Strategic Action Plan: Overview

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Northeast States Collaborative on Interregional Transmission

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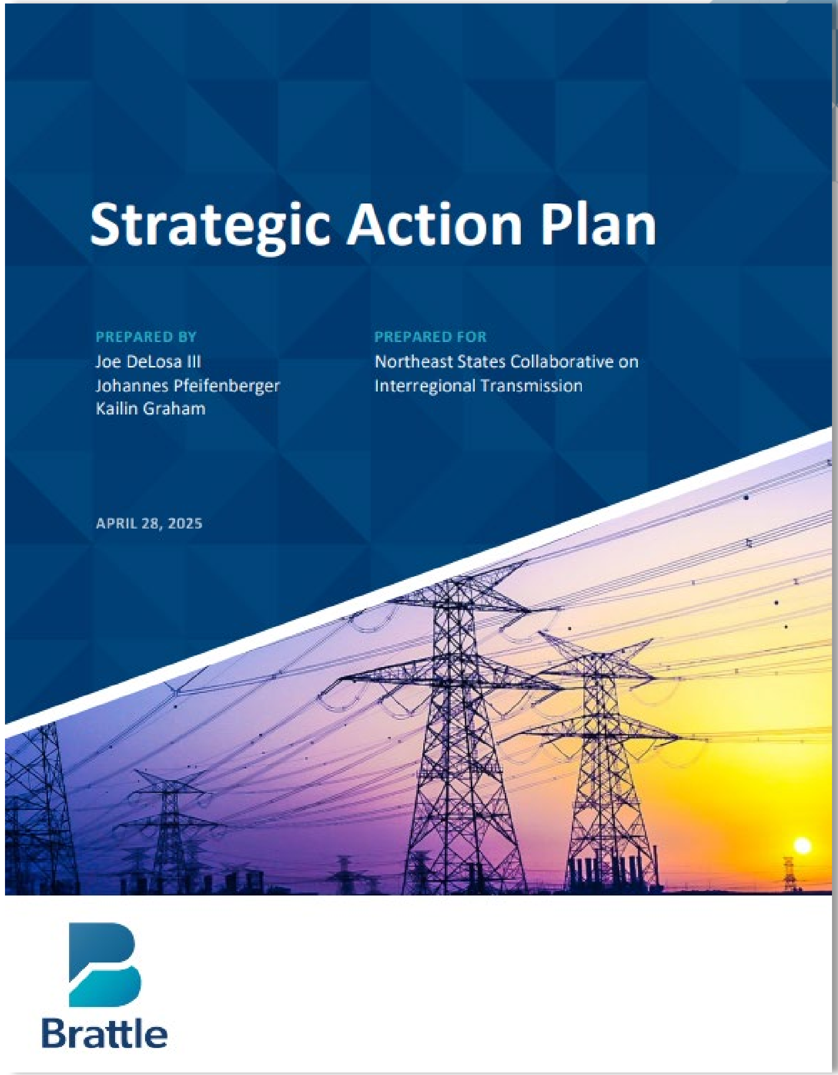
Brattle

Contents



Strategic Action Plan link

Strategic Action Plan: Overview

The Action Plan is intended to advance the Collaborative's work by focusing efforts over the near-term (5 in the next year) and mid-term (3 in the next several years)

Near-Term Action Plan

A. Address Current Gaps in Interregional Transmission:
   - Candidate Project Identification (incl. RFI)
   - Allocation of Project Costs

B. Support Development of Uniform HVDC Design Standards with DOE Consortia

C. Assess Opportunities to Align and Optimize State Offshore Wind and Transmission Procurements

D. Develop Interregional Coordination Principles for Order 1920 Compliance Filings

E. Support Reducing Seams-Related Inefficiencies

Mid-Term Action Plan

A. Explore Need for Tariff Revisions Based on Lessons Learned

B. Explore the Creation of a Buying Pool for Transmission Equipment

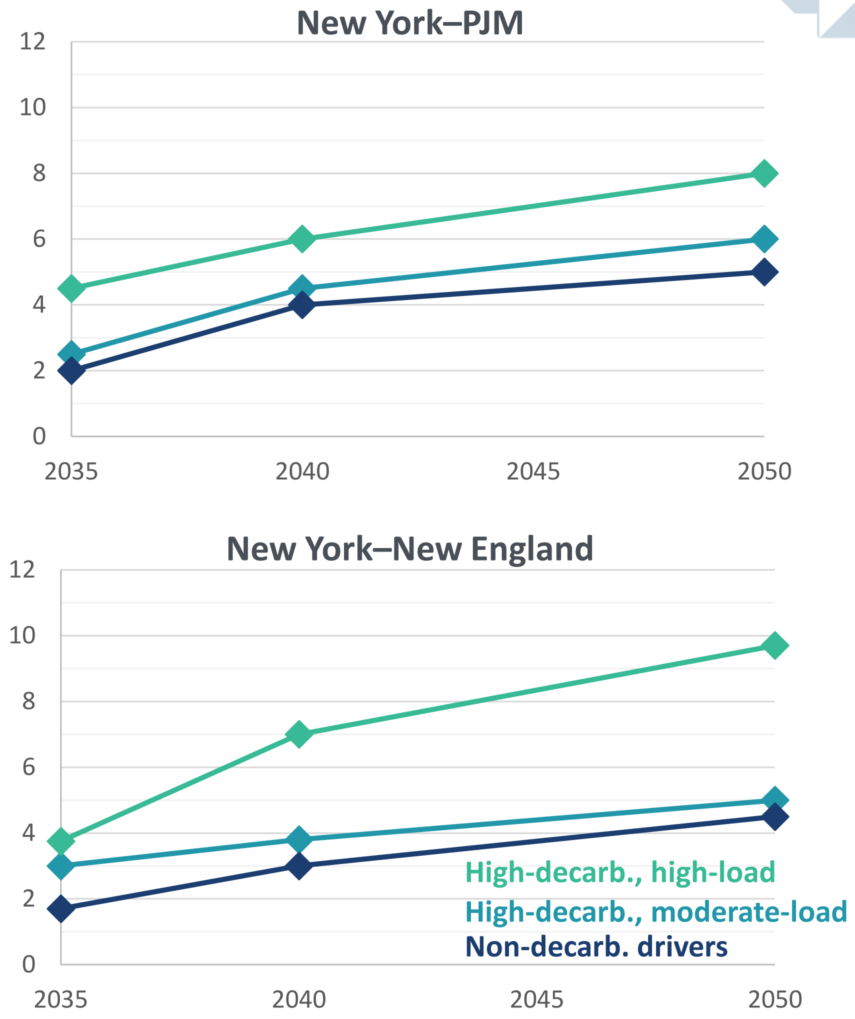
C. Enable the Transition From Generator Export Lines to Network Transmission Facilities

Current Gaps in Interregional Transmission Initiatives

Interregional transmission between NY, NE, and PJM is highly valuable in the near- and long-term, and low-regrets expansion opportunities should be pursued

- Cost-effective expansions between these regions are identified in numerous studies by DOE, NERC, national labs, MIT, states, and industry
- Based on these studies, we identify a **2035 low-regrets** need of **2 GW between NY and PJM** and **1.7 GW between New York and New England**
  - While uncertain, studies expect the magnitude of low-regrets expansions to increase, even without decarbonization drivers
- **Studies also highlighted the long-term need for expansion between the Northeast and Canada**
  - **By 2050: 10 GW between Canada and Northeast is low-regrets**
- **Realizing the value of interregional transmission identified in these studies requires overcoming key barriers,** particularly introducing intertie optimization and fully accounting for the value of existing and new interties
  - *The exact magnitude of interregional transfer capability needs remain uncertain and depends on progress on decarbonization as well as load growth*

Estimated Range of *Low-Regrets* Transmission Expansion Needs (GW)



Near-Term Action Plan: A. Addressing Current Gaps

The Action Plan sets out near-term steps necessary to identify, evaluate, select, and provide the opportunity for states to agree to share the cost of beneficial interregional transmission projects so they can be developed.

Interregional Candidate Project Identification

- In light of the lack of ISO-led processes for identifying beneficial interregional transmission, the Collaborative should **develop and issue a Request for Information** on project designs that could meet low-regrets needs
- Scope of the Request focused on “low-hanging fruit” opportunities to identify the most cost-effective projects with near-term benefits and feasible implementation plans, including grid enhancing technologies
  - RTOs will need to be critical technical advisors and participants in the effort, given the ultimate need to integrate any identified transmission project with the RTO/ISO regional plans, and the roles of existing transmission coordination venues

Interregional Allocation of Project Costs

- For any interregional transmission project to be pursued, states will need to agree on a framework for identifying benefits and **sharing the resulting costs of investments**
- A successful cost allocation framework will need to be:
  - Sufficiently flexible to accommodate projects that address a variety of regional needs (e.g., reliability, economic, and policy)
  - Specific enough to be implementable by RTO/ISOs, without being overly restrictive or formulaic
- We recommend developing a strawman approach, including an invitation for comments on cost allocation structures and benefit methods, referencing existing best practices, Commission precedent, and other innovative approaches

Near-Term Action Plan

B. Support Development of Uniform HVDC Design Standards with DOE Consortia

Challenge:

- MSSC caps do not permit delivery of 2,000 MW from OSW based on latest 525kV bi-pole HVDC technology

Action Items:

- POINTS Consortium
- Develop recommendations for technology standardization
- Engage industry to ensure recommendations are feasible for design and construction
- Enable states to agree on a common network-ready HVDC standard, to enable large HVDC facilities can be networked to provide expanded regional or interregional capabilities

C. Assess Opportunities to Align and Optimize State Offshore Wind and Transmission Procurements

Challenge:

- States are subject to different requirements that result in customized procurement frameworks

Action Items:

- Specify and provide the ability for states to coordinate and adopt a set of best practices, including by potentially:
  - Incorporating “network-ready” standard for export cables
  - Creating the option to convert export cables into open access facilities
  - Developing bid evaluation criteria to reflect transmission value
  - Combining state procurements into multi-state efforts
  - Preserving contracting flexibility to avoid supply-chain bottlenecks

D. Develop Interregional Coordination Principles for Order 1920 Compliance Filings

Challenge:

- Limited focus paid by RTO/ISO to the updated requirements of Order 1920 regarding interregional coordination

Action Items:

- Develop a set of interregional planning principles
  - Current timing restrictions should be eliminated
  - Should specify that <u>all</u> benefits to <u>each</u> region should be considered
- Coordinate with regions to incorporate Collaborative principles within Order 1920 coordination provisions

E. Support Reducing Seams-Related Inefficiencies

Challenge:

- Existing interregional transmission facilities are poorly utilized
- RTO/ISOs do not recognize value interregional transmission provides within planning analyses

Action Items:

- Resolve seam-related inefficiencies, including by advocating for intertie optimization
- Encourage regions to assess and consider the benefits of better-utilized interregional facilities within improved planning processes

Mid-Term Action Plan

A. Explore Need for Tariff Revisions Based on Lessons Learned

Challenge:

- Tariff provisions may not be well-suited to enable joint selection, pursuit, funding, and allocation of projects identified through the RFI.
- Projects identified by the Collaborative may be poorly suited for existing processes, as a project is unlikely to satisfy discrete regional needs in each region's planning process, which proceed on inconsistent timelines
- These existing processes overlook opportunities for mutually beneficial interregional transmission facilities

Action Items:

- Coordinate with RTO/ISOs to develop the necessary revisions (if any) to their market rules to enable the evaluation and selection of identified beneficial interregional projects, and apply the Collaborative's desired cost allocation

B. Explore the Creation of a Buying Pool for Transmission Equipment

Challenge:

- Lack of a centralized mechanism for coordinated bulk orders of HVDC equipment
- International competition for HVDC supply chain expansion and timely delivery

Action Items:

- Take initial steps towards determining the preferred structure and necessary scope of such a buying pool.
- Research the following questions:
  - What is the minimum buy-in for suppliers to participate?
  - What are off-ramps for changes in policy or schedule?
  - How much capital would need to be put "at-risk"?
  - Which technological criteria must be determined in advance?
  - How to account for technological evolution?

C. Enable the Transition from Generator Export Lines to Network Transmission Facilities

Challenge:

- Individual offshore wind generators' radial export lines may eventually become transmission facilities of a future networked offshore grid
- Current offshore wind procurements do not consistently specify and enable the future transition of export cables to open-access network transmission facilities

Action Items:

- Identify the necessary contractual and regulatory frameworks that could be adapted to create networked offshore grid
- Evaluate mechanisms that have been developed to meet this goal, including CAISO's Subscriber Participating Transmission Owner model.
- Lead a series of discussion with FERC staff to consult on the application of open-access precedent throughout the process

Additional Slides:

Synthesis of Transmission Needs Studies

New York – PJM: Significant transmission expansion between is valuable in the near-term

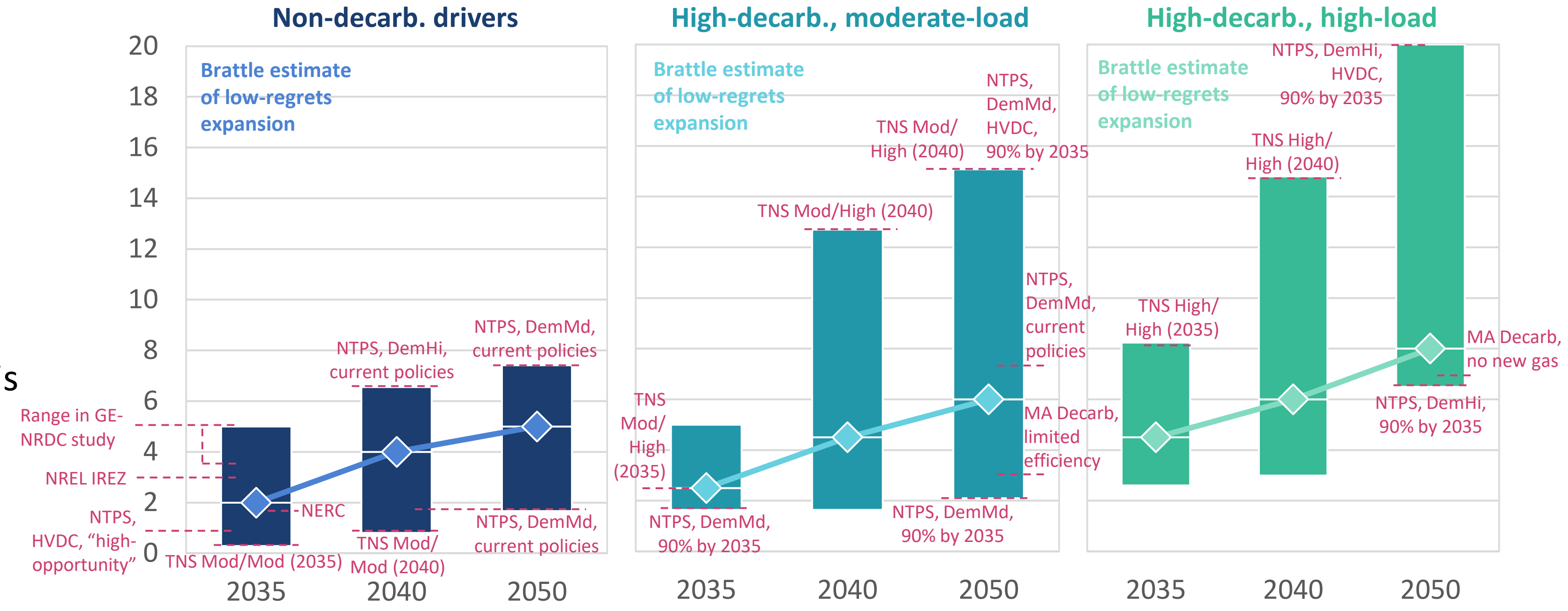
Based on multiple independent studies, we estimate that at least **2 GW** additional transfer capability between **New York and PJM by 2035 is low-regrets**, even without considering the value of transmission for decarbonization

- Represents low end of range from all studies, and central value of studies that did not consider decarbonization as the driver for transmission development

At least **4 GW by 2040 is likely low-regrets**, but needs may be significantly higher in high-decarbonization futures (up to 12–15 GW)

- Building in **flexibility and expandability** is likely efficient given the potential for much larger long-term needs
- Our low-regrets estimates for high-decarb. futures range from **4.5–6 GW in 2040** to **6–8 GW in 2050**
  - Datacenter and electrification demand in PJM makes high-load scenarios more likely

Estimated Range of NY–PJM Transmission Needs (GW)



Notes: Ranges above cover transfer capability needs reported in the DOE 2023 Transmission Needs study (TNS, summarizing multiple studies), DOE National Transmission Planning Study (NTPS), GE-NRDC study, MA Decarbonization Pathways study, LBNL study, NREL IREZ study, and NERC ITCS study. These ranges exclude scenarios deemed unrealistic, such scenarios with zero transmission expansion between NY and PJM in the MA Decarb Study. Annotations indicate noteworthy scenarios from these studies. NTPS results are from “AC” expansion scenarios unless denoted otherwise.

New York – New England: Interregional upgrades across the interface presents low-regrets, near-term opportunities

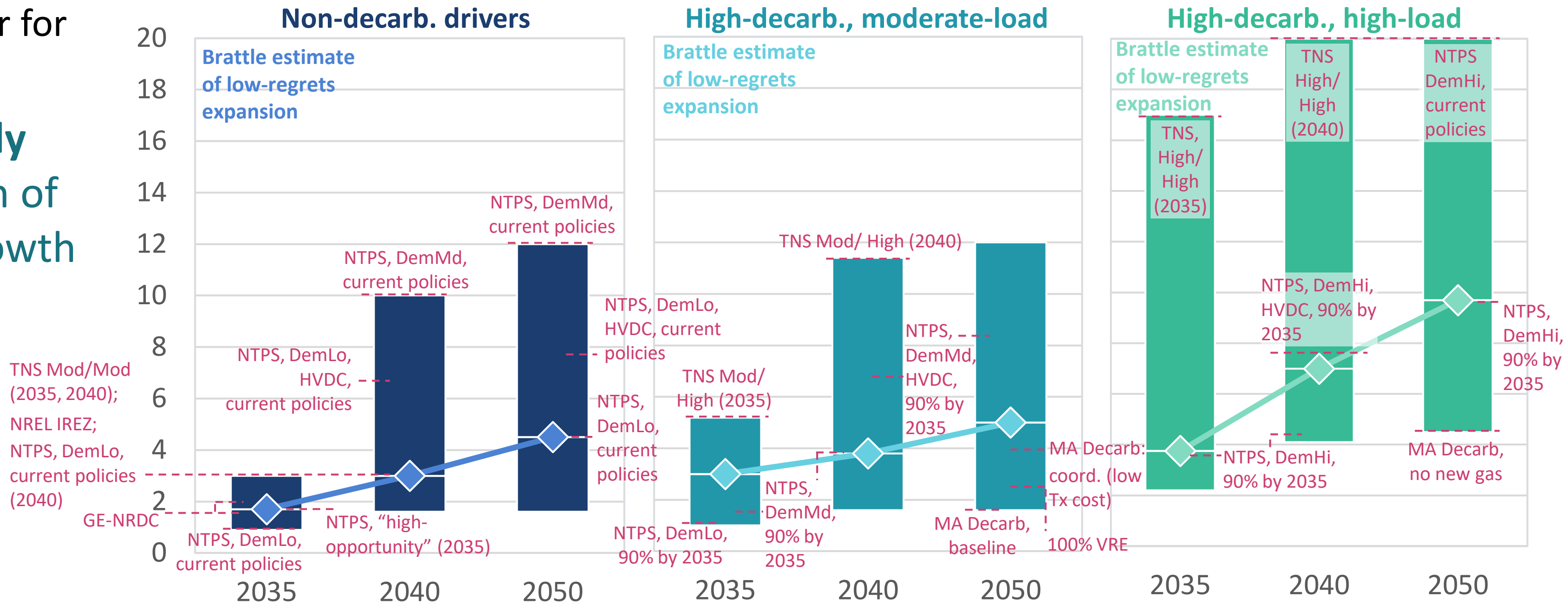
Based on multiple independent studies, we estimate that at least **1.7 GW** additional transfer capability between **NY and New England by 2035 is low-regrets**, even without considering the value of transmission for decarbonization.

- Similarly represents low end of range across studies and central estimate of studies that did not consider decarbonization as the driver for transmission development

Long-term (2040–2050) needs are highly uncertain; depend on scale and location of renewables adoption as well as load growth

- **3 GW by 2040 is low-regrets**, but may be conservative given decarbonization ambitions of both regions
  - Our low-regrets estimates for high-decarbonization scenarios conservatively skew towards the bottom of each range given the uncertainty amongst projects
- Option value for increased transfer capability is particularly valuable, given potentially high interregional needs

Estimated Range of New England–NY Transmission Needs (GW)



Notes: "Non-decarb. drivers" refers to scenarios where decarbonization was not a driver/constraint for the analysis. Ranges above cover transfer capability needs reported in the DOE 2023 Transmission Needs study (TNS, summarizing multiple studies), DOE National Transmission Planning Study (NTPS), GE-NRDC study, MA Decarbonization Pathways study, and NREL IREZ study. These ranges exclude scenarios deemed unrealistic, such as low-electrification and low-offshore wind scenarios in the MA Decarb. study which report low transmission needs due to new nuclear capacity in NY and CT. Annotations indicate noteworthy scenarios from these studies. NTPS results are from "AC" expansion scenarios unless denoted otherwise.

Canada: Significant expansion between the Northeast and Quebec is valuable long-term, and near-term for reliability in New York

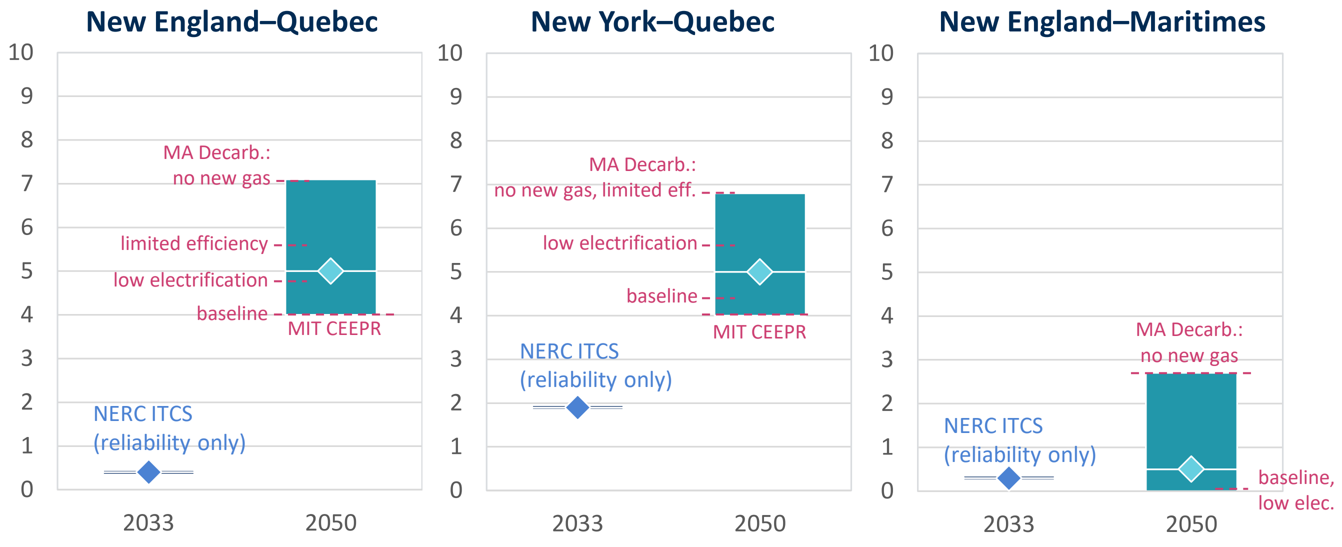
Based on multiple independent studies, we estimate that at least **5 GW** additional transfer capability **by 2050** between both **New England and Quebec** and **New York and Quebec is low-regrets**. When just considering reliability benefits, **1.9 GW between New York and Quebec by 2033 is low-regrets**

- While fewer studies considered transmission expansion to Canada, long-term (2050) studies show consistent value in significant expansion between Quebec and both New England and New York
  - Needs are greater (up to 7 GW) in higher renewables/low thermal generation futures
  - Value is derived from operating lines **bidirectionally** to balance Northeast renewables
- The MA Decarbonization Pathways study found a moderate need between **New England–New Brunswick** between 0–0.8 GW by 2050, scaling to 2.7 GW in a future with no new gas generation

NERC study demonstrates near-term reliability need

- **0.4 GW between NE–QC, 1.9 GW between NY–QC, 0.3 GW between NE–Maritimes**
- These figures consider resource adequacy only, and are therefore **conservative estimates that do not consider economic or public policy benefits of further expansion**

Estimated Range of Northeast–Canada Transmission Needs (GW)



Notes: Ranges above cover transfer capability needs reported in the NERC ITCS (2033 only), the MIT CEEPR study (2050 only) and the MA Decarbonization Pathways study (2050 only). Annotations indicate noteworthy scenarios from these studies.

List of Studies Reviewed

Study	Years analyzed	Findings
1. DOE 2023 Transmission Needs Study	2030, 2035, 2040	**NY-New England:** 2035: 2.8–17 GW; 2040: 2.9–21.4 GW **NY-PJM:** 2035: 0.29–8.24 GW; 2040: 0.81–12.7 GW
2. DOE National Transmission Planning Study	2035, 2040, 2050	**NY-New England:** 1.7–2.9 GW by 2035, 3.8–6.7 GW by 2040 in central case **NY-PJM:** ~1 GW by 2040 for AC, but much higher in HVDC futures
3. DOE Atlantic OSW Transmission Study	2050	Interregional topology resulted in a **total of 14 GW of offshore transmission** between Atlantic states, with a **benefit-cost ratio of 2.9** ($2.4 billion/yr in production cost and resource adequacy benefits) [granular results on transfer capability needs between individual regions not provided].
4. GE-NRDC Study	2035	$12 billion in net present value from 87 GW interregional transmission (2 GW between NY-NE, 5 GW between NY-PJM), including $1 billion in resilience benefits from single 2035 polar vortex event.
5. MA Decarb Pathways Study	2050	**NY-New England:** 0.5–4.5 GW (1.6–4.5 GW when focusing on most realistic scenarios) **NY-PJM:** 1.5–7 GW (Caveat: PJM was not explicitly modeled as its own zone but a boundary condition for New York) **QC-NY:** 3.8–6.8 GW **QC-New England:** 4.1–7.1 GW **New England-Maritimes:** 0–2.7 GW (0–0.8 GW when focusing on most realistic scenarios)

Study	Years analyzed	Findings
6. LBNL Analyses	2012–2023	**NY-New England:** documents historical energy market value of $137–189 million/yr per GW of transmission **NY-PJM:** documents historical energy market value of $149–156 million/yr per GW of transmission
7. NREL IREZ	2022	3 GW expansions from PJM to New York and New York to New England increases energy cost savings of transmission corridor by $118 million/yr and $28 million/yr, respectively (incremental costs: $27 million/yr and $21 million/yr, respectively)
8. MIT CEEPR	2050	**QC-New England:** 4 GW provides power system cost savings of $1,121 million/yr (13%) **QC-NY:** 4 GW provides power system cost savings of $913 million/yr (13%) Value is generated by utilizing the transmission bidirectionally to balance Northeast renewables, avoiding firming costs
9. NERC ITCS	2033	**NY-New England:** 0 GW (this is unlikely once considering economic and public policy benefits) **NY-PJM:** 1.8 GW to alleviate significant resource deficiencies in New York **QC-New England:** 400 MW **QC-NY:** 1.9 GW **New England-Maritimes:** 300 MW

For Study Summaries, see: Strategic Action Plan, Phase 1: Study Synthesis of Transmission Needs (Feb 2025)

Note on Existing Interregional Transfer Capability

- In additional to transmission expansion needs, **we found that there were a range of values reported across different studies for how much interregional transfer capability exists today**
- Namely, the DOE Transmission Needs Study, DOE National Transmission Planning Study (NTPS), and NERC Interregional Transfer Capability Study report different existing transfer capabilities at the New York–New England and New York–PJM interfaces
- Different assumptions on existing capability partially explain differences in additional transfer capability needs
  - e.g. DOE NTPS assumes greater existing transfer capability between New York and PJM than the Transmission Needs Study, and as a result finds less expansion is needed at that interface

	DOE Transmission Needs Study	DOE NTPS	NERC ITCS
New York <> New England	2,030 MW	3,500 MW	Summer: >1,303 / <1,660 MW Winter: >2,432 / <1,359 MW
New York <> PJM	2,000 MW	6,600 MW	Summer: >913 / <1,356 MW Winter: >4,019 / <4,814 MW

Sources: DOE NTP Study Team letter, December 17, 2024; NERC ITCS Phase 1 results.

The Need to Address Inefficiencies Across Market Seams

Five Sources of Inefficiencies Created by Market Seams

Seams between RTOs will generally be more efficient than seams between non-market regions that rely entirely on bilateral trades. Nevertheless, significant seams-related inefficiencies exist between RTO markets:

1. **Interregional transmission planning** is ineffective
2. **Generator interconnection** delays and cost uncertainty created by affected system impact studies (and effectiveness coordination through means such as the SPP-MISO JTIQ, reducing costs by 50%)
3. **Resource adequacy** value of interties (often not considered in RTO's resource adequacy evaluations) and barriers to capacity trades (often created by RTOs' restrictive capacity import requirements and incompatible resource accreditations)
4. **Loop flow management** inefficiencies through market-to-market coordinated flowgates (with shares of firm flow entitlements) under the existing JOAs
5. **Inefficient trading** across contract-path market seams and the need for intertie optimization

NREL Report: Barriers and Opportunities to Realize the System Value of Interregional Transmission (June 2024)

NREL recommends reforms to "significantly enhance the value of interregional transmission and deliver additional within-region benefits":

Common Actions	• Develop a framework for resource adequacy sharing among regions • Support joint studies to identify transfer needs during extreme events and develop operational procedures to mitigate issues • Evaluate internal transmission system ability to accommodate large power transfers as the underlying generation mix changes
Nonmarket and Hybrid Actions	• Implement coordinated scheduling and operations platforms or consolidation • Pursue joint congestion management programs and reevaluate qualified paths for congestion management • Develop consistent methods to calculate available transfer capacity • Update processes to prioritize system reliability in scheduling market and wheeling transactions
Market Actions	• Eliminate fees and improve price forecasting for coordinated transaction scheduling or move toward intertie optimization • Update corridor flow limits, automate procedures, and align assumptions for congestion management programs • Revise interface pricing methods and validate interregional transactions • Integrate operational control of merchant HVDC lines with regional market operations
Transformative Actions	• Conduct long-range, nationwide interregional transmission planning • Implement interconnection-wide intertie optimization • Establish a national system operator and planner to coordinate national network planning, scheduling, and resource adequacy functions

Recognize resource-adequacy and resilience value of interregional transmission

- Improved coordination and joint congestion management

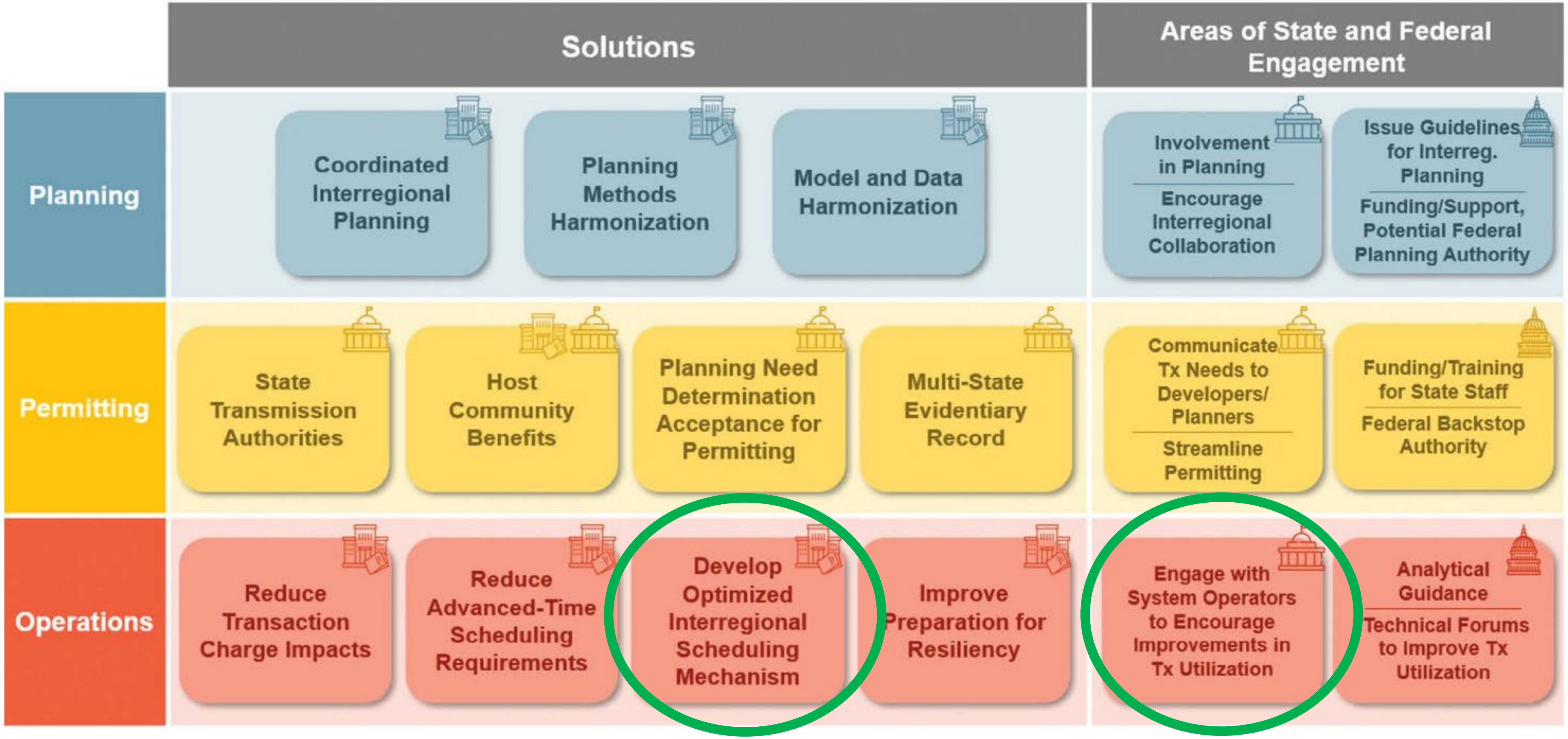
- De-pancaking
- Improved intertie pricing
- **Move toward intertie optimization**

- Interregional planning
- Interconnection-wide optimization

NARUC Report: Collaborative Enhancements to Unlock Interregional Transmission (June 2024)

NARUC
National Association of Regulatory Utility Commissioners

Recommends reforms improve planning, permitting, and operational utilization of interregional transmission, including intertie optimization:



Source: https://pubs.naruc.org/pub/BACDBB9D-02BF-0090-0109-B51B36B74439

Note

This content is in part based on:

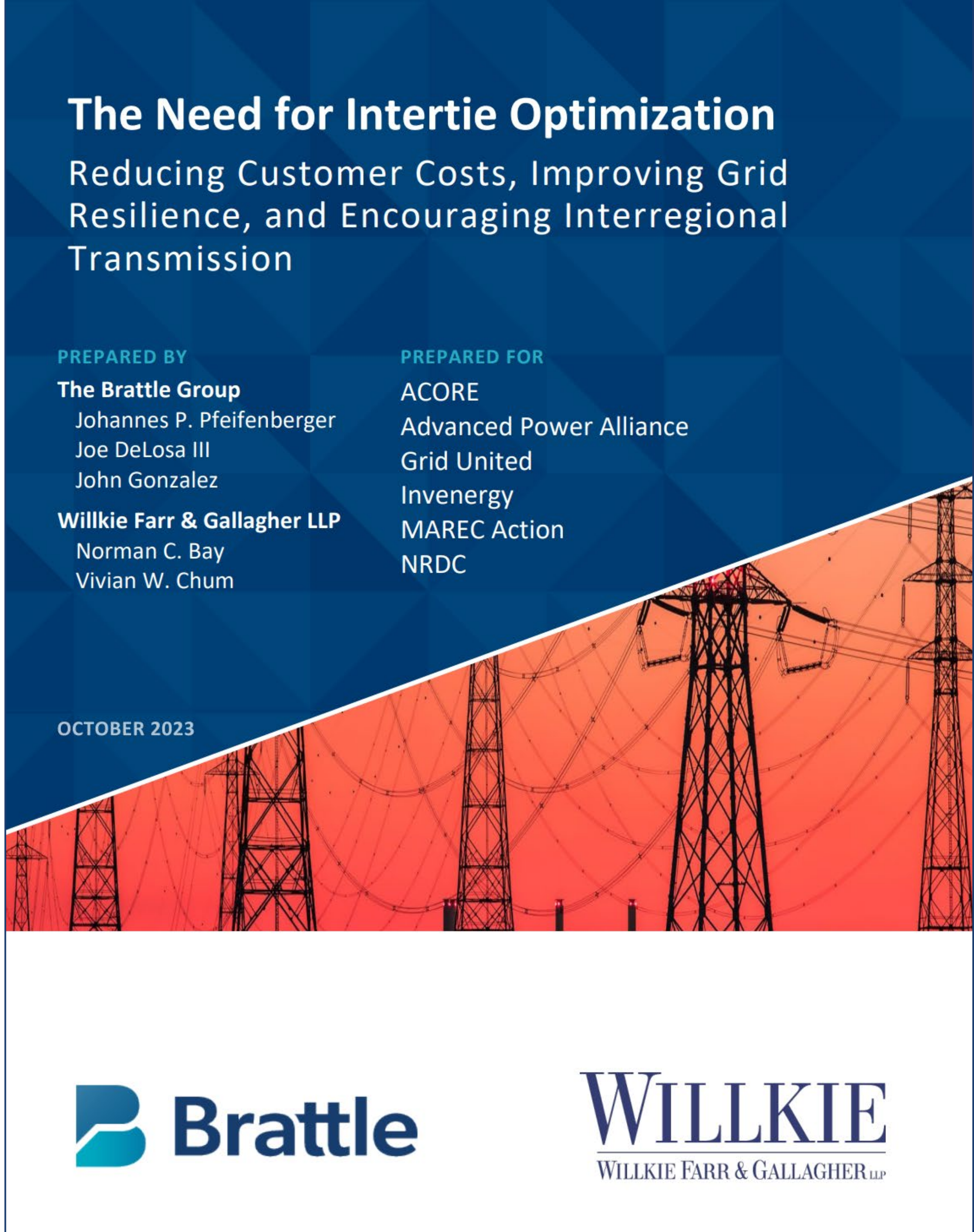
The Need for Intertie Optimization, prepared for ACORE, Advanced Power Alliance, Grid United, Invenergy, MAREC, and NRDC, October 2023

Intertie Optimization FAQs and Implementation Principles, February 2024

Intertie Optimization: Efficient Use of Interregional Transmission (Update), presented to OPSI, April 12, 2024

Market Benefits and Seams: Options and Implications, presented to CREPC-WIRAB, April 24, 2024.

Various State of Market, LBNL, NARUC, and NREL reports (as cited in the slides)


The Need for Intertie Optimization

Reducing Customer Costs, Improving Grid Resilience, and Encouraging Interregional Transmission

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Promising Initiative: SPP's Inter-Market Optimization Framework

- SPP staff has been exploring an Inter-Market Optimization Framework to improve the efficiency of transfers between SPP and its neighbors, resulting in increased economic benefits for SPP's market participants
- On October 16, 2024, SPP's Strategic Planning Committee (SPC) endorsed that staff's work on this concept be prioritized within the "Optimized Seams" objectives of SPP's strategic planning roadmap
- SPP's proposed next steps:
  - Further evaluate potential value of adding this feature to the market design
  - Prioritize inter-market optimization within the Optimized Seams strategic opportunity
  - Develop policy proposals to address challenges identified

Source: SPP Documents & Filings – SPC Meeting Materials, Oct 8, 2024

About the Speaker

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Joe DeLosa III is a Manager at The Brattle Group with comprehensive experience at the intersection of state clean energy policy and wholesale electricity markets. He has served as a subject matter expert for clients and senior policymakers across a wide range of power market issues, including cost-effective implementation of state clean energy policy, transmission planning, energy and reserve markets, and resource adequacy. Mr. DeLosa has offered expert guidance on major state policy initiatives, including integrating offshore wind, integrated distribution planning, transmission cost allocation, and retail rate design.

Before joining Brattle, Mr. DeLosa was the Bureau Chief of Federal & Regional Policy at the New Jersey Board of Public Utilities, where he managed all RTO and federal affairs for the State. In his prior role, he also oversaw regulatory affairs for the Delaware Public Service Commission. He has also advised a wide range of PJM states as a long-time member of the Organization of PJM States (OPSI) staff.

Brattle Group Practices and Industries

ENERGY & UTILITIES

Competition & Market Manipulation
Distributed Energy Resources
Electric Transmission
Electricity Market Modeling & Resource Planning
Electrification & Growth Opportunities
Energy Litigation
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Finance and Ratemaking
Gas/Electric Coordination
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