfer capability. ISO-NE, PJM and NYISO are aware of states' interest in accelerating analysis about the feasibility of increasing the historic limit.[40]

F. Larger wind farm installations

Interconnection of new resources in New England is also limited to 1,200 MW. As infrastructure is added to address OSW resource volatility (and intermittent resource volatility more broadly), it should be possible to take advantage of growing economies of scale in OSW technologies to build projects larger than 1,200 MW. Larger OSW installations would reduce the number of interconnections required to meet offshore wind targets. Another benefit for New England could be to permanently lift the import

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39 The system is required to operate at 60 hertz plus or minus a small deadband under all normal operating conditions and re-acquire target frequency within a small period following a contingency (loos of major generator or transmission facility). The RTOs send small control signals to dispatchable resources to ensure frequency is maintained. Changes in the resource mix, particularly the availability and performance of resources that might provide frequency control (also called regulation) may pose challenges to secure operations.

40 https://www.iso-ne.com/static-assets/documents/100009/2024_03_22_letter_to_ne_states_collaborative_letter_on_interregional_planning_combined.pdf.

limit on the HQ-NE Phase II HVDC tie line, allowing imports of Canadian hydro power up to the facilities 2,000 MW design level. Inter-regional transmission to bolster at least the New York/New England interface will support an increase in the loss of source limit.

In summary, inter-regional transmission development will be supportive of the following:

- Northeastern states' public policies renewable resource development and deployment
- Improved overall energy economics in all three regions by additional sharing of energy and reserves
- Improved operating flexibility in all three regions
- Increased or eliminated loss of source limitation on resource operation and development
- Capture emerging scale economies in ESW technology

IX. CONCLUSION

Planning and development of inter-regional transmission in ISO-NE, NYISO, and PJM is an important part of maximizing the economic and environmental benefits of the large amounts of offshore wind, solar photovoltaics, battery storage, and other clean energy resources being built to meet public policy. Planning to build the necessary transmission infrastructure must begin now. The three northeastern RTOs' regional planning processes are well suited to surfacing the internal needs of their respective market regions, but they have not successfully identified beneficial multi-region economic and public policy transmission projects. Effective inter-regional transmission planning for public policy could be facilitated by the adoption of tariff provisions that implement a multi-RTO framework similar to the SAA approach used in PJM. A multi-region SAA structure, for example, would allow groups of states across the RTOs to identify needs and address cost recovery and allocation, with the RTOs assessing impacts through application of Northeastern ISO/RTO Planning Coordination Protocol (NPCP) process so that all regional stakeholders are properly engaged.