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New England’s Evolving Grid

CISE Fall Workshop

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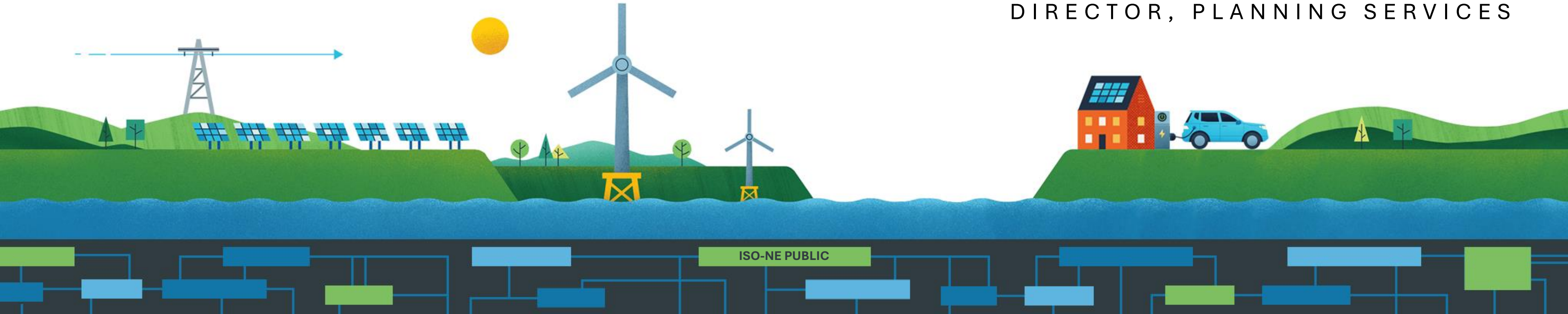
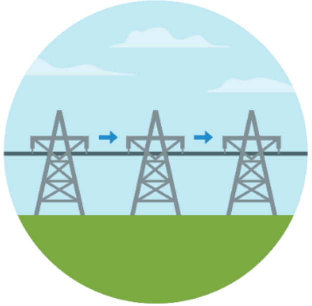


ISO New England Performs Three Critical Roles to Ensure Reliable Electricity at Competitive Prices

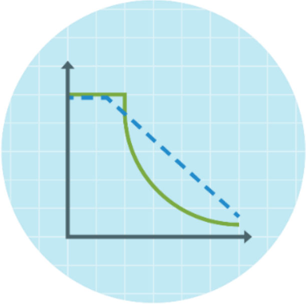
Grid Operation

Coordinate and direct the flow of electricity over the region's high-voltage transmission system



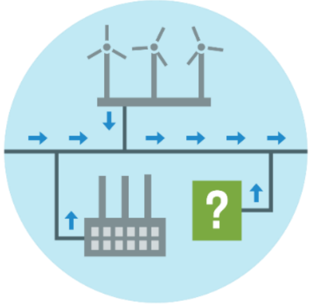
Market Administration

Design, run, and oversee the markets where wholesale electricity is bought and sold



Power System Planning

Study, analyze, and plan to make sure New England's electricity needs will be met over the next 10 years



Things We Don’t Do

- Handle retail electricity
- Own power grid infrastructure
- Have a stake in companies that own grid infrastructure
- Have jurisdiction over fuel infrastructure
- Have control over siting decisions
- Plan the resource mix

CHANGES IN THE NEW ENGLAND POWER GRID

Emissions Reductions

Emissions from regional generators have fallen significantly since 2010

Annual New England System Generator Emissions, 2010–2023

↓ 39%

Carbon Dioxide (CO_2)

↓ 63%

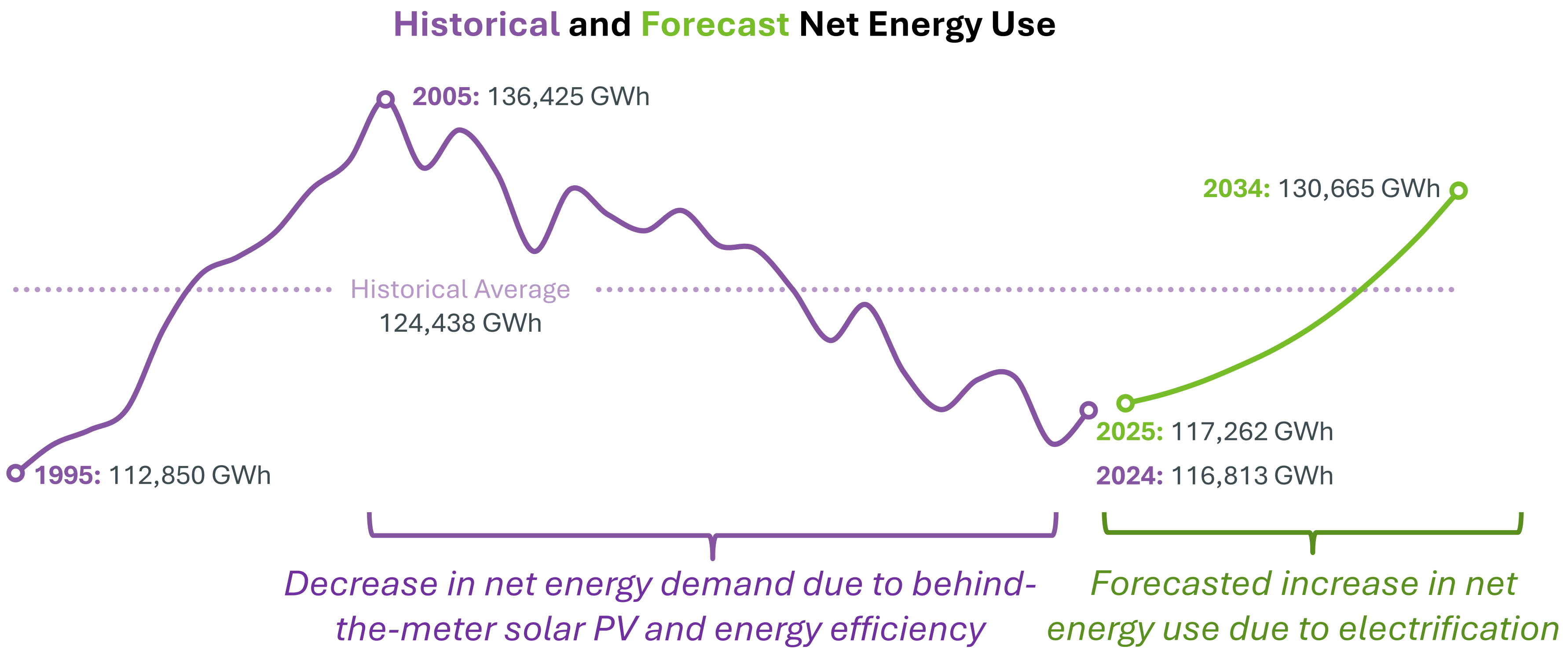
Nitrogen Oxide (NO_x)

↓ 98%

Sulfur Dioxide (SO_2)

Source: ISO New England, *New England Electric Generators Air Emissions Report*

Steady Growth Expected in Annual Net Energy Use

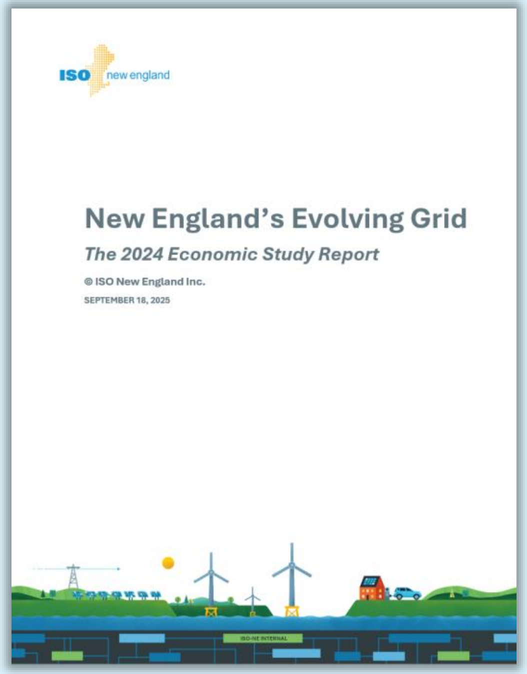


Source: ISO New England 2025-2034 Forecast Report of Capacity, Energy, Loads, and Transmission (2025 CELT Report) (May 2025)

2024 ECONOMIC STUDY

Newest Economic Study Explores Possible Strategies to Reduce Emissions in New England's Evolving Grid

Learn more about the 2024 Economic Study


ISO new england

New England's Evolving Grid

The 2024 Economic Study Report

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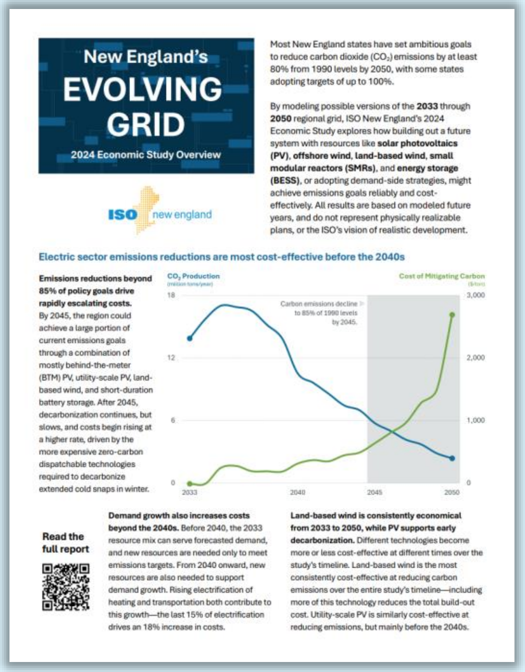
ISO-NE INTERNAL

New England's Evolving Grid: The 2024 Economic Study Report (Sept. 2025)


New England's EVOLVING GRID

2024 Economic Study Overview

ISO new england

Most New England states have set ambitious goals to reduce carbon dioxide (CO_2) emissions by at least 80% from 1990 levels by 2050, with some states adopting targets of up to 100%.

By modeling possible versions of the **2033** through **2050** regional grid, ISO New England's 2024 Economic Study explores how building out a future system with resources like **solar photovoltaics (PV)**, **offshore wind**, **land-based wind**, **small modular reactors (SMRs)**, and **energy storage (BESS)**, or adopting demand-side strategies, might achieve emissions goals reliably and cost-effectively. All results are based on modeled future years, and do not represent physically realizable plans, or the ISO's vision of realistic development.

Electric sector emissions reductions are most cost-effective before the 2040s

Emissions reductions beyond 85% of policy goals drive rapidly escalating costs. By 2045, the region could achieve a large portion of current emissions goals through a combination of mostly behind-the-meter (BTM) PV, utility-scale PV, land-based wind, and short-duration battery storage. After 2045, decarbonization continues, but slows, and costs begin rising at a higher rate, driven by the more expensive zero-carbon dispatchable technologies required to decarbonize extended cold snaps in winter.

Read the full report

Demand growth also increases costs beyond the 2040s. Before 2040, the 2033 resource mix can serve forecasted demand, and new resources are needed only to meet emissions targets. From 2040 onward, new resources are also needed to support demand growth. Rising electrification of heating and transportation both contribute to this growth—the last 15% of electrification drives an 18% increase in costs.

Land-based wind is consistently economical from 2033 to 2050, while PV supports early decarbonization. Different technologies become more or less cost-effective at different times over the study's timeline. Land-based wind is the most consistently cost-effective at reducing carbon emissions over the entire study's timeline—including more of this technology reduces the total build-out cost. Utility-scale PV is similarly cost-effective at reducing emissions, but mainly before the 2040s.

New England's Evolving Grid Fact Sheet

KEY FINDINGS

Overview of Key Findings

1

Including more dispatchable technologies reduces needed capacity by over 15%

2

Shifting the hours of peak demand in winter reduces costs

3

Emissions reductions beyond 85% of policy goals drive escalating costs

4

Demand growth also increases costs beyond the 2040s

5

Deep decarbonization in 2040s drives increased curtailment of renewables and reduces the economic viability of certain technologies

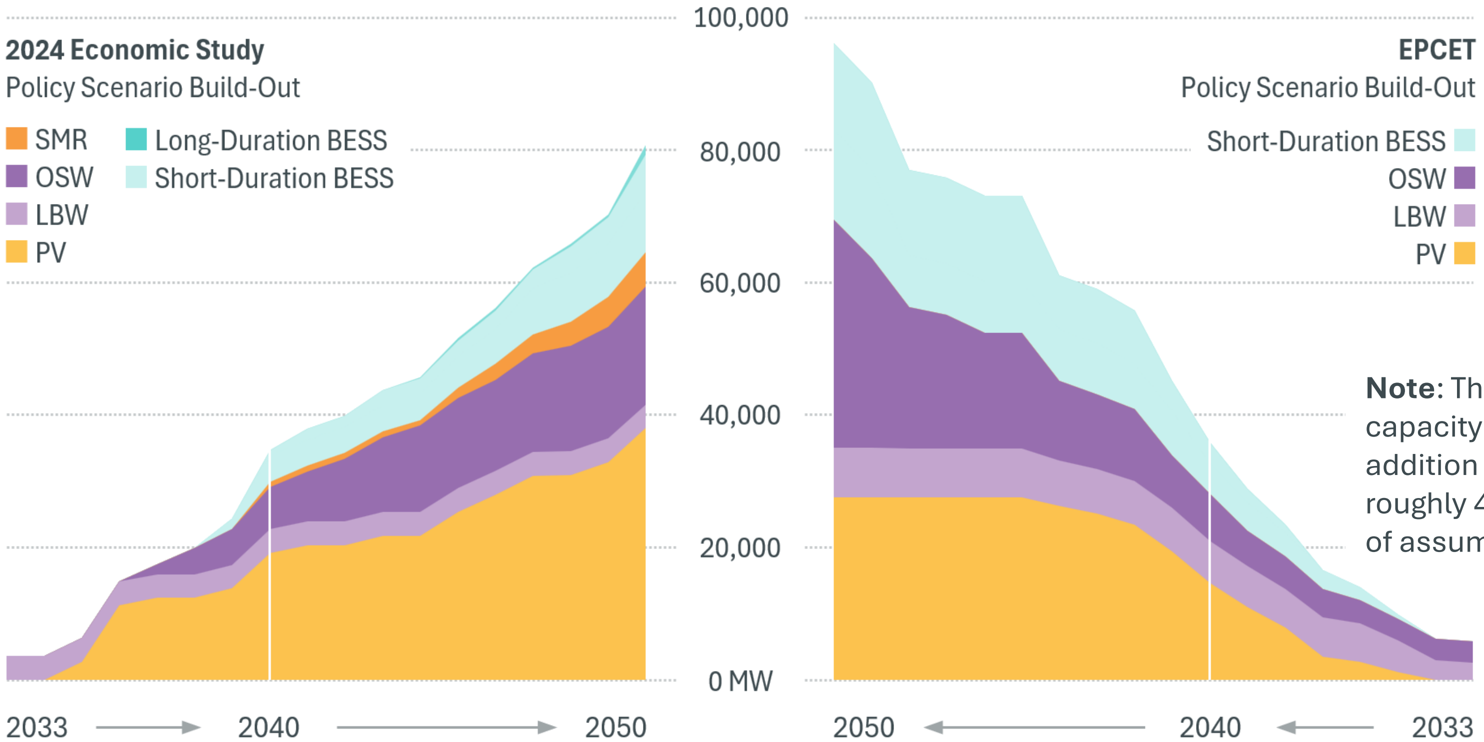
6

Land-based wind is consistently economical from 2033 to 2050, while PV supports early decarbonization

See report for full description of findings and results

Including More Dispatchable Technologies Reduces Needed Capacity by Over 15%

Key Finding 1

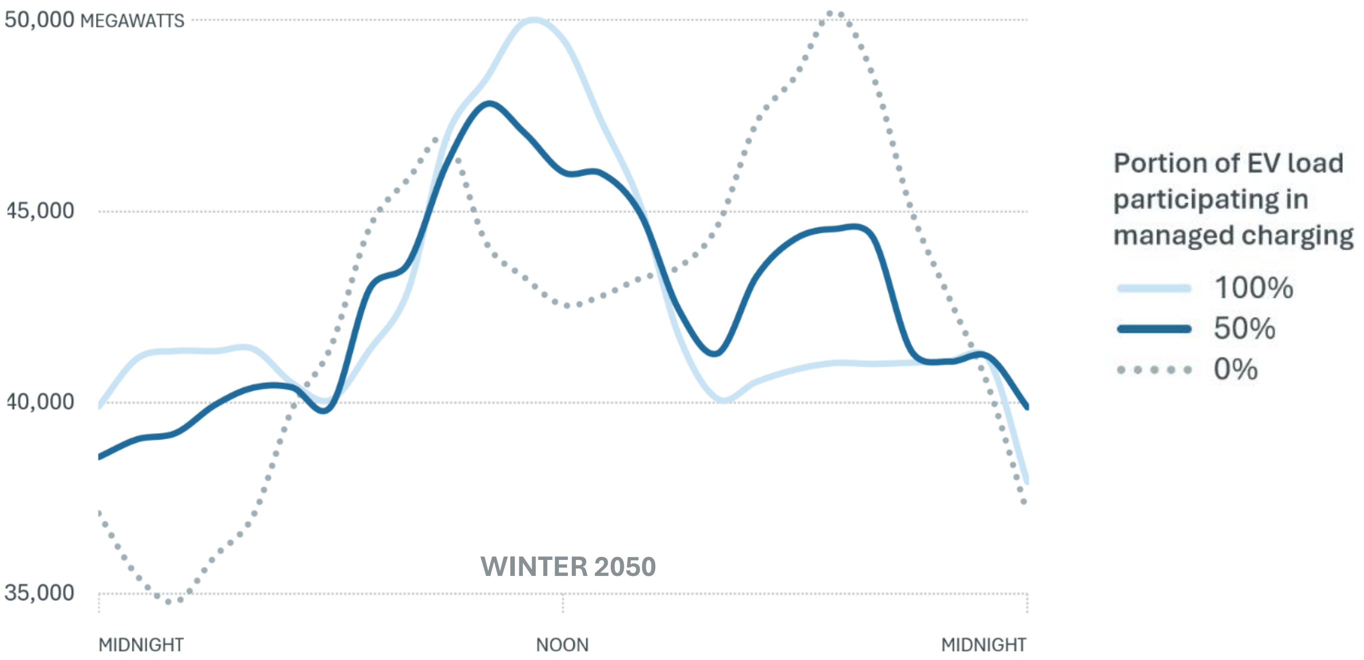


Note: This new capacity is in addition to the roughly 49,000 MWs of assumed capacity

Shifting Peaks in Winter Demand Reduces Costs

Key Finding 2

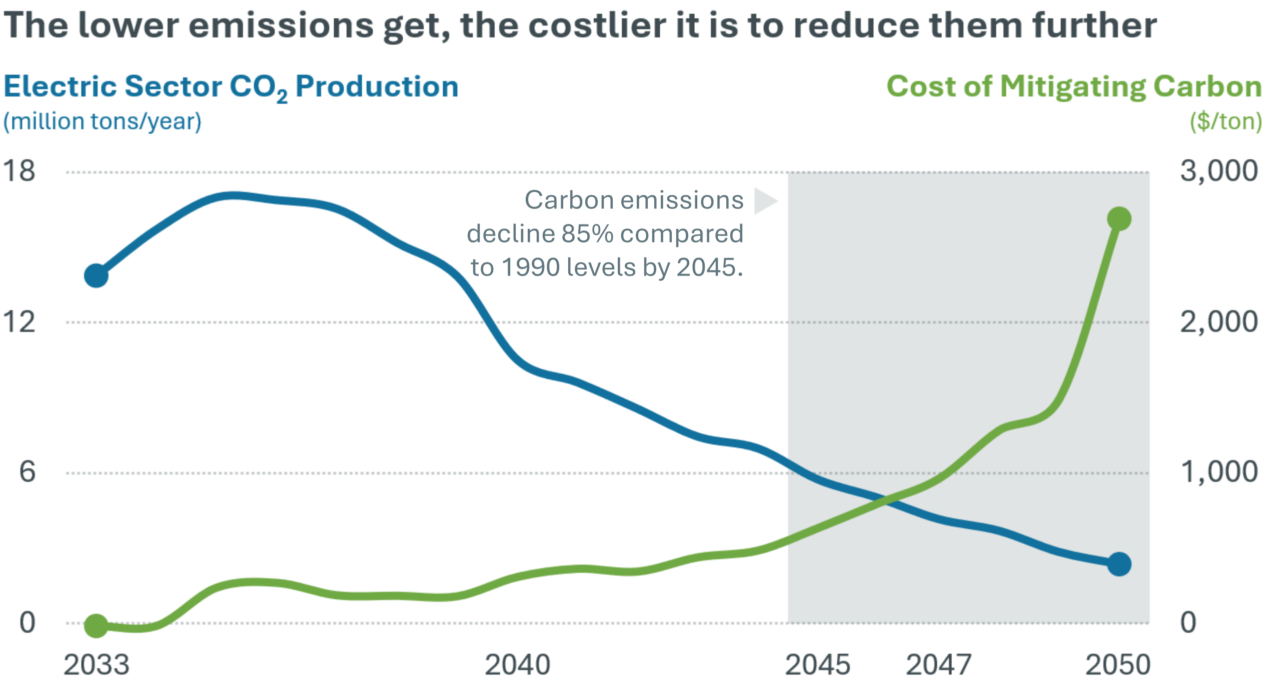
Shifting 100% of the 2050 EV fleet to a managed charging program reduces future costs by 12%



Note: Chart includes behind the meter (BTM) solar, but does not account for utility scale solar

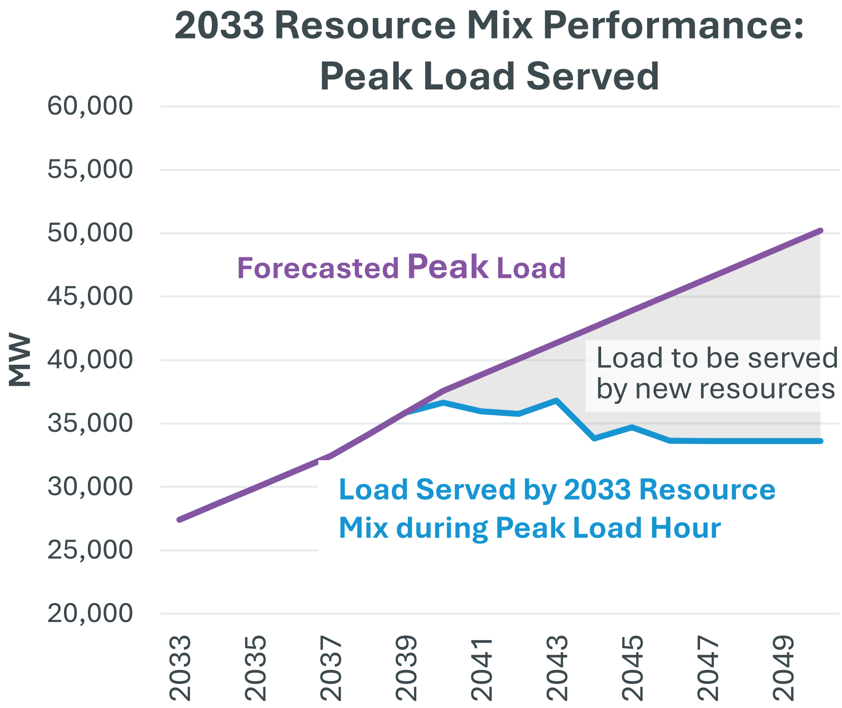
Emissions Reductions Beyond 85% of Policy Goals Drive Escalating Costs

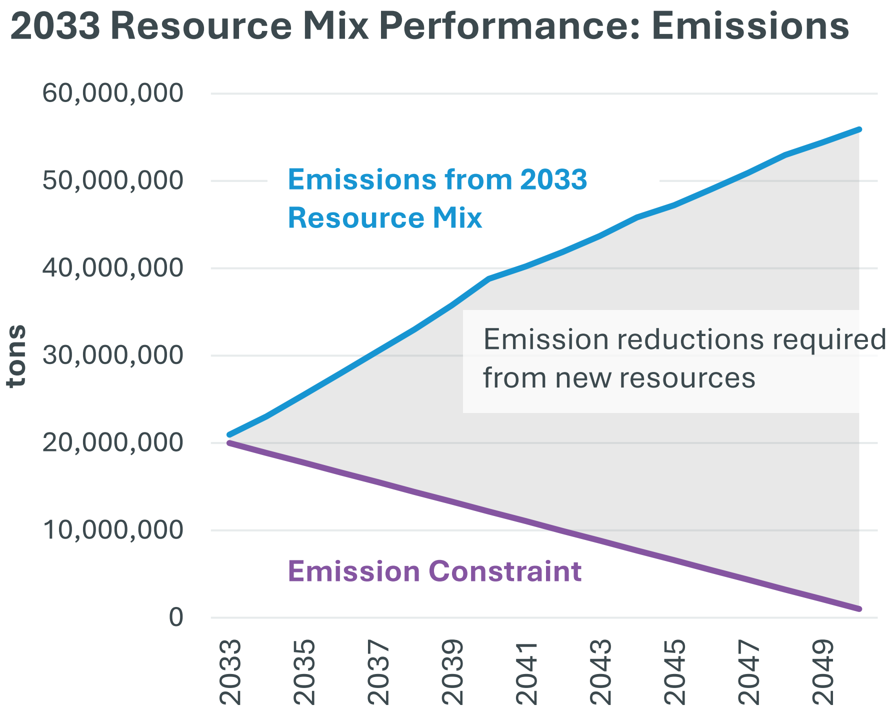
Key Finding 3



Demand Growth Also Increases Costs in the 2040s

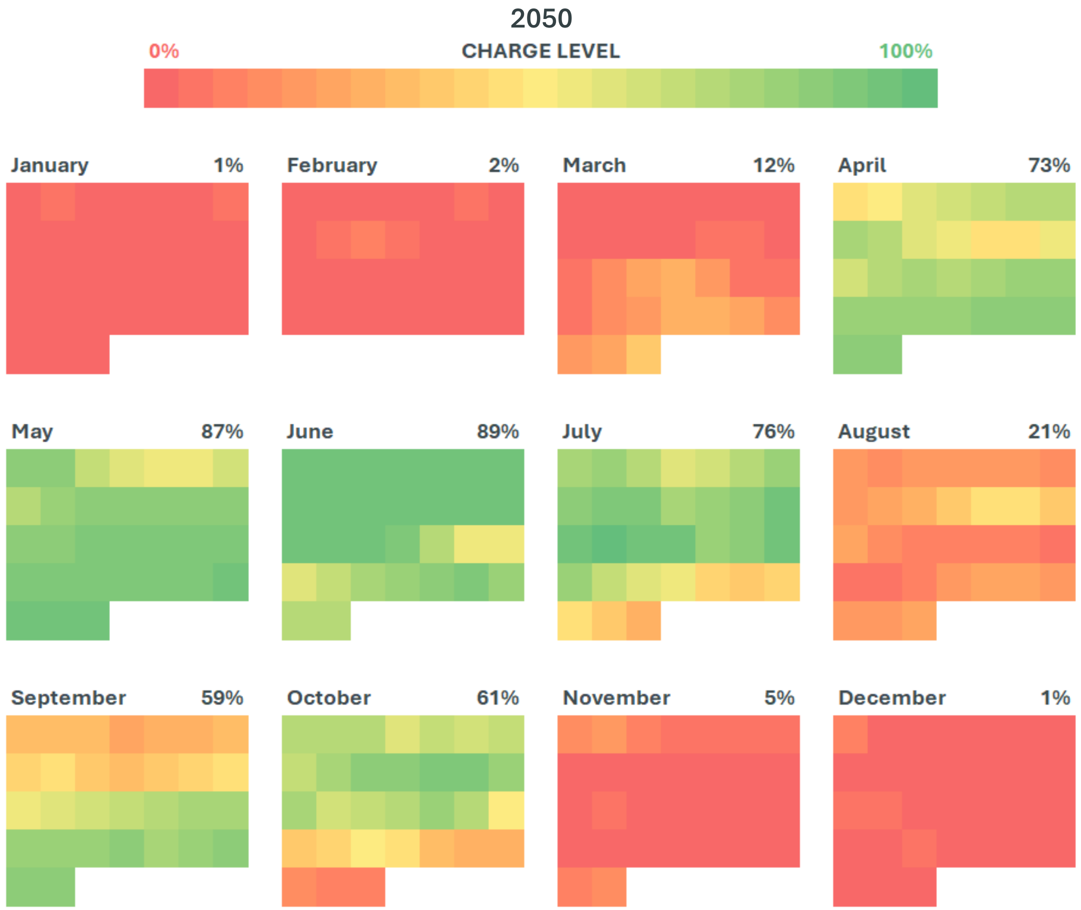
Key Finding 4





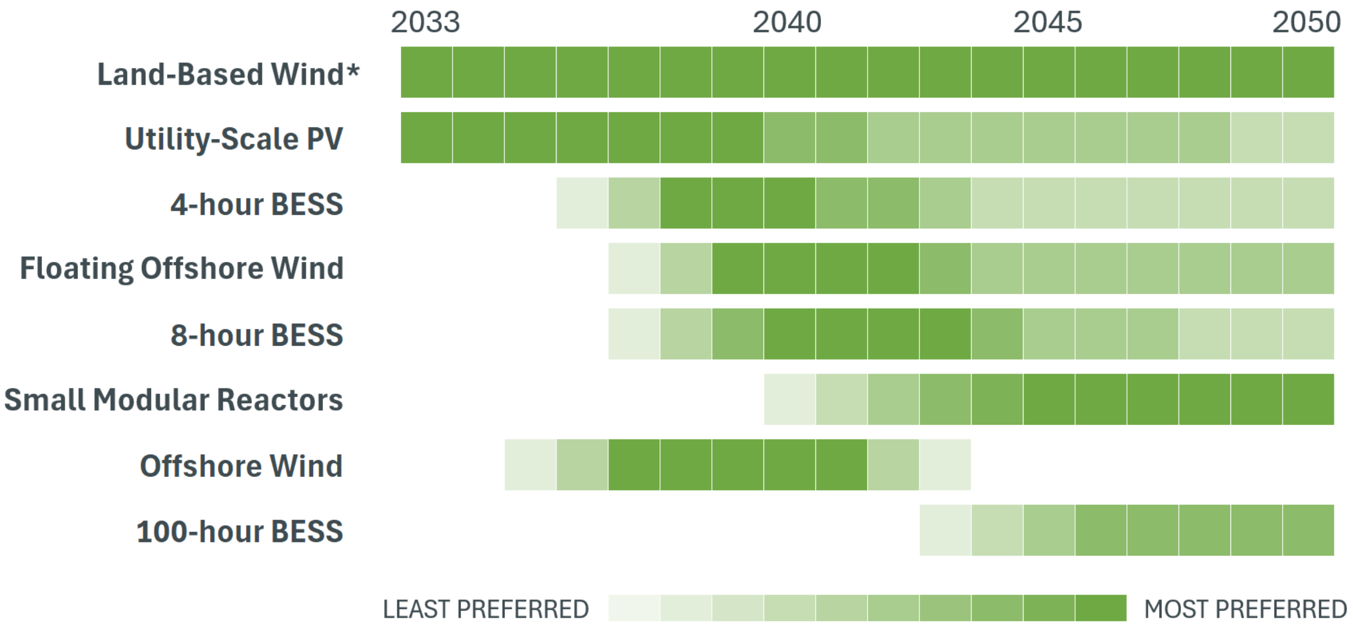
Deep Decarbonization in 2040s Drives Increased Curtailment of Renewables and Reduced Economics of Certain Technologies

Key Finding 5



Land-based Wind is Consistently Economical from 2033 to 2050, While PV Supports Early Decarbonization

Key Finding 6



*Land-based wind is the only technology subject to land availability constraints.
This category reflects what the model would build without these constraints.

Shifting part of the decarbonization effort away from the electric sector can significantly reduce costs

Additional Findings

% electric sector decarbonization *% electrification of transportation and heating sectors*	*% cost reduction versus Reference**
***100%** electric sector decarbonization* ***85%** electrification of transportation and heating sectors*	*18% cost reduction versus Reference*
***85%** electric sector decarbonization* ***100%** electrification of transportation and heating sectors*	*29% cost reduction versus Reference*
***85%** electric sector decarbonization* ***85%** electrification of transportation and heating sectors*	*43% cost reduction versus Reference*
***100%** electric sector decarbonization* ***75%** electrification of transportation and heating sectors*	*30% cost reduction versus Reference*
***75%** electric sector decarbonization* ***100%** electrification of transportation and heating sectors*	*43% cost reduction versus Reference*
***75%** electric sector decarbonization* ***75%** electrification of transportation and heating sectors*	*66% cost reduction versus Reference*

Reference case assumes 100% electric sector decarbonization and 100% electrification of transportation and heating sectors

LOOKING FORWARD

Conclusion and Next Steps

- The 2024 Economic Study is **one of the broadest power system analyses the ISO has conducted to date**, with over 2,500 simulations across nearly 40 scenarios
  - The results show that **early, least-cost emissions reductions and a diverse set of technologies** can maintain reliability at scale
  - **Insights on flexible demand, renewable integration, and system planning** are relevant well beyond New England
- The work **builds on EPCET results**, creating continuity in the analysis and helping to track trends in the region's decarbonization pathways
- Findings will **guide policymakers, planners, and stakeholders** in evaluating tradeoffs and practical strategies, while also informing the 2026 Economic Study as it explores new trajectories for the regional grid

Questions

Acronyms

BESS	Battery Energy Storage Systems
BTM PV	Behind the Meter Photovoltaic
CELT	Capacity, Energy, Load, and Transmission Report
EPCET	Economic Planning for the Clean Energy Transition
EV	Electric Vehicle
LBW	Land-based Wind
OSW	Offshore Wind
PV	Photovoltaic
SMR	Small Modular Reactor

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