Acadia Center

Advancing the Clean Energy Future

Transmission Planning, Interconnection, and Cleaning Up the Peak

Office of Energy Transformation (OET) Presentation
July 2025

Jamie Dickerson
Senior Director, Climate and Clean Energy Programs
Acadia Center

acadiacenter.org • info@acadiacenter.org • 207.236.6470 ext. 001
Boston, MA • Hartford, CT • New York, NY • Providence, RI • Rockport, ME

WHO IS ACADIA CENTER?

MISSION

Acadia Center's mission is to advance bold, effective, and equitable clean energy solutions for a livable climate and a stronger, more equitable economy.

PROGRAMS

Acadia Center focuses on eight areas of climate and clean energy, within which we prioritize consumer benefits, public health, economic growth, and equitable distribution of benefits:

- **Energy Efficiency and Building Decarbonization**
- **Clean Energy and Grid Reform**
- **Utility Innovation and Accountability**
- **Transportation and Mobility**
- **Climate, Energy, and Equity (CLEAN-E) Analysis**
- **State and Regional Climate Policies**
- **Equity, Environmental Justice, and Outreach**
- **Public Engagement and Communications**

SUPPORT

Acadia Center is funded by foundation grants and individual donations. It does not accept corporate or government funding.

Acadia Center

How Transmission Planning, Interconnection Reform Can Help Decarbonize Peak Electric Demand

AGENDA:

- Introduction and Framing
- Transmission Planning
- Interconnection Reform
- The Intersection
- Takeaways

Acadia Center

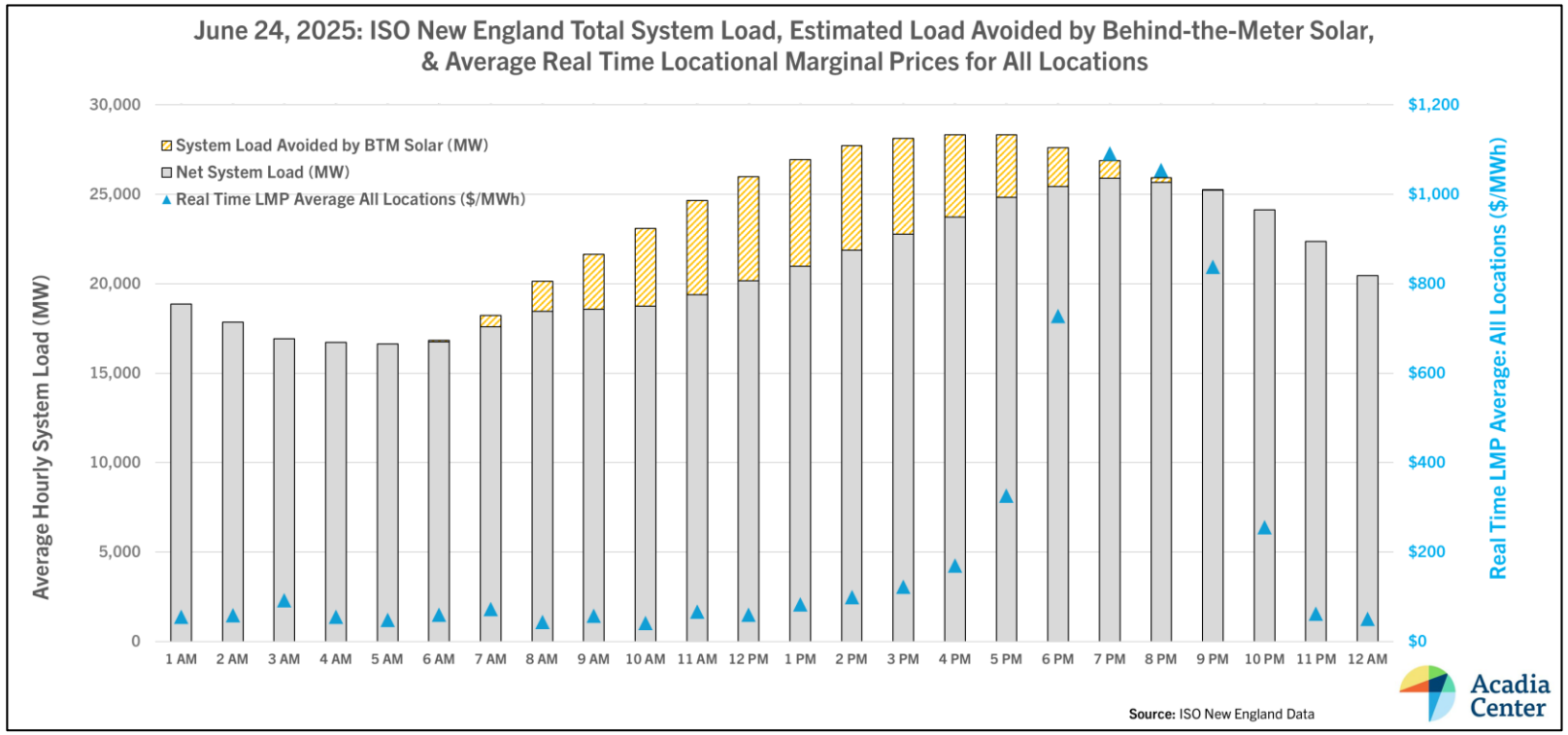
I. Introduction and Framing

- What peak are we decarbonizing, and how will the peak evolve?
- The pivotal role of demand-side and distributed resources, and broader grid flexibility

Acadia Center

Decarbonizing the peak in 2025 (summer; 25-26 GW)

- June 24, 2025: **five-plus GW of distributed solar saved consumers *at least* $8.2 million** on one of the most expensive days of the year for the grid, which tested the grid's reliability with rarely seen peak demand highs.



Acadia Center

LINK: https://acadiacenter.org/resource/grid-action-report-june-heat-wave/.

Decarbonizing the peak in 2050 (winter; 55 GW?)

FIGURE 4
New England Peak Electric Demand: 2020 vs. 2050 5-Study Comparison

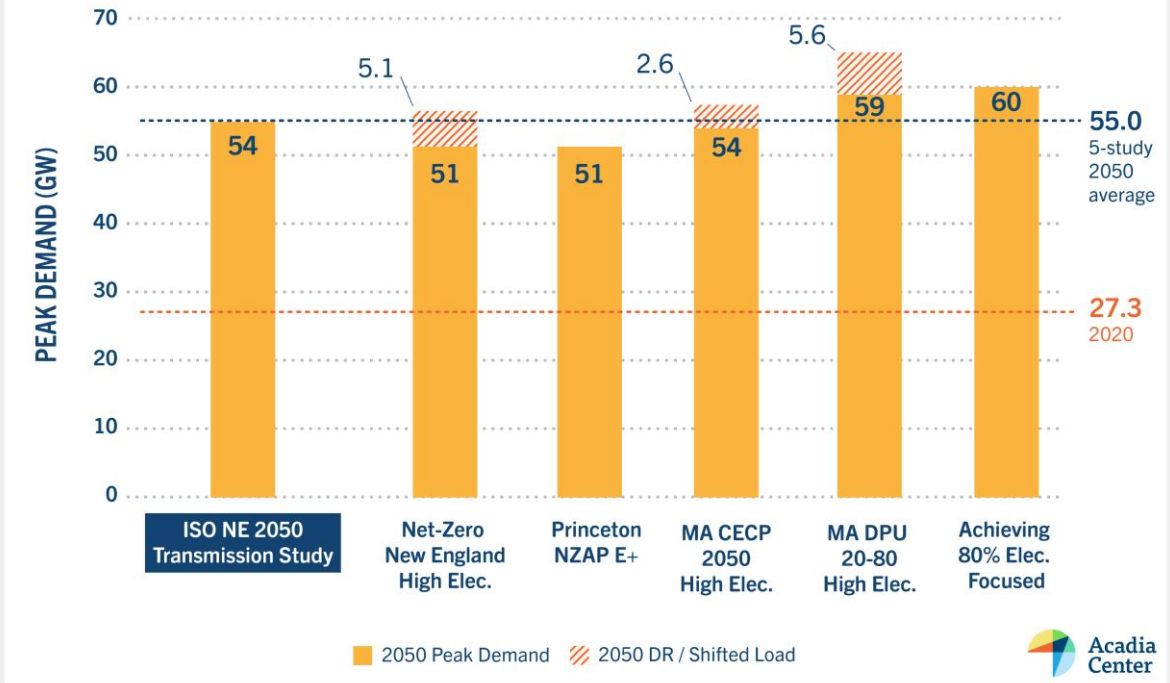
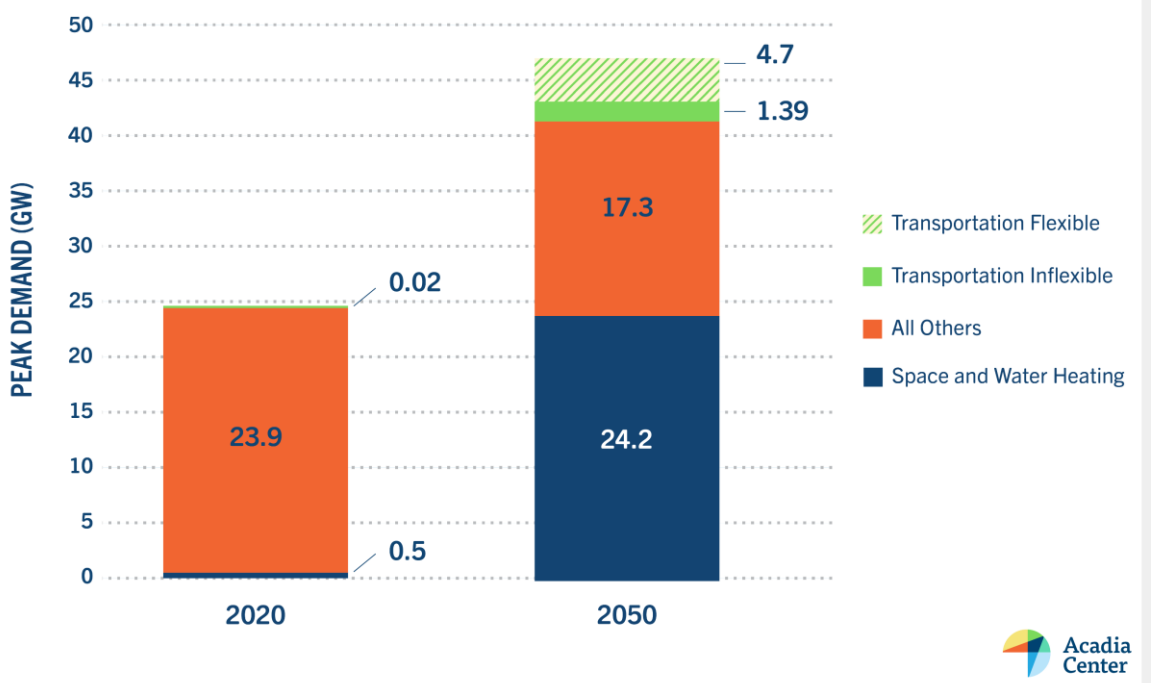
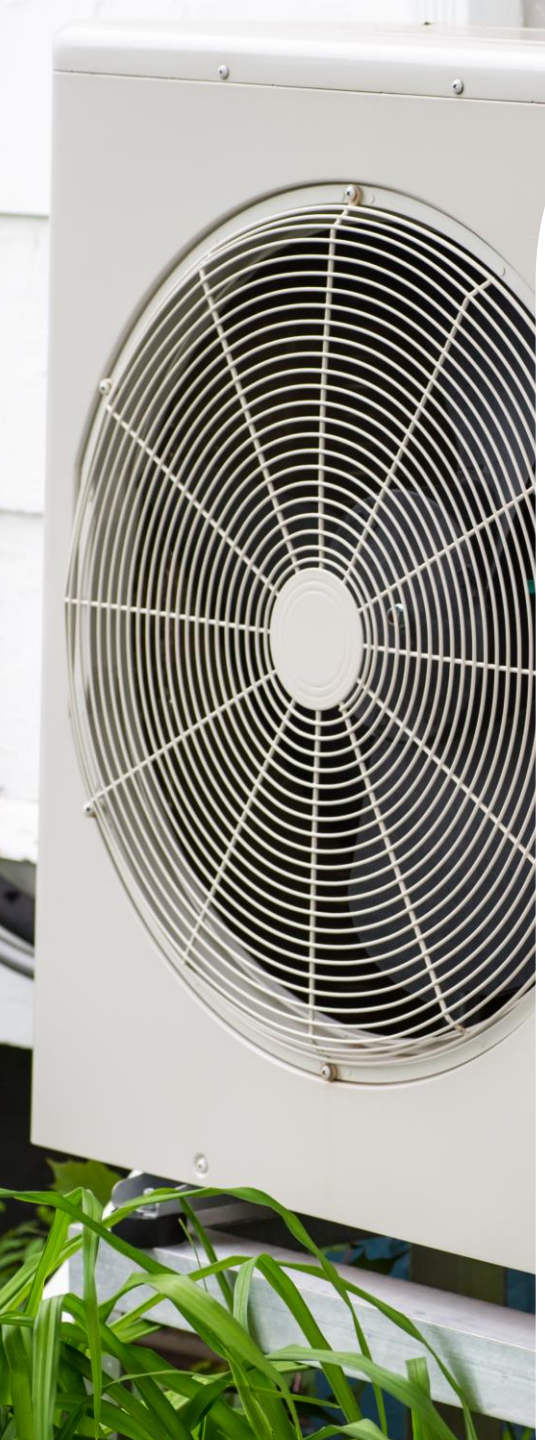


FIGURE 5
MA CECP Full Electrification Scenario: Average New England Peak Demand in Top 50 Hours: 2020 vs. 2050



Source: The Energy Is About to Shift – Acadia Center and Clean Air Task Force

Acadia Center



Grid Flexibility (Active Demand Management):
Most studies underestimate peak reduction potential

Table 5. New England 2050 Peak Load Reduction from Demand Response and Assumed Flexibility of EV and Water Heating End Uses: 5-Study Comparison

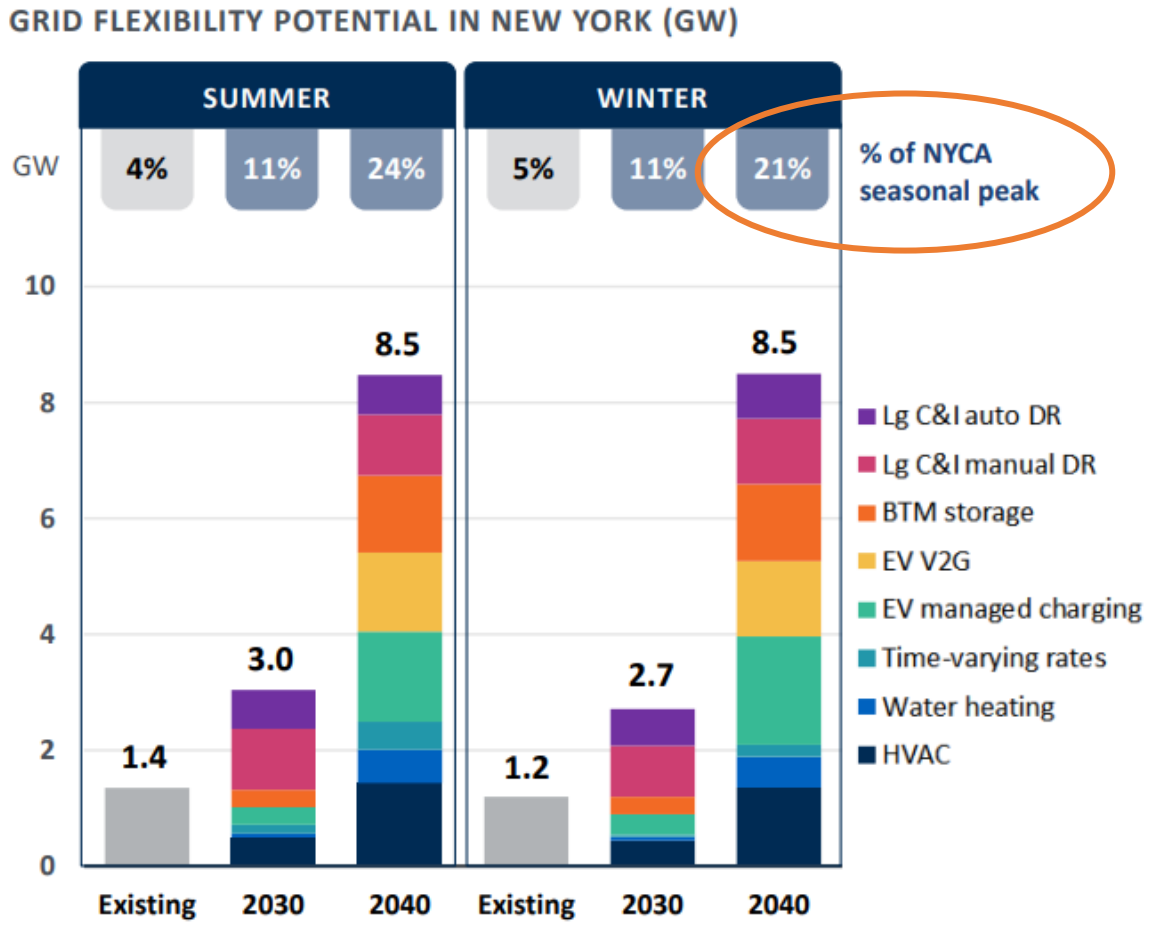
STUDY & SCENARIO	2050 PEAK REDUCTION (GW)	2050 % PEAK REDUCTION	2050 % EV TOTAL LOAD FLEXIBLE	2050 % TOTAL WATER HEATING LOAD FLEXIBLE
MA DPU 20-80 High Electrification	5.6	-9.4%	50%	25%
MA CECP 2050 High Electrification	2.6	-4.6%	75%	0%
Princeton NZAP E+	Unknown[44]	Unknown	50%	20%
Net-Zero New England High Electrification	5.1	-10.1%	Unknown	0%
Achieving 80% Electrification Focused	Unknown	Unknown	Unknown	Unknown
Studies Average (Excluding Unknowns)	**4.4**	**-7.0%**	**58%**	**11%**

Source: The Energy Is About to Shift – Acadia Center and Clean Air Task Force

Acadia Center

New Modeling in NY Shows > 3x grid flexibility potential

It is essential to include these demand/distributed resources in a peak evaluation



Source: Brattle Group
New York's Grid Flexibility Potential

This level of peak demand reductions would save New England **~$8B in transmission costs alone!**

**Assuming $750 million per GW of peak reduced below 51 GW, per ISO-NE 2050 Transmission Study.

Left: The portfolio of grid flexibility measures could avoid $2.9 billion annually in NY power system costs by 2040, of which $2.4 billion could be returned to consumers.

Acadia Center

Everything, Everywhere, All At Once

Regional planning

> ISO-NE 2050 Transmission Study

> Long Term Transmission Planning Process (LTTP)

> FERC 1920, 2023

> Independent Transmission Monitor (ITM) proposals

Interregional planning

> Northeast States Collab. on Interregional Transmission

> NEG-ECP and NICE

> Northeast Grid Planning Forum (NGPF)

> IPSAC (e.g., load loss limit)

National/Int'l planning

> NERC Internal Transfer Capability Study

> DOE National Transmission Planning Study

> Additional modeling

Canadian planning

> Atlantic CAN OSW Grid Int. and Tx Study

> Ongoing provincial/utility planning processes

> New C-49 OSW law

MA Distribution System Planning

> ESMPs (GMAC)

> LTSPP, DPU 25-20

> EEAC

MA Interconnection Policy/Technical Forums

> IIRG, DPU 25-48

> ESIRG, DPU 23-115, 117, 126

> TSRG, DPU 19-55, 20-75

Energy Transition Forums

> MA Office of Energy Transformation (DTP, FTT, EMT, ETAB)

> Climate Compliance Plans, Line Extension Allowances, NPA Framework, etc.

Acadia Center

Summary of Key Takeaways and Recommendations

Transmission Planning: Unlocking a wider set of clean peak resources

- Need more robust interregional focus and coordination to unlock significant, complementary new generation and storage resources across the full northeast US and eastern Canada region (NPCC)
- Need longer-term planning horizon – initiating efforts today to meet high likelihood 2040/2050 needs
- Need to align and expedite LTTP and Order 1920 compliance efforts to seek investments that can unbottle additional clean resources and address future peaks driven by extreme weather conditions
- Need (desperately) to address lack of oversight of ACP proposals via an ITM, in part to ensure those local upgrades can be right-sized for hosting capacity, load growth

Interconnection Reform: Bringing new clean peak resources online quicker

- Need to usher in a new paradigm of flexible interconnection via planned agreements and DERMS
- Need to expedite distribution-level interconnection, ASO studies to help resources qualify for expiring tax credits
- Need to pioneer new, improved ways to study and deploy energy storage swiftly, especially for retrofit installations
- Need to create new frameworks for ultra-fast and even permissionless system approvals (e.g., balcony solar)

II. Transmission Planning

Breaking down multiple elements of transmission planning:

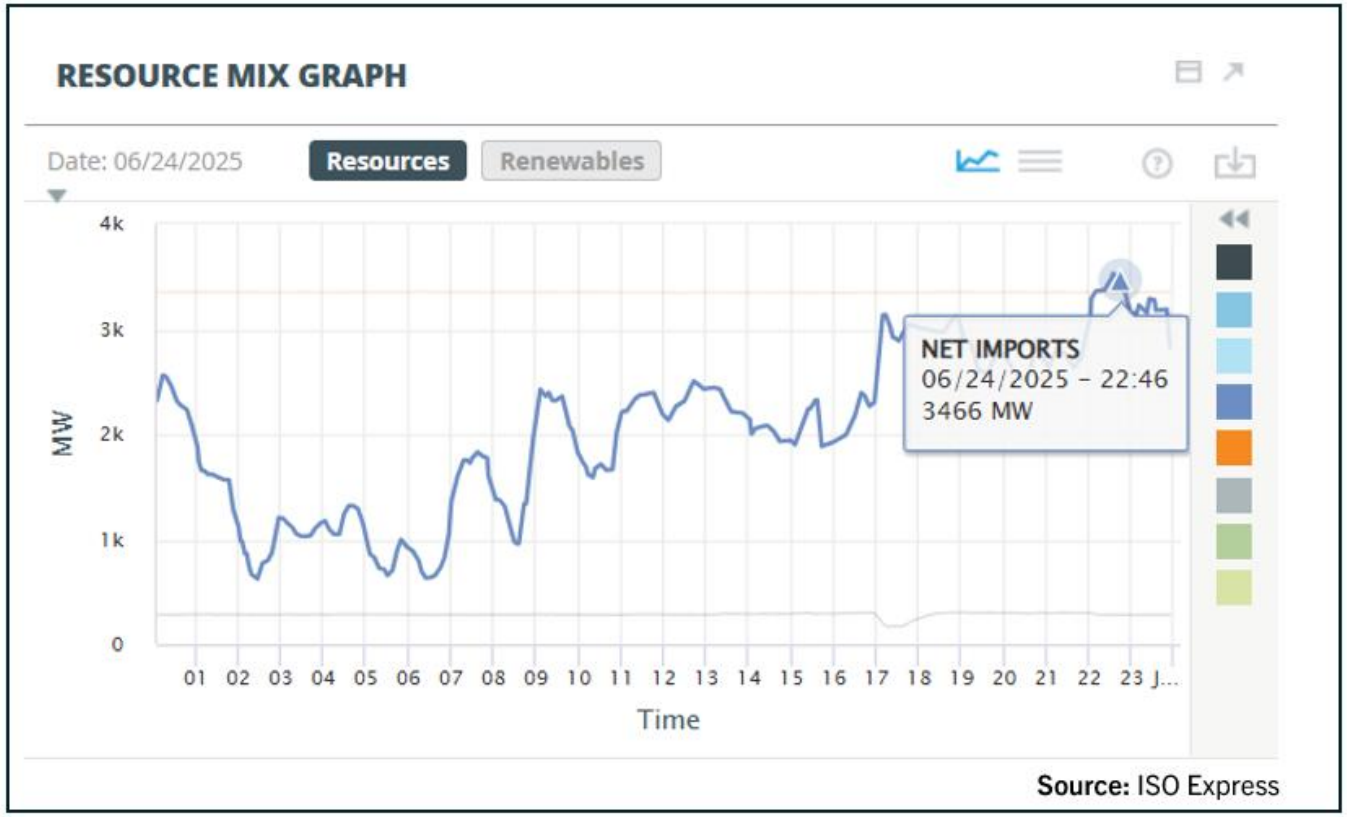
- **Interregional:** from fragmented to unified
- **Regional:** unbottling renewables and storage within New England
- **Local upgrades:** optimizing for hosting capacity, load growth
- **Intersection:** where Transmission and Distribution levels meet

Acadia Center

Interregional electricity trade: mutual aid during shared grid stress events

- On June 24 heat wave, net imports from neighboring regions were relied on in all 24 hours of the day, and exceeding 3 GW from 5pm-on during the periods of highest net demand and cost

June 24 ISO-NE Total Net Imports



Acadia Center

Local transmission upgrades helped enable safe retirement of Mystic Generating Station in Everett

Acadia Center

Zooming Out: The Broad View of Our Grid

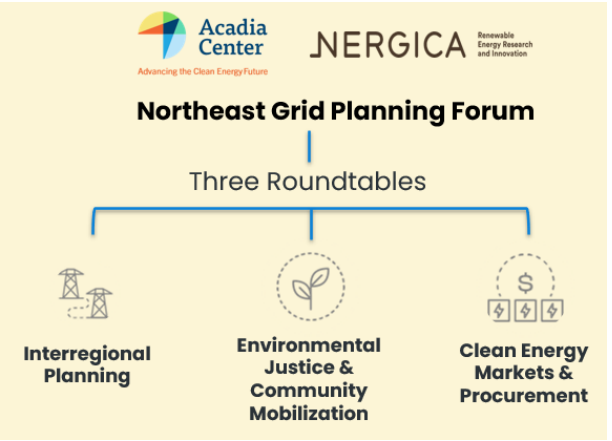
- Canada and the northeast US share **aggressive carbon reduction goals**, will experience a ~doubling of demand by 2050
- Bidirectional clean energy – a transmission network that can **deliver energy 'north and south' between the US and Canada** - optimizes the benefits of onshore and offshore wind, hydropower, storage, and other clean energy resources (all of which will help decarbonize peak demand)
- Canada & US share a **deep history of joint infrastructure** planning and development
- **NPCC** – Northeast Power Coordinating Council, already serves as regional reliability entity under/with NERC

Webpage: https://www.northeastgrid.org/

Framing Paper: https://acadiacenter.org/resource/the-northeast-grid-planning-forum-framing-paper/

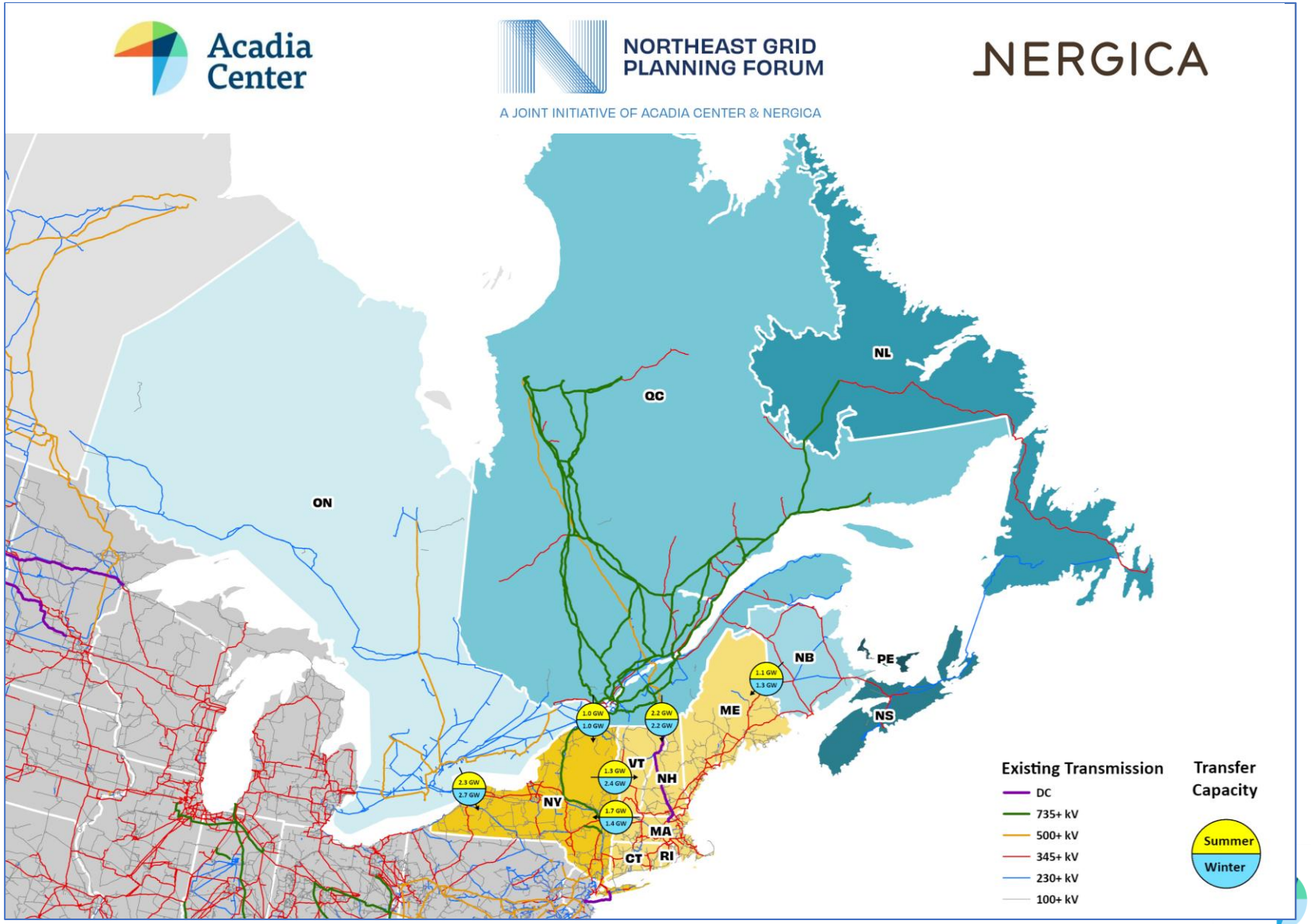
Northeast Grid Planning Forum (NGPF)

- Purpose: create an inclusive structure that facilitates joint planning, coordination, and effective decision-making, for a next-generation power network that will safeguard the economic competitiveness and energy resilience of the entire region.



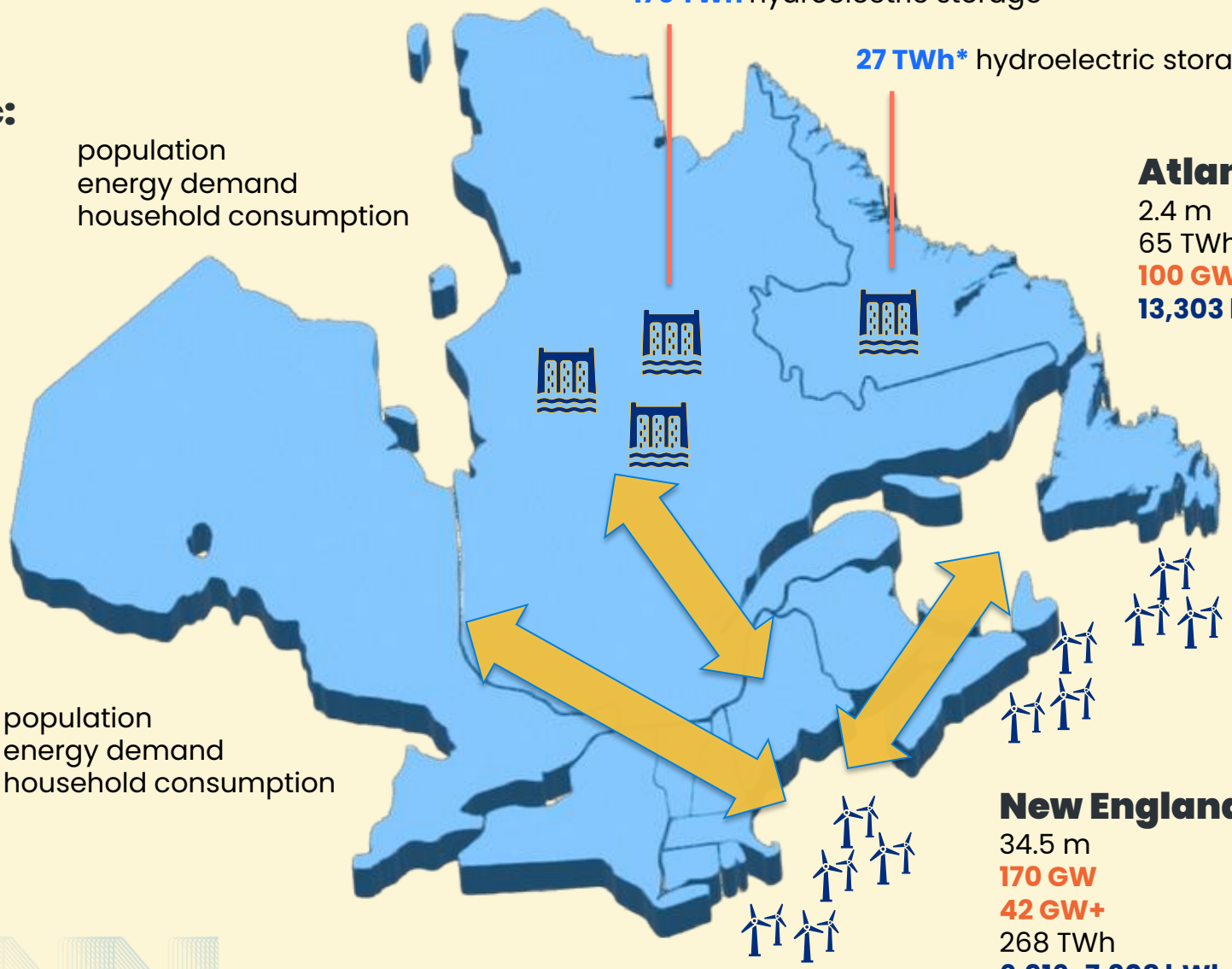
Acadia Center

Connections Between US and Canadian Energy Systems Exist, But Must Be Strengthened



Acadia Center

Connecting clean energy resources for bidirectional trade, peak balancing benefits



Quebec:

8.5 m	population
202 TWh	energy demand
17,111 kWh	household consumption

Atlantic Canada:

2.4 m	population
65 TWh	energy demand
100 GW+	offshore wind potential
13,303 kWh	household consumption

Ontario:

14.6 m	population
137 TWh	energy demand
8,300 kWh	household consumption

New England / New York:

34.5 m	population
170 GW	2050 renewable procurement
42 GW+	offshore wind potential
268 TWh	energy demand
6,916-7,308 kWh	household consumption

Why Interregional Transmission Planning Matters for Decarbonizing the Peak

Expands the market for on-peak resources like offshore wind, ensuring a place for power to travel on the grid

Optimizes cost sharing and the procurement of clean peak resources across multiple jurisdictions

Reduces curtailments, congestion, price 'cannibalization' for renewables and storage

Balances variable renewable output with complementary resources to create clean firm capacity

Integrates a grid "bigger than the weather" so as to share benefits of clean peak resources among neighbors

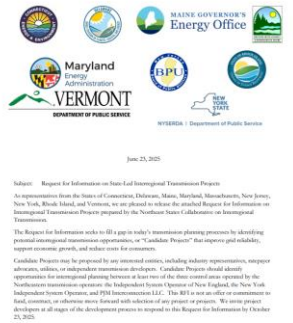
"Expanded transmission capacity…[is] important in all pathways….In the near term, these lines were used to import carbon-free electricity from Quebec, largely from new onshore wind projects. In the long term, the lines were used to allow ***bi-directional power flow for balancing a high renewables power system*** *throughout the Northeast region."*

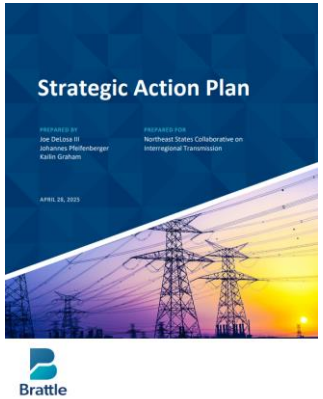
*"****New inter-regional transmission was a critical part*** *of all pathways because of its importance as a balancing strategy in high renewables systems. Its value stems* ***from three factors: weather diversity*** *across zones,* ***complementary resource endowments, and the flexibility of the Quebec hydro system****."*

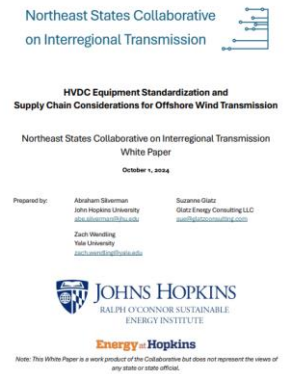
Acadia Center

Momentum on interregional transmission planning

- **NEG-ECP and NICE**
  - NICE reconstituted, transmission working group formed
- **NE States Collaborative**
  - Strategic Action Plan (SAP) released
  - RFI for interregional project concepts
- **Atlantic Canada OSW**
  - Increased interest in vast new resource potential
- **OSW equipment and supply chain**
  - Work on standard architecture, supply chain planning

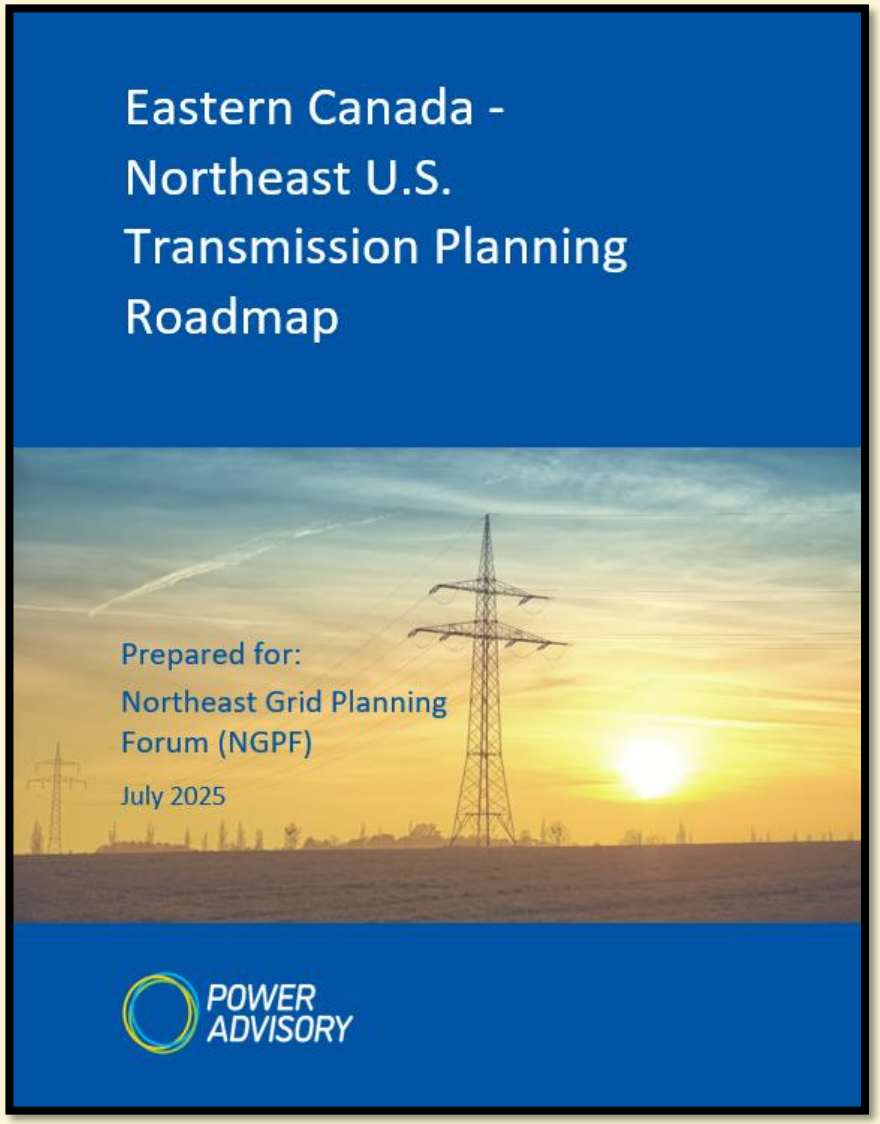






Acadia Center

Preview: Northeast US/CAN Interregional Transmission Planning Roadmap (coming soon!)



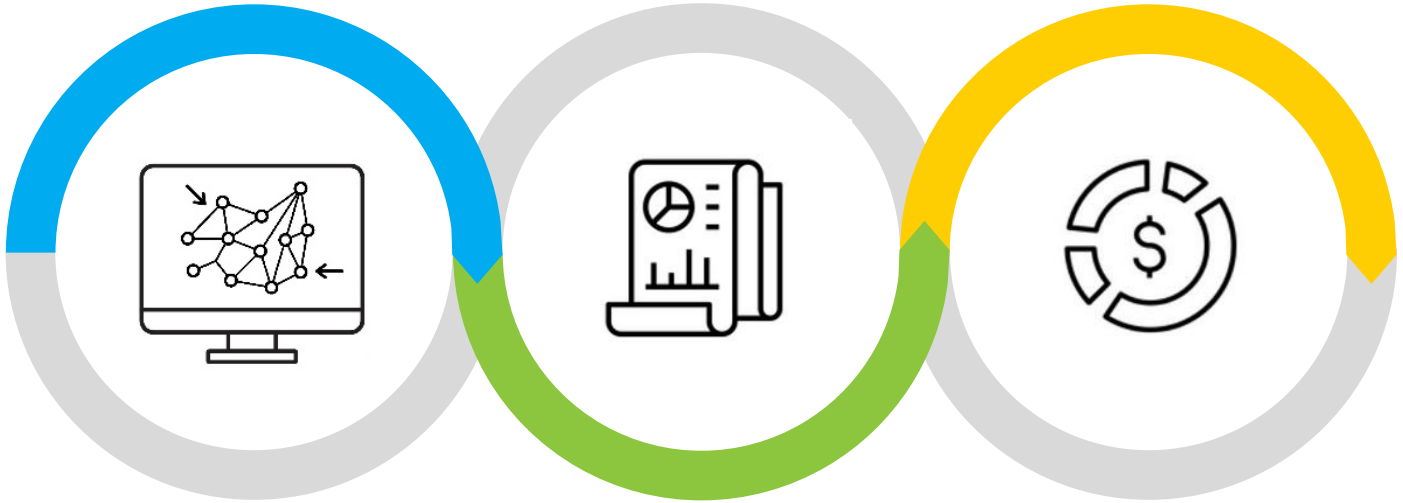
Eastern Canada – Northeast U.S. Interregional Transmission Planning

The Northeast U.S. and Eastern Canada have complementary resources that could **optimize** the regional energy system and **reduce the cost** of decarbonization.

- MIT analysis: $2.4B annual savings from 4 GW of cross-border transmission
- MA Decarbonization Roadmap: 10-13 GW of transmission to Canada

Coordinated planning and development of transmission and non-transmission solutions is needed to realize benefits.

A successful framework requires **collaboration**, **transparency**, and **resect for sovereignty** of participating jurisdictions.



Need Identification

Create a process to analyze and identify long-term transmission needs that account for policy goals, public interest values, and evolution of the power system over time.

Project Design / Selection

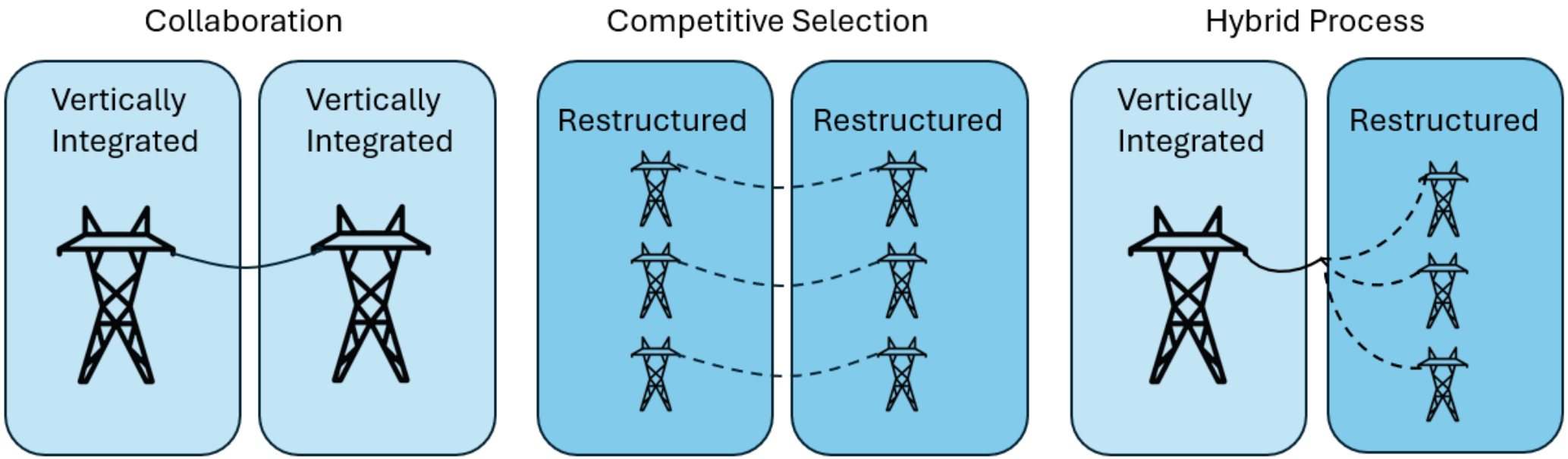
Establish an inclusive mechanism to design (in vertically integrated markets) or procure (in restructured markets) solutions to address identified needs..

Cost Allocation

Agree on a methodology to apportion costs based on energy system benefits and achievement of broader public policy goals, including economic development.

Project Design / Selection Framework

- ❑ Market structures vary between jurisdictions in the Northeast U.S. and Eastern Canada.
- ❑ Processes to design or competitively select projects to meet identified needs can be adapted to regulatory structures of participating jurisdictions.



✓ *Utilities collaborate to design solutions in projects spanning vertically integrated markets.*

✓ *Solutions are competitively procured in restructured markets.*

✓ *Solutions are designed in vertically integrated markets and procured in restructured markets.*

Pathway to Interregional Coordination

New England states and Eastern Canadian provinces can advance coordinated planning and project development by establishing durable collaboration platforms, sharing information, and adapting existing policies.

Trust Building & Coordination

Establish forums for coordination among participating jurisdictions and their respective stakeholders and communities (e.g., multi-state and province MOU).

Information Sharing & Analysis

Compile information on energy system configurations and future requirements; conduct analysis to identify needs transparently.

Policy Reforms

Revise existing mechanisms (e.g., ISO-NE LTTP) or create new tools (e.g., voluntary state agreement) to enable planning and solution development between provinces and states.

Models from Other Jurisdictions

Transmission planning and development approaches from the Midcontinent Independent System Operator (MISO) and the European Network of Transmission System Operators for Electricity (ENTSO-E) provide models on which provinces and states can draw.

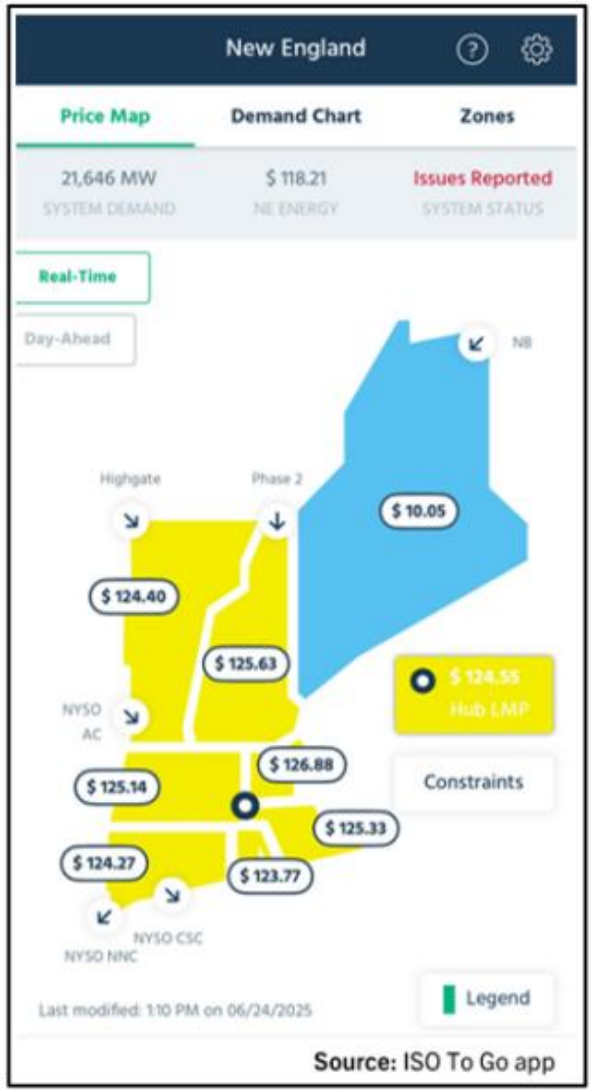
- Long-Range Transmission Plan (LRTP) consists of scenario analysis to identify 20 to 40-year transmission needs.
- Needs **account for utility and state policies**, projected load, and system conditions to identify **portfolios of projects** that are not dependent on any one generation project or specific reliability violation.
- Multi-Value Projects (MVPs) identified through the LRTP that are over $20 million and above 100kV are **competitively procured** in states without Right of First Refusal laws that require all transmission to be built by incumbent utilities.
- The latest MVP Tranche 2.1 portfolio of $22 billion (USD) of investment across 24 projects expanding and strengthening 345kV and 765kV transmission in the MISO Midwest subregion

- Europe-wide Ten Year Network Development Plans (TYNDPs) based on plans from 40 Transmission System Operators (TSOs) across 36 European Union (EU) Member States.
- Identifies **cross-border projects** that facilitate **decarbonization**, enhance reliability, and **minimize costs**.
- TSOs may propose, but **are not required to develop identified projects.**
- TSOs proposing projects determine cost allocation, with contribution from other TSOs receiving significant benefit.
- Proposed projects are evaluated across common benefit categories for inclusion in TYNDPs.
- Projects included in TYNDPs are eligible to receive funding from the EU Connecting Europe Facility.

Regional transmission planning: LTTP and Order 1920 offer new path

FERC Order 1920 Benefit	ISO-NE LTTP Benefit
Avoided or Deferred Reliability Transmission Facilities and Aging Transmission Infrastructure Replacement (Avoided investment in transmission that would not meet all long-term needs)	☑
Reduced Loss of Load Probability or Reduced Planning Reserve Margin (Fewer potential blackout events)	☑
Production Cost Savings (Savings from using cheaper electricity)	☑
Reduced Transmission Energy Losses (Savings from reducing line losses)	☑
Reduced Congestion Due to Transmission Outages (Savings from reducing congestion)	☑
Mitigation of Extreme Weather Events and Unexpected System Conditions	⊘
Capacity Cost Benefits from Reduced Peak Energy Losses (Reduced cost of resources used for during peak hours)	☑

June 24 1:10 PM ISO-NE Real Time Price Map



Source: ISO To Go app

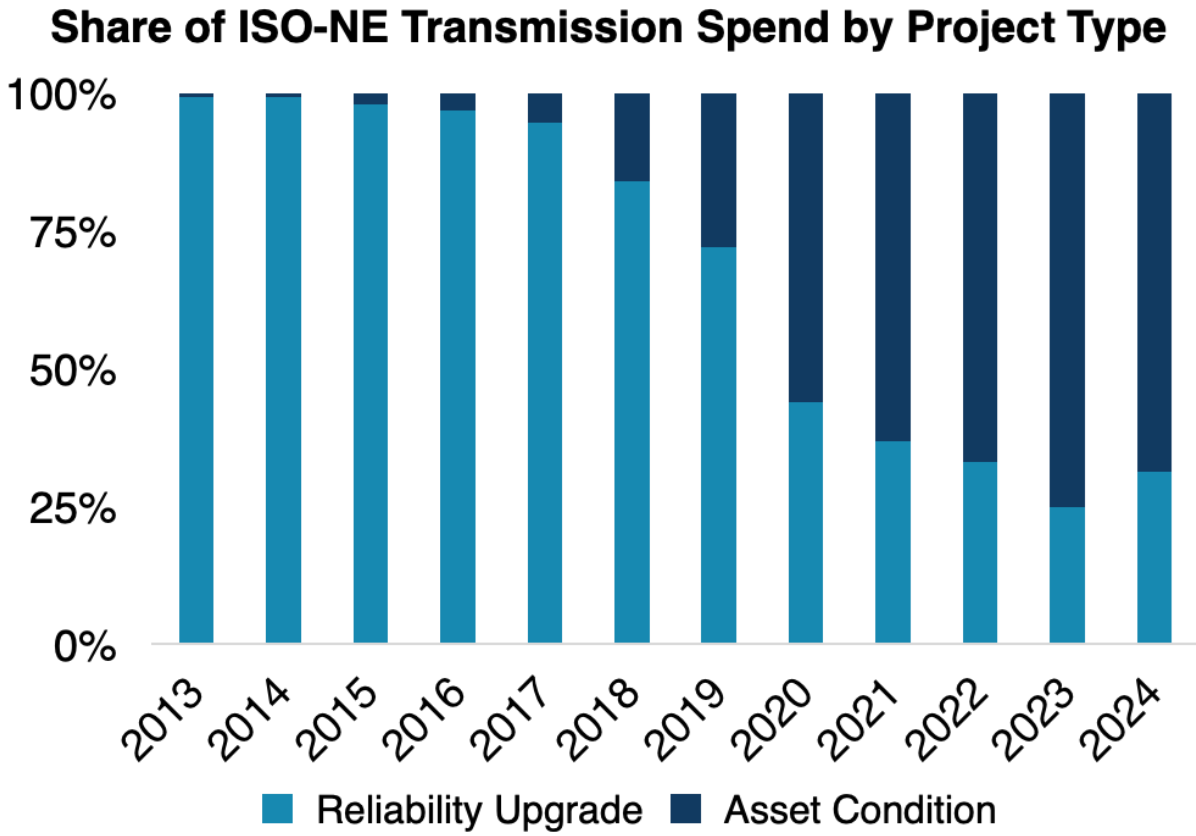
Acadia Center

An ITM is urgently needed to rationalize and rein in un-optimized asset condition project spending

TLDR: Transmission owners have shifted ~70% of transmission spending away from competitively-bid regional projects to self-selected local projects that escape meaningful oversight (for cost/prudence/hosting capacity/etc.).

The Consequences for New England:

- Spending on ACPs increased eightfold from 2016 to 2023, from $58 million to $800 million.
- Since 2023 (when NESCOE first called out this increase), over **$4 *billion*** have been proposed in just two years as of March 2025. Only $24 million of regional projects have been proposed in that same 2-year period.
- Larger perspective: Since 2002, New England has built around $13 billion worth of regional projects, with another $420 million planned through 2030. In contrast, around $5.4 billion in ACPs have been built since 2002, and now **~$6 billion of ACPs are under construction or planned through 2030**.
- **ACP investment will soon dwarf total regional spending accumulated over more the span of 2 decades in a fraction of that time.



Source: RMI NECPUC 2025 Presentation, ISO-NE Final RSP Project List and Final Asset Condition List, March 2025

III. Interconnection Reform

- Ongoing processes and progress in MA
- Innovative interconnection reform models
- Nexus between Transmission and Distribution: interconnection issues spanning T&D

Acadia Center

Policy innovations for DG interconnection

- **Flexible interconnection**
  - Modifying operational schedules to benefit projects and system
  - Planned (contractual) -> operational (DERMS)
  - Static -> dynamic -> real-time curtailment
  - For both new generation and new load
  - Will require reasonable limits (curtailment, costs)
- **Proactive planning and system investments for DG hosting capacity, ideally also addressing load**
  - Creating holistically planned headroom, factoring in locational suitability for DG alongside identified upgrade needs for load growth
- **Cost allocation advancements**
  - Alternative cost-sharing "multi-beneficiary pays" models for larger network upgrades
  - Standardized upgrade costs for smaller projects, e.g., Common system modification fee proposal(s) in DPU 25-48
- **Key: timing of federal tax credit phaseouts**
  - Timely interconnection approval will be vital to qualify for ITC/PTC

Acadia Center

Roundup – Interconnection progress in MA

- **ESMPs: Electric System Modernization Plans**
  - Planning lacked robust DG hosting capacity planning; only some indirect headroom via load increases
  - Order (June 2025) approved ESMPs as strategic plan; next ESMPs in 2030
- **LTSPP: Long Term System Planning Process**
  - Proactive planning for DG within larger system planning processes is critical
  - Expect recent working group efforts (DPU 25-20) will lead to formal LTSPP process
  - Will provide opportunities to propose distribution system upgrades to increase DG hosting capacity proactively (and before 2030 ESMPs come in)
  - Directive needed to establish new flexible interconnection paradigm, work toward consensus on approach for allocating upgrade costs to DG, ratepayers
- **Other interconnection progress in Massachusetts**
  - Updates to Simplified and Expedited processes in DG interconnection tariff – IIRG proposed revisions to make it easier for DERs to participate (new docket, DPU 25-48)

Acadia Center

Other emerging interconnection solutions

- **Notable recent state examples**
  - **California** Limited Generation Profile Interconnection: specific energy export schedule for DERs to ease interconnection burden using public grid data.
  - **New York** cost-sharing 2.0 strategy: DERs only responsible for incremental cost of upgrades because NY did multi-value distribution project modeling, identifying substation upgrades that increase hosting capacity while solving pre-existing asset condition or capacity issues
  - **New Jersey** instant permitting bill: aimed at expediting small DG project approvals; needs added interconnection policy
- **Other forward-looking ideas on interconnection**
  - Flexible interconnection – pilots underway/in development in IL, MD, NY, and MA, but no full-fledged state program (Gov. Healey's affordability bill contains directive for EDCs to offer a flexible integration program (Sec. 159)
  - Connect and Manage and other energy only interconnection models
  - Surplus Interconnection Service (SIS) processes – identified as likely priority for 2026 work via ISO-NE/NEPOOL, part of DOER's required review of existing solicitations and procurements process
  - Use of Advanced Transmission Technologies (ATT), advanced conductors, Grid-Enhancing Technologies (GETs), and energy storage to improve hosting capacity, mitigate upgrade costs (DPU authority to approve given in 2024 climate law; topic also stipulated as part of DPU/DOER investigation into GETs/ATTs)
  - Creating and/or strengthening performance incentive mechanisms (PIMs) for interconnection speed, cost, ease
  - Creating a program similar to intervenor compensation to help under-resourced groups/customers navigate the interconnection process

Aligning DG interconnection with transmission-level planning

- **Distribution system upgrades to increase DG hosting capacity will be big enough to affect the transmission system**
  - Essential that the region align these interconnection/hosting capacity-driven upgrades with proactive transmission planning work under LTTP, 1920 (as well as asset condition project review and spending)
- **Affected System Operator (ASO) studies present key hidden hurdle**
  - Elongated timelines for ASO study completion could throw wrench into timelines at the distribution level – with knock-on effects for federal tax credit eligibility

Acadia Center

The next DER frontier – "permissionless" behind-the-meter systems

- **Proliferation of low-cost battery storage, solar panels will soon vastly expand customers' options regarding adding clean energy, storage**
  - Ability to avoid permitting, interconnection requirements, and other soft costs will increasingly become a major advantage for fast, low-cost adoption
- **Permissionless solutions may include:**
  - Balcony solar – in tandem with battery storage (see, e.g., rapid uptake and interest in Germany)
  - Wall outlet-level battery storage products for refrigerators, sump pumps, etc. (see, e.g., Pila Energy)
  - Window heat pump units
  - Plus other solutions, and combinations thereof

Acadia Center

FOR MORE INFORMATION:

Jamie Dickerson
jdickerson@acadiacenter.org

Sign up: acadiacenter.org/about

Acadia Center
Advancing the Clean Energy Future