ISO New England Overview and Regional Update

New Hampshire House Science, Technology & Energy Committee

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ISO New England's *Mission and Vision*

Mission: *What we do*

Through collaboration and innovation,
ISO New England plans the transmission system, administers the region's wholesale markets, and operates the power system to ensure reliable and competitively priced wholesale electricity

Vision: *Where we're going*

To harness the power of competition and advanced technologies to reliably plan and operate the grid as the region transitions to clean energy

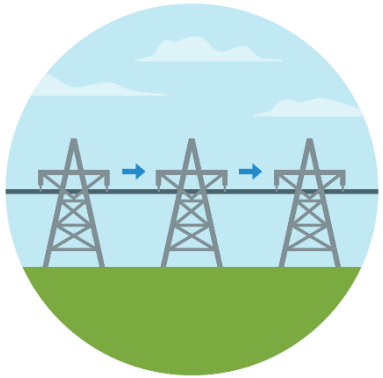
ISO New England (ISO) Has More Than Two Decades of Experience Overseeing the Region's Restructured Electric Power System

- **Regulated** by the Federal Energy Regulatory Commission
- **Reliability Coordinator** for New England under the North American Electric Reliability Corporation
- **Independent** of companies in the marketplace and **neutral** on technology

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

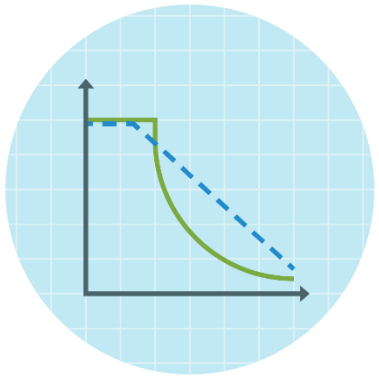
Grid Operation

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



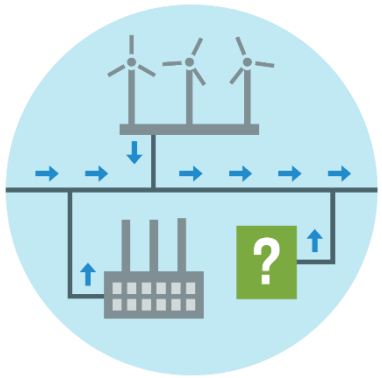
Market Administration

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

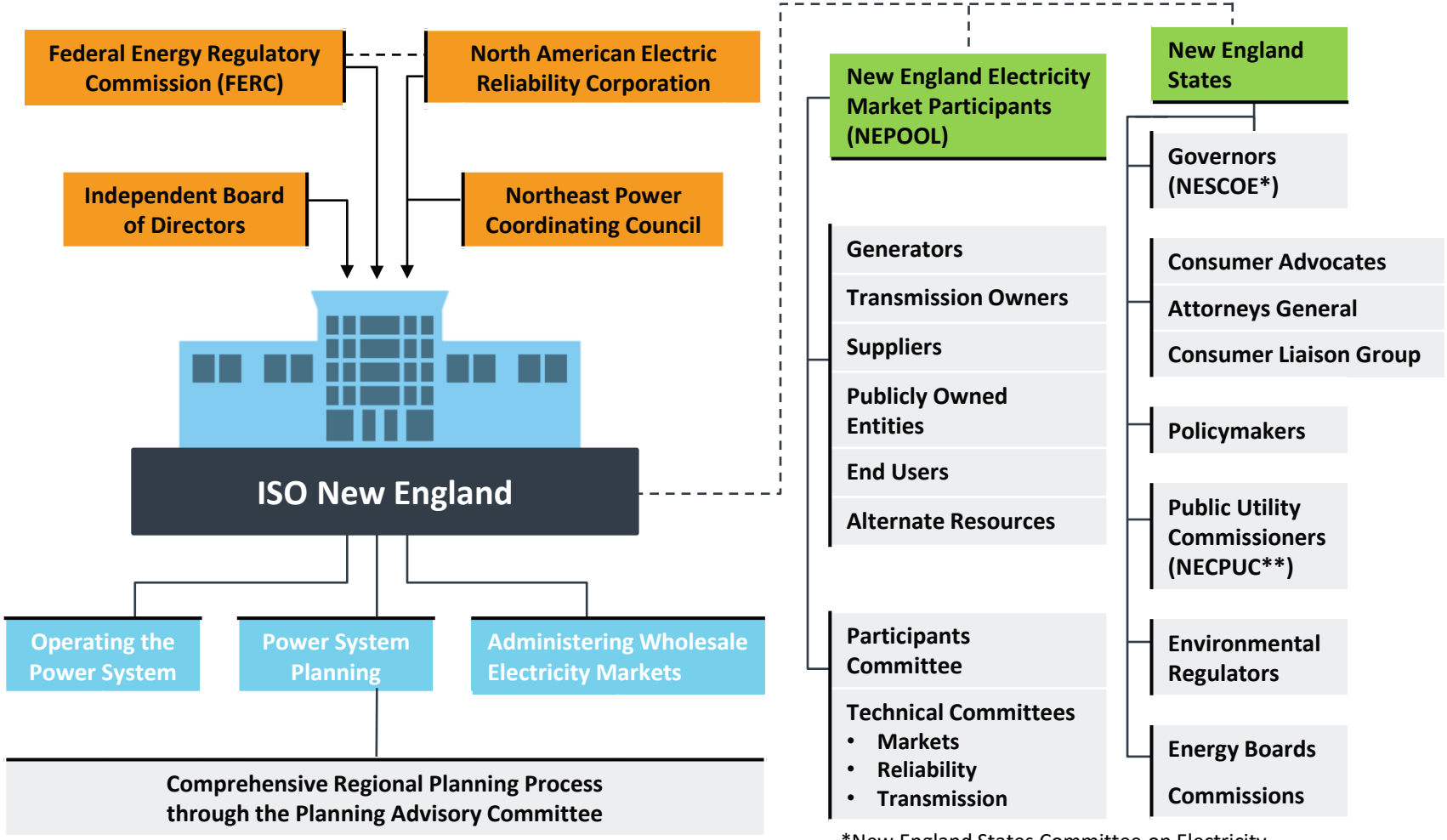
Own power grid infrastructure

Have a stake in companies that own grid infrastructure

Have jurisdiction over fuel infrastructure

Have control over siting decisions

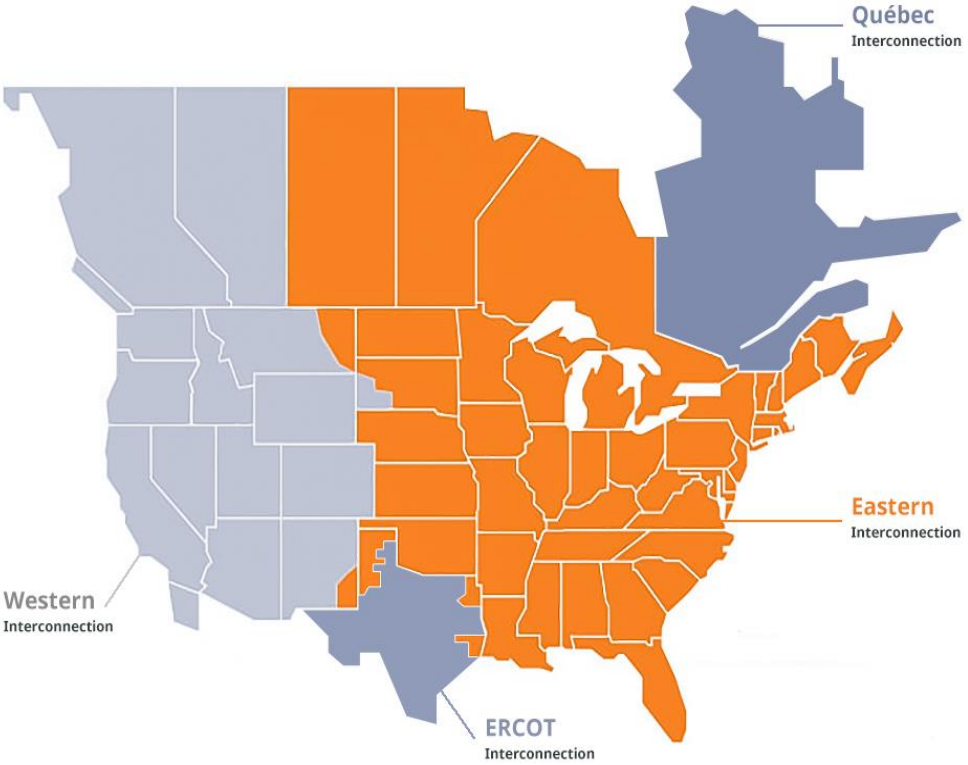
Numerous Entities Including an Independent Board Provide Oversight of and Input on ISO's Responsibilities



*New England States Committee on Electricity
**New England Conference of Public Utilities Commissioners

New England's Power Grid Is Part of a Larger Electric Power System

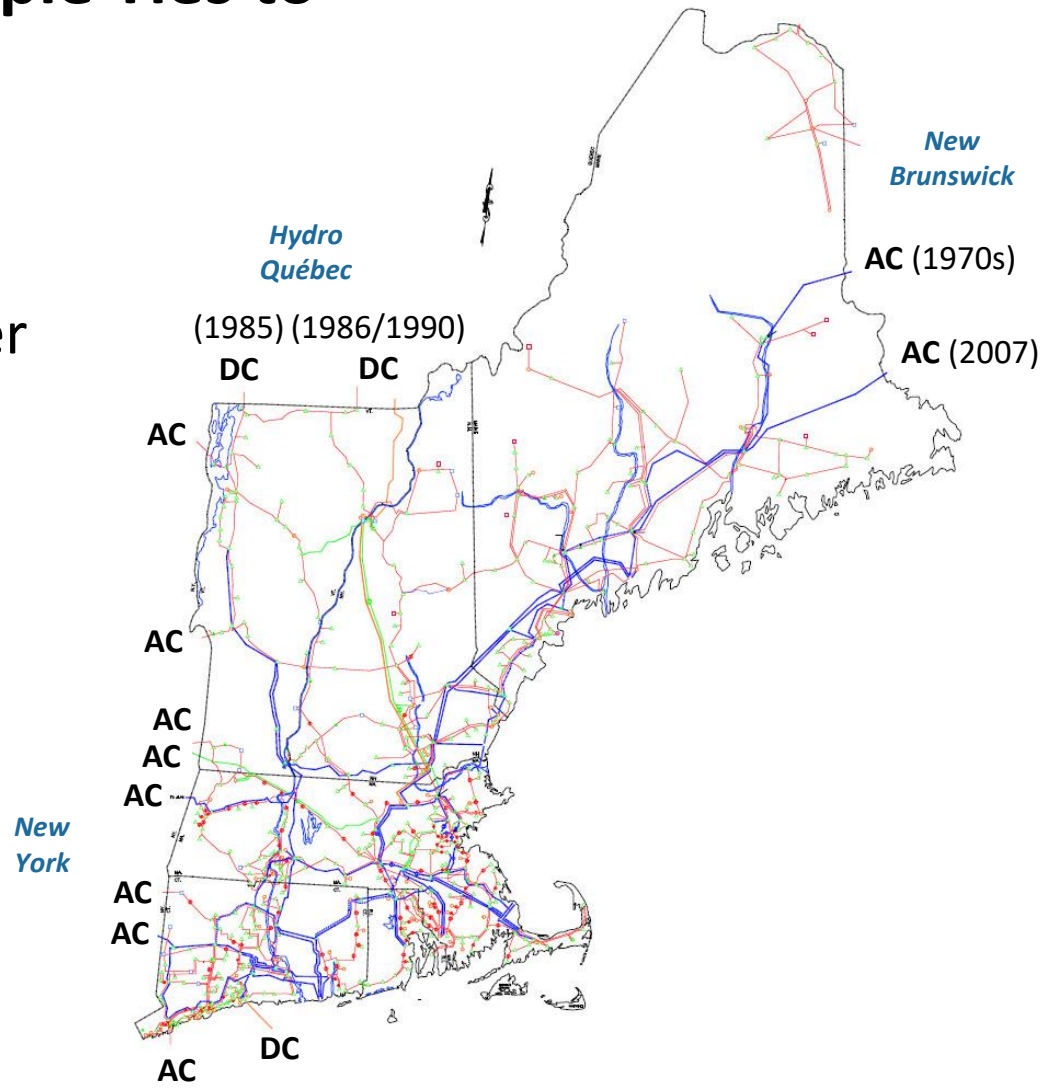
- Part of the **Eastern Interconnection**, one of four large power grids in North America
  - Interconnected through primarily alternating current (AC) transmission
- Tied to **Québec** only through direct current (DC) transmission
- 2003 blackout ushered in wide-area monitoring and **mandatory** reliability standards
- Subject to reliability standards set by **NERC** and **NPCC***



* North American Electric Reliability Corporation (NERC) and Northeast Power Coordinating Council (NPCC)

New England Has Multiple Ties to Neighboring Regions

- Transmission system is tied to neighboring power systems in the U.S. and Eastern Canada:
  - New York (8 AC ties, 1 DC tie)
  - Hydro Québec (2 DC ties)
  - New Brunswick (2 AC ties)
- **13%** of the region's energy needs were met by imports in 2023



Note: AC stands for Alternating Current and DC stands for Direct Current

ISO-NE Is a Summer-Peaking System

New England shifted from a winter-peaking system to a **summer-peaking** system in the early 1990s, largely because of the growth of air conditioning and a decline in electric heating

- Peak demand on a normal summer day has typically ranged from 17,500 MW to 22,000 MW
- Summer demand usually peaks on the hottest and **most humid** days and averaged roughly 25,600 MW since 2000

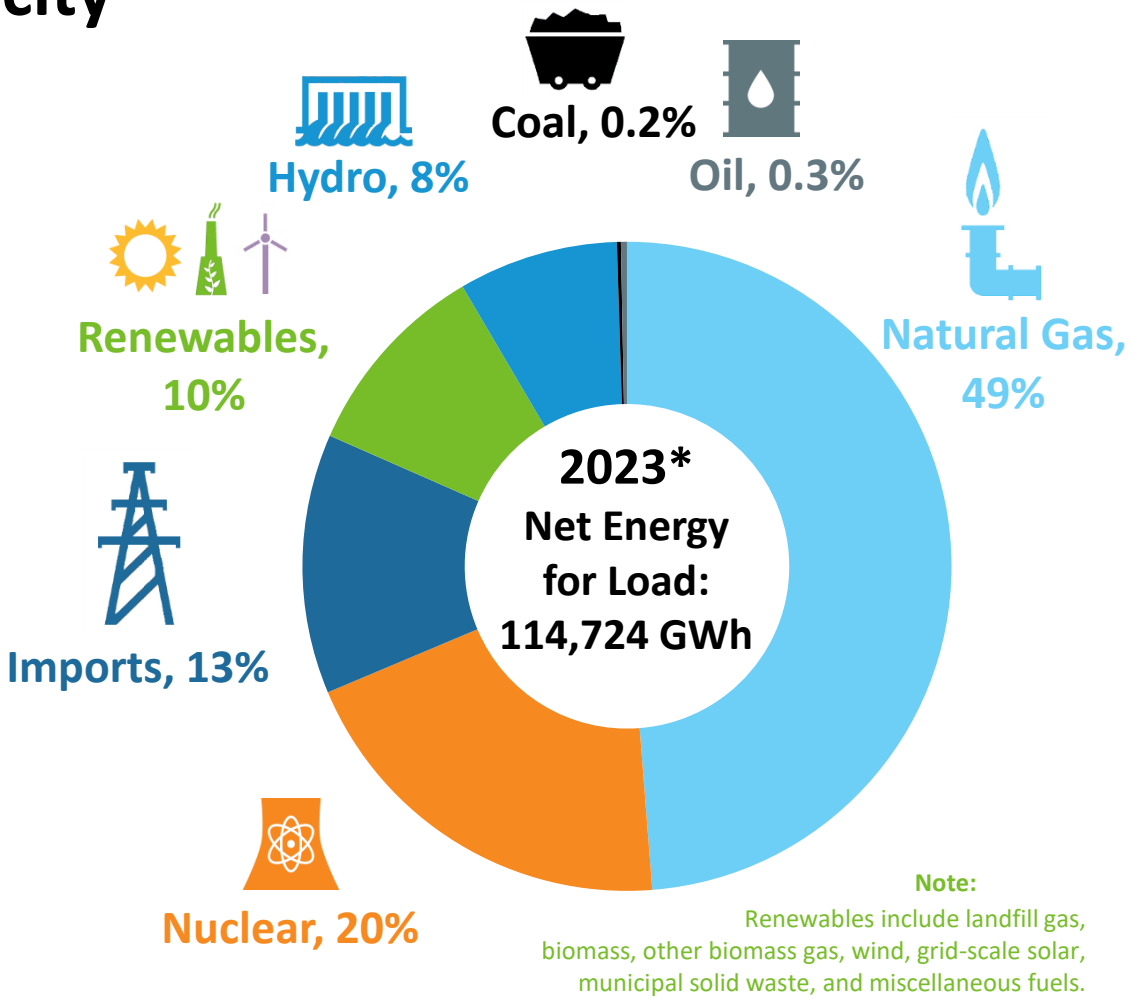
- Region's all-time summer peak demand was **28,130 MW** on **August 2, 2006**

The region is expected to shift back to a **winter-peaking system** with the electrification of heating demand

- Region's all-time **winter** peak demand was **22,818 MW** on **January 15, 2004**

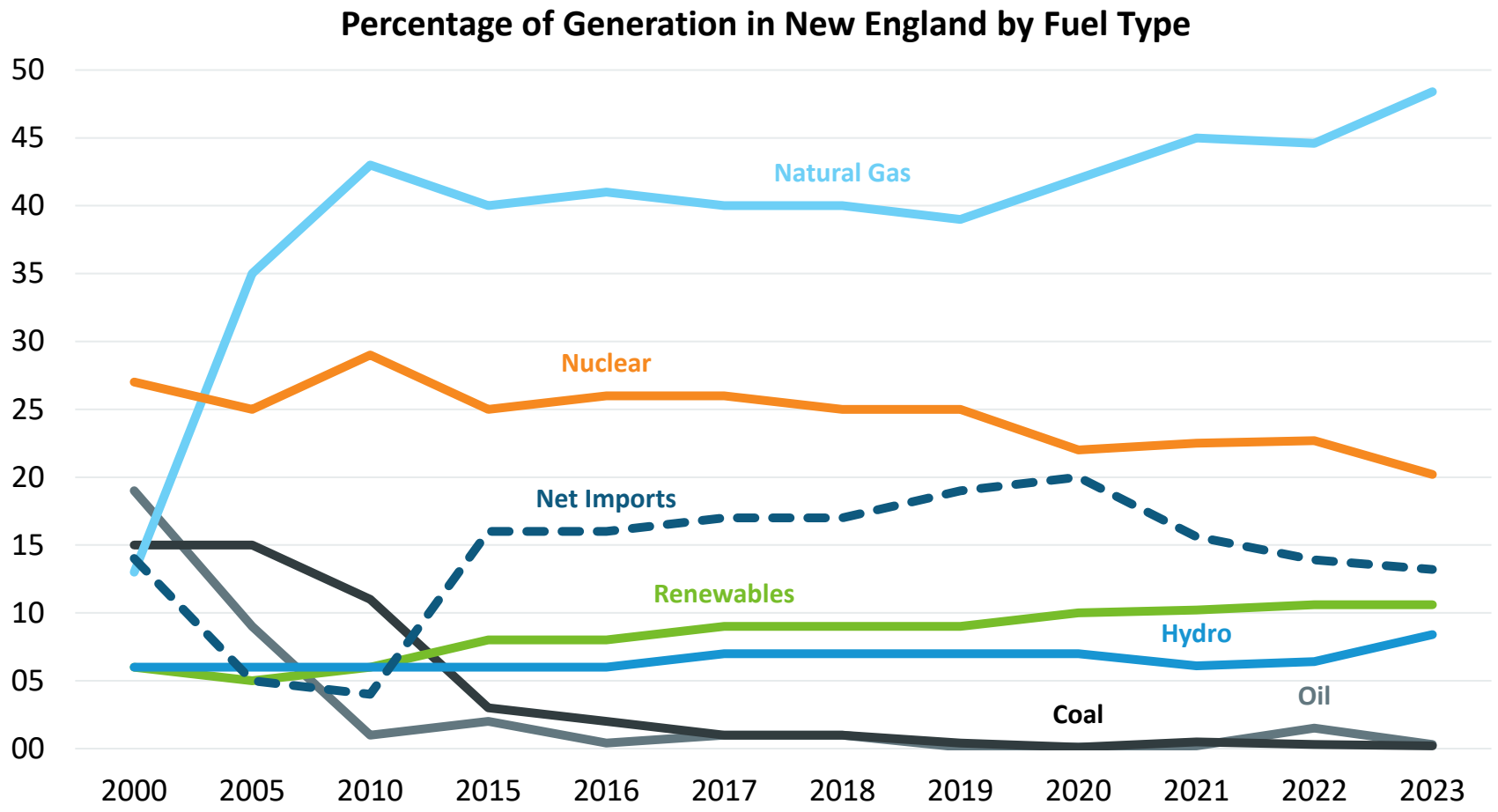
Lower-Emitting Sources of Energy Supply Most of New England's Electricity

- In 2023, most of the region's energy needs were met by natural gas, nuclear, imported electricity (mostly hydropower from Eastern Canada), renewables, and other low- or non-carbon-emitting resources
- Region is transitioning away from older coal and oil resources



*Data is subject to adjustment. Source: 2023 Net Energy and Peak Load by Source
https://www.iso-ne.com/isoexpress/web/reports/load-and-demand/-/tree/net-ener-peak-load

Dramatic Changes in the Energy Mix



***Source**: ISO-NE Net Energy and Peak Load by Source*
Electric generation within New England; excludes imports and behind-the-meter (BTM) resources, such as BTM solar.

Markets Select the Most Cost-Efficient Resources to Meet Current and Future Electricity Needs

Energy Market

Electric Energy: The Day-Ahead and Real-Time Energy Markets are forward and spot markets for trading **electric energy**. Energy prices **fluctuate** throughout the day and at different locations in New England, reflecting the amount of consumer demand, constraints on the system, and the price of fuel that resources use to generate electricity.

Ancillary Services

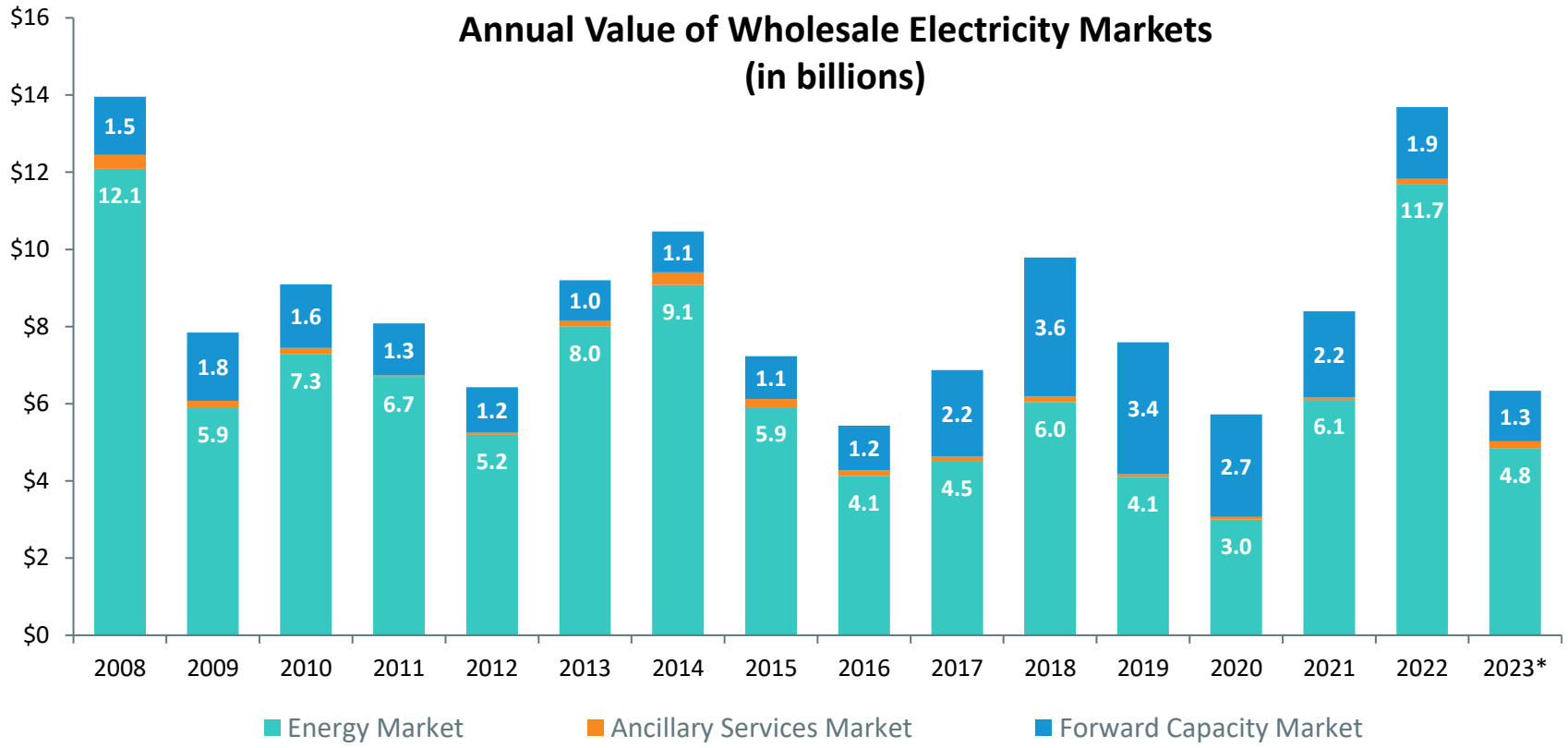
Short-Term Reliability Services: Resources compete in the ancillary markets to provide backup electricity as well as services needed to support the physical operation of the system, such as frequency regulation and voltage support. These services are **critical** during periods of heavy demand or system emergencies.

Forward Capacity Market

Long-Term Reliability Services: Resources compete to sell **capacity** to the system in three years' time through annual Forward Capacity Auctions. The Forward Capacity Market works in tandem with the Energy Markets to **attract** and **sustain** needed power resources today and into the future.

Markets Select the Most Cost-Efficient Resources to Meet Current and Future Electricity Needs

Energy Market Values Vary with Fuel Prices, While Capacity Market Values Vary with Changes in Supply



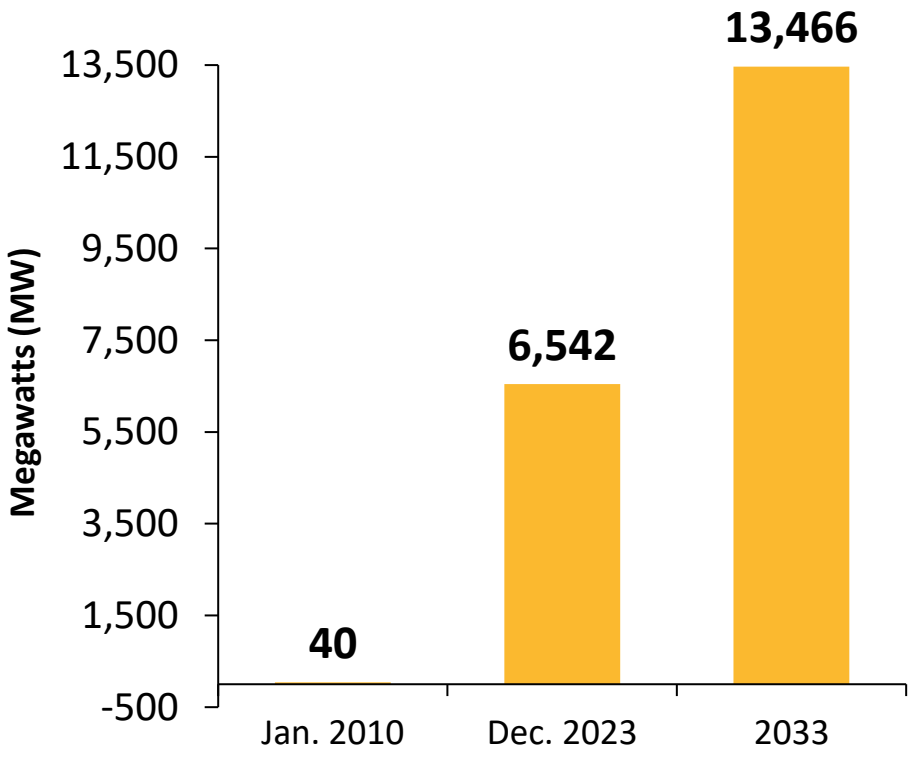
Source: ISO-NE Markets and Settlements Data; (March 2024) *2023 data are subject to adjustment

ISO New England Forecasts Strong Growth in Solar Photovoltaic (PV) Resources

December 2023 Solar PV Installed Capacity (MW_{ac})

State	Installed Capacity (MW_{ac})	No. of Installations
Connecticut	1,091	91,290
Massachusetts	3,712	179,362
Maine	588	11,506
New Hampshire	244	21,234
Rhode Island	400	22,769
Vermont	507	21,179
New England	**6,542**	**347,341**

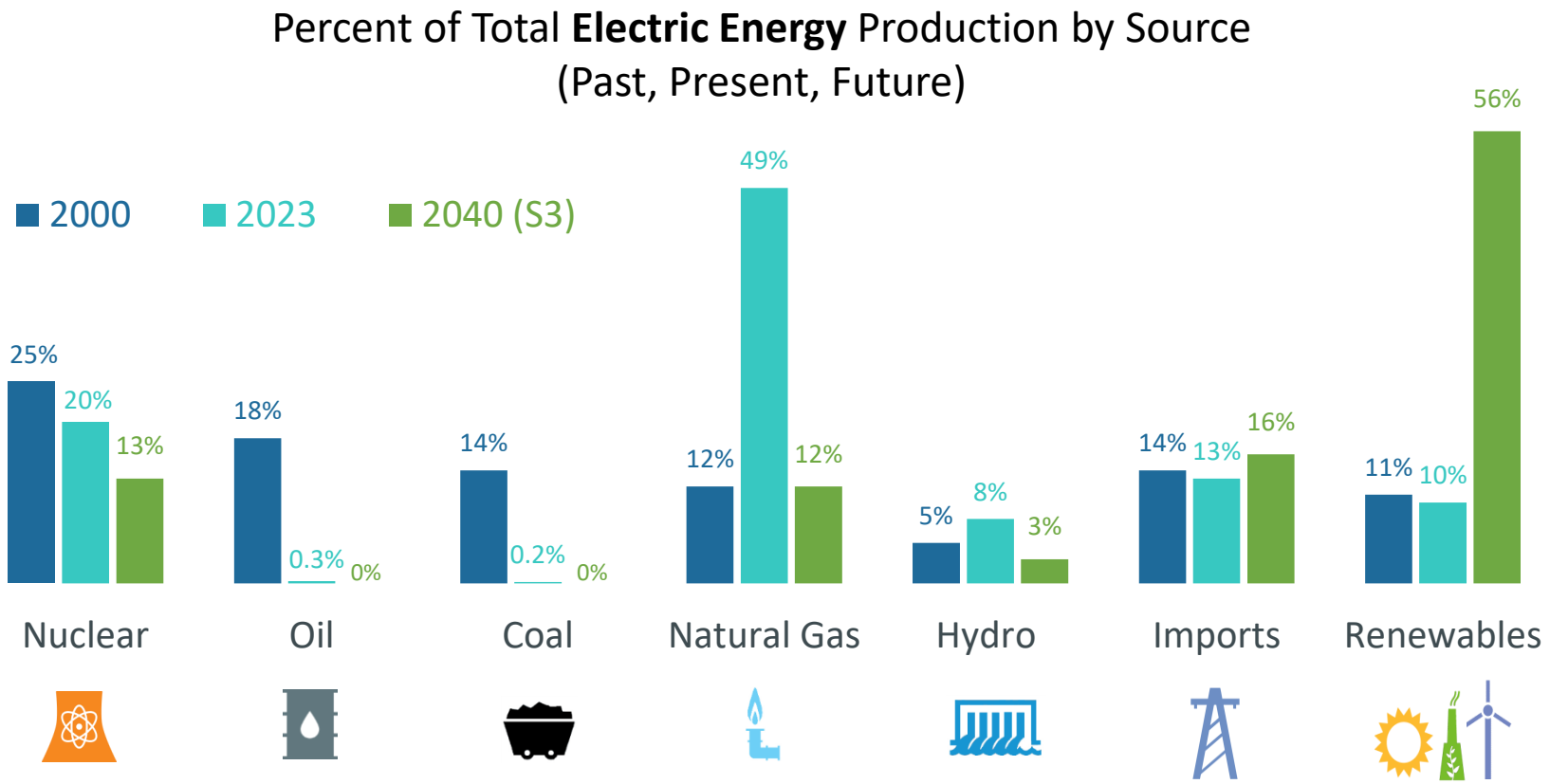
Cumulative Growth in Solar PV through 2033 (MW_{ac})



Note: The bar chart reflects the ISO's projections for nameplate capacity from PV resources participating in the region's wholesale electricity markets, as well as those connected "behind the meter." The forecast does not include forward-looking PV projects > 5 MW in nameplate capacity. Source: ISO New England 2024-2033 Forecast Report of Capacity, Energy, Loads, and Transmission (2024 CELT Report) (May 2024), and 2024 Photovoltaic (PV) Forecast; MW values are AC nameplate.

Dramatic Changes in the Energy Mix

New England made a major shift from coal and oil to natural gas over the past two decades, and is shifting to renewable energy in the coming decades

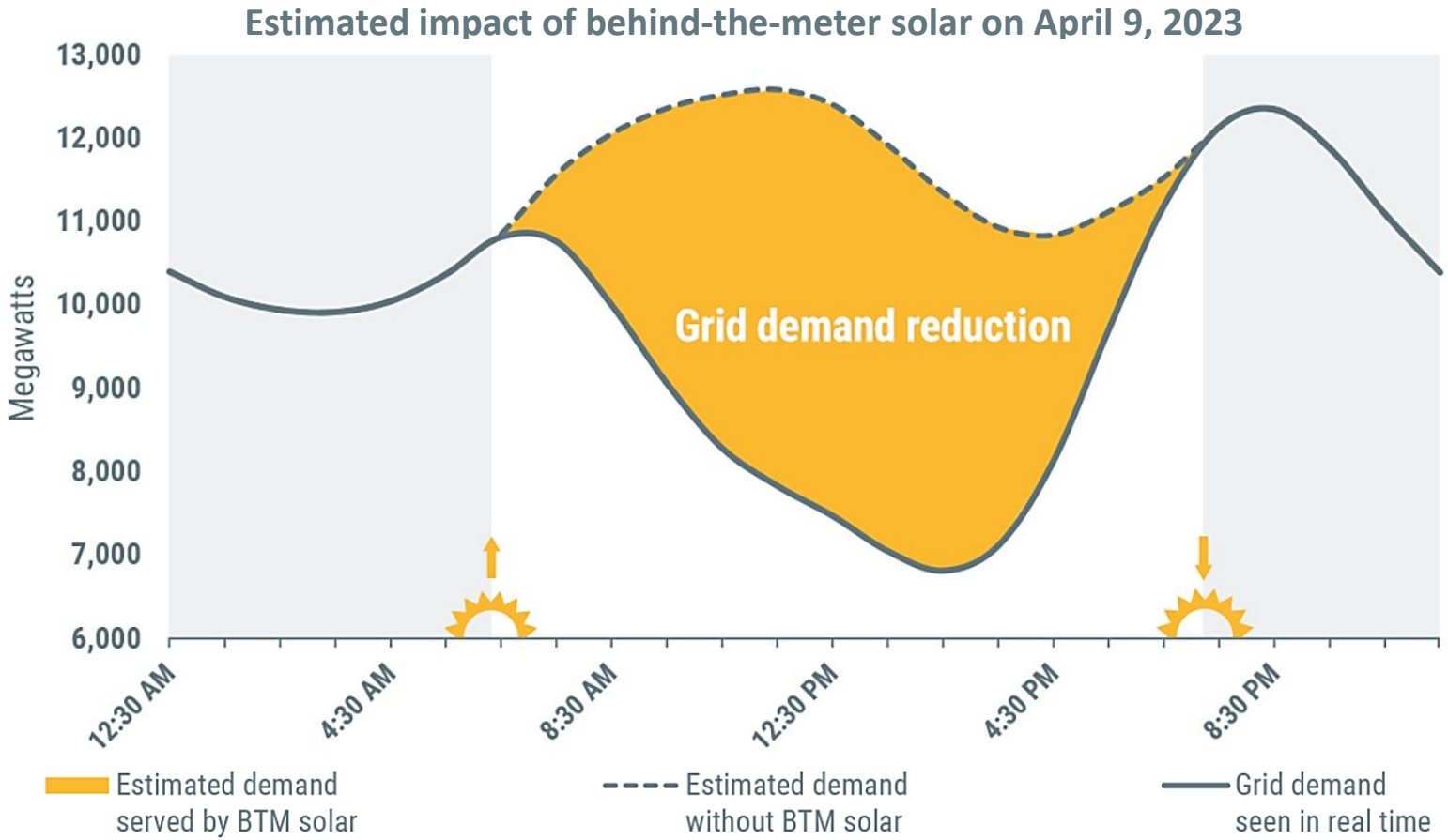


Source: ISO New England Net Energy and Peak Load by Source; data for 2023 is preliminary and subject to resettlement; data for 2040 is based on Scenario 3 of the ISO New England 2021 Economic Study: Future Grid Reliability Study Phase 1.

Renewables include landfill gas, biomass, other biomass gas, wind, grid-scale solar, behind-the-meter solar, municipal solid waste, and miscellaneous fuels.

Nighttime Electricity Load on the Region's Electric Grid is Exceeding Daytime Consumption On Sunny Days

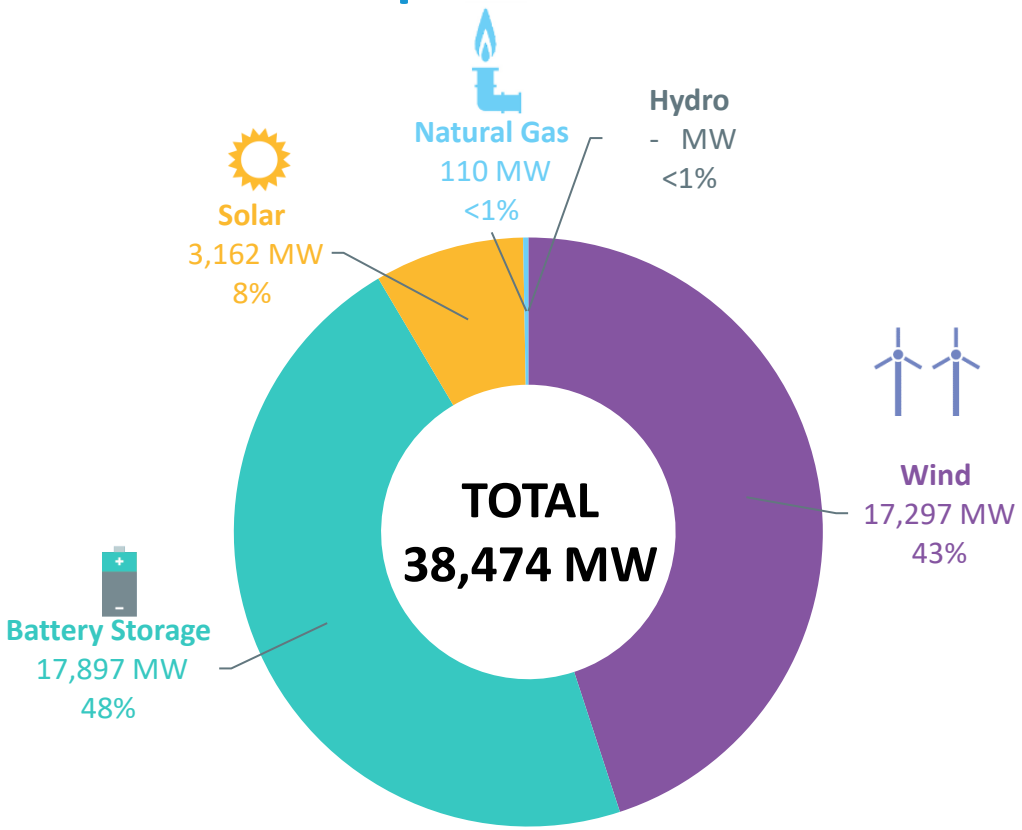
Continued development of solar deployment drives down afternoon load, especially in spring when demand is lower



Source: ISO Newswire Article from April 11, 2023, New England again sets record for low demand on regional power system - ISO Newswire

Wind Power & Battery Storage Comprise Most of the New Resource Proposals in the ISO Interconnection Queue

All Proposed Resources



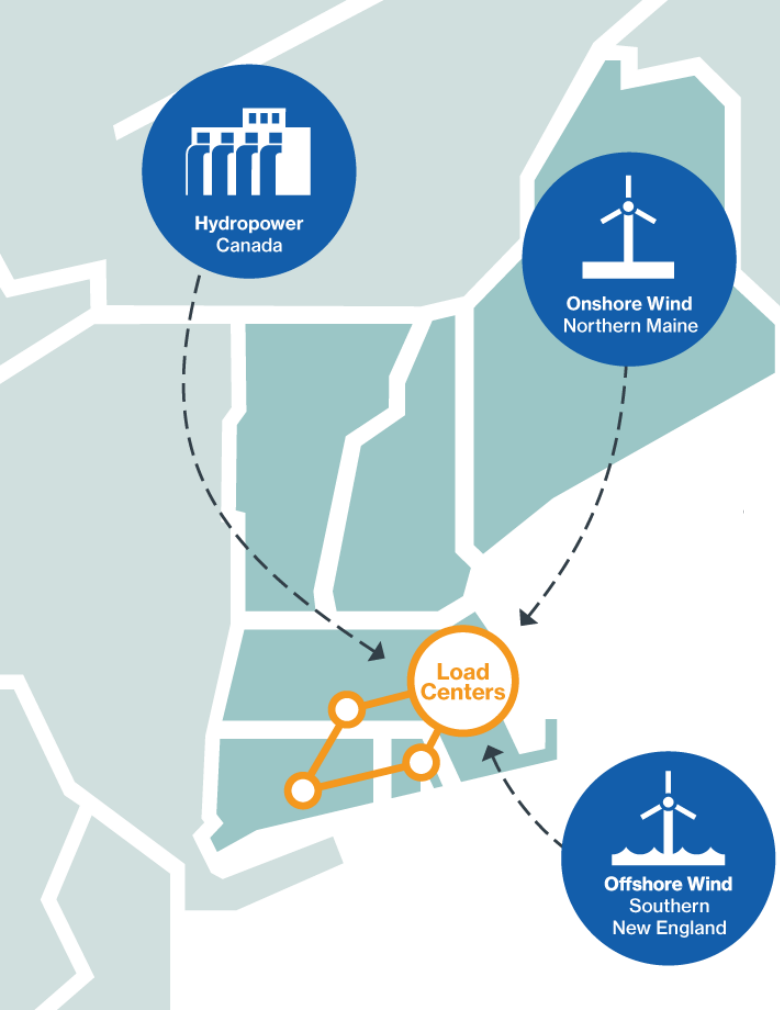
Source: ISO Generator Interconnection Queue (January 2025)
FERC Jurisdictional Proposals; Nameplate Capacity Ratings
Note: Some natural gas proposals include dual-fuel units (with oil backup).
Some natural gas, wind, and solar proposals include battery storage. Other includes hydro, biomass, fuel cells and nuclear uprate.

Proposals by State

(all proposed resources)

State	Megawatts (MW)
Connecticut	8,610
Massachusetts	20,903
Maine	5,120
New Hampshire	899
Rhode Island	2,597
Vermont	344
Total	**38,474**

Source: ISO Generator Interconnection Queue (January 2025)
FERC Jurisdictional Proposals



Lines represent types of ETUs private developers have proposed in recent years

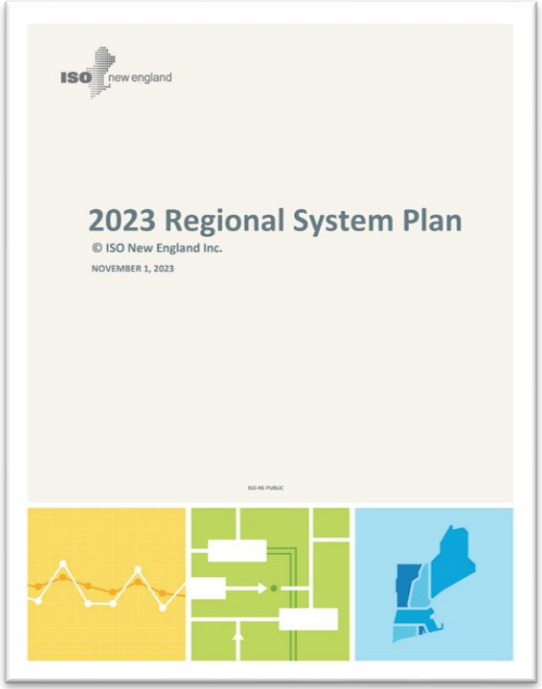
Source: ISO Interconnection Queue (January 2025)

Developers Are Proposing Large-Scale Transmission Projects to Deliver Clean Energy to Load Centers

- Developers are proposing eight elective transmission upgrades (ETUs) to help deliver over **10,000 MW** of clean energy to New England load centers
- Wind projects make up about **40%** of new resource proposals in the ISO Queue
  - Most are offshore wind proposals in southern New England, but some are onshore wind proposals in northern New England and **would require transmission** to deliver the energy to load centers

ISO New England's Role in Transmission Planning

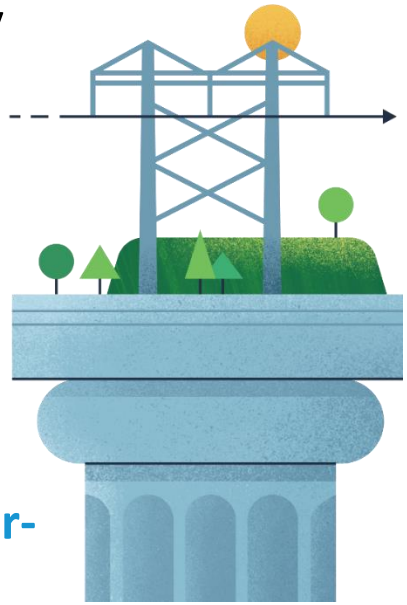
- As the **Regional Transmission Organization**, the ISO is required to identify transmission infrastructure solutions that are essential for maintaining power system reliability in New England
- Through an **open stakeholder process**, the ISO is responsible for the development of long-range plans to address future system needs over the ten-year planning horizon
  - Summarized in a **Regional System Plan (RSP)**
- The transmission planning process is governed by a **FERC-approved tariff**
- ISO-NE continuously revises the transmission planning process to comply with applicable FERC orders



ISO New England 2023 Regional System Plan

Longer-term Transmission Planning (LTTP)

- In 2020, the New England States Committee on Electricity (NESCOE) vision statement recommended that the ISO work with stakeholders to conduct a **comprehensive long-term regional transmission study**
- In response, the ISO began the study and received **FERC approval** to revise the ISO Tariff to establish a repeatable longer-term study process
- The resulting 2050 Transmission Study was the **first longer-term transmission study** conducted for New England



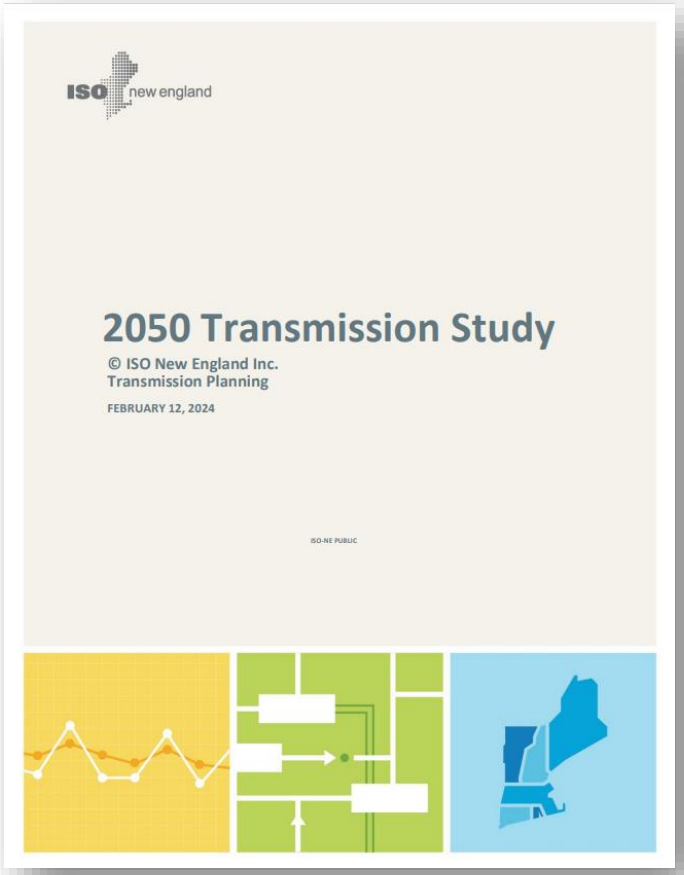
- The study informs stakeholders of the **amount and type** of **transmission infrastructure** necessary to provide reliable, cost-effective energy to the region through the **clean energy transition**, driven by state policy

Longer-term Transmission Planning (LTTP)

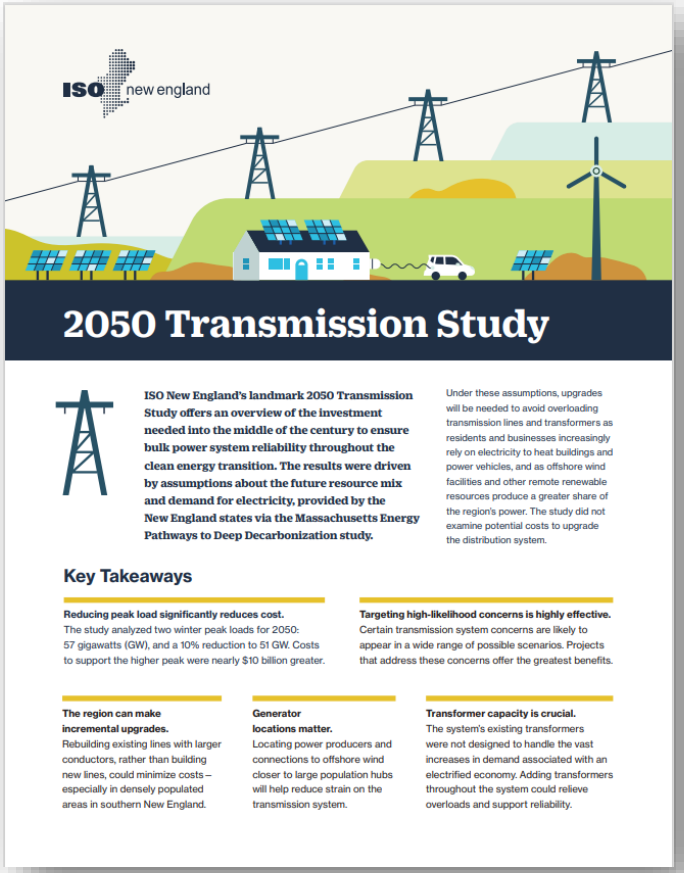
- The **region's aging transmission system** has the potential to become a significant bottleneck to progress if it does not keep pace with changes to other elements of the power system

- NESCOE requested the ISO issue its **first regional solicitation** under the LTTP process with a focus on North-South transmission (Maine/NH)

ISO Releases 2050 Transmission Study



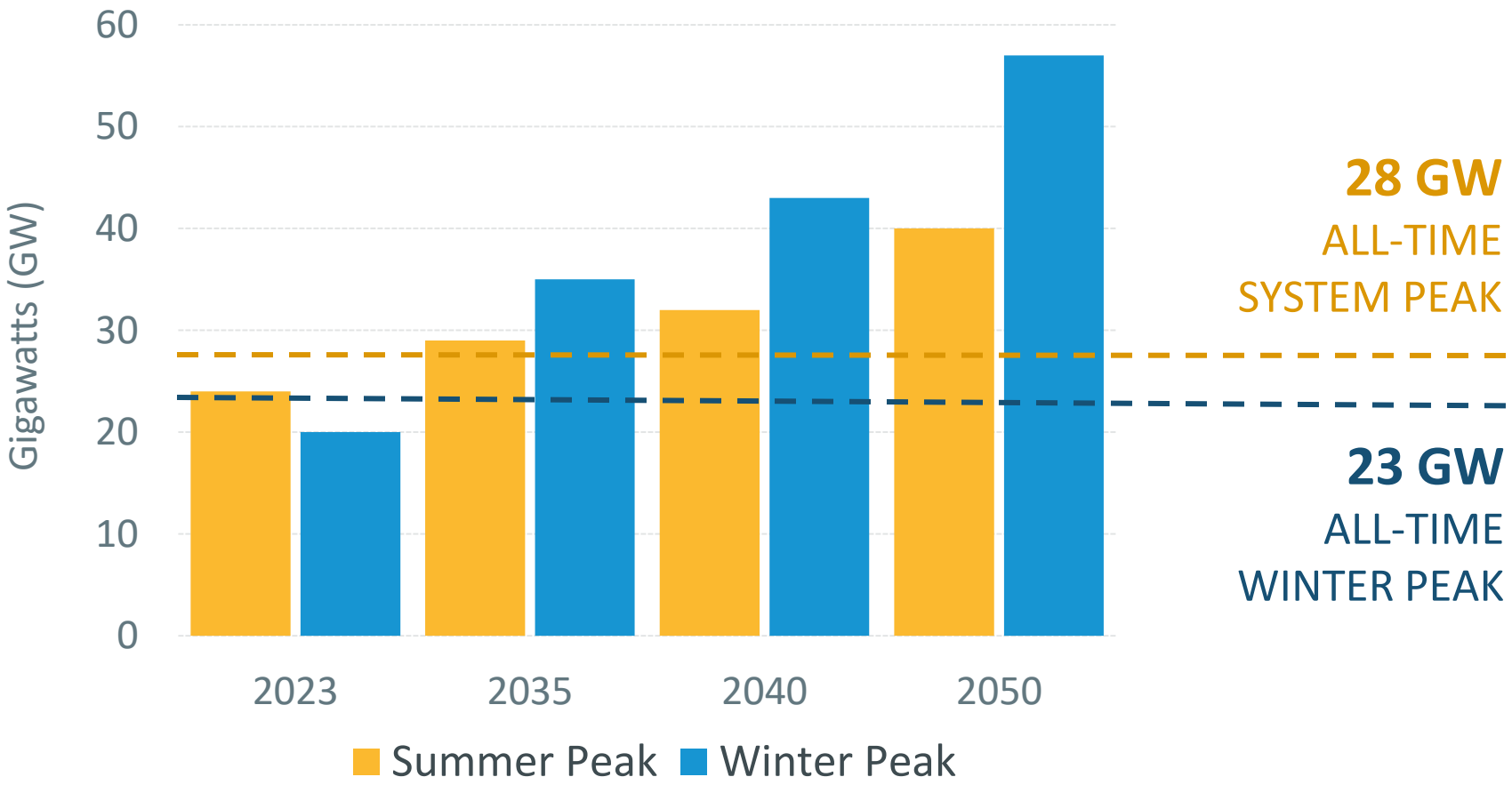
[2050 Transmission Study Final Report]



[2050 Transmission Study Fact Sheet]

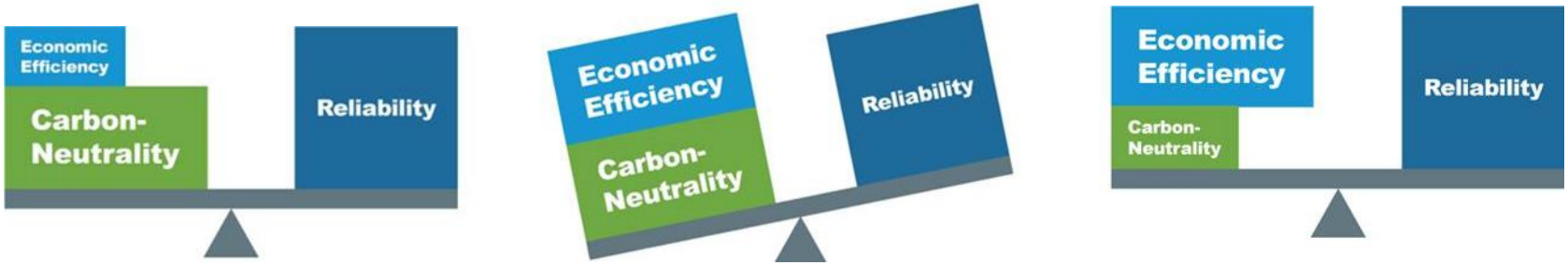
Peak Demand Period Will Shift to Winter

Significant amounts of clean energy will be needed to meet state decarbonization goals while serving significantly increased demand



Economic Planning for the Clean Energy Transition (EPCET) Overview

- EPCET explores the operational, engineering, and economic challenges the region must address in order to support the New England States' commitment to reduce carbon emissions over the next several decades
- Most of the six states aim to cut emissions by at least 80% from 1990 levels by the year 2050 through a shift to renewable energy and electrification of heating and transportation
- Work performed over two years, draft report published in August



EPCET's key findings converge on a common theme: ***designing the power system of the future requires balancing reliability, economic efficiency, and carbon-neutrality***

EPCET: Key Findings for the New England Grid

- **Increased variability will require vastly different supply levels from year to year**
  - Peak demand could vary by up to 50% between mild and severe winters by 2050
- **Emissions reductions will be seasonal**
  - Spring will be mostly decarbonized by 2040, but a small portion of winter days will still produce significant emissions in 2050
- **Renewable-only build-outs may be vast**
  - If the 2050 resource build-out is almost entirely wind, solar, and batteries, the region will need a power system that is roughly four times its current capacity to achieve state emissions goals and maintain reliability.
- **Firm, dispatchable, zero-carbon generation could help address challenges**
  - These resources may support reliability and reduce build-out costs

There Are Four Pillars Necessary to Support a Successful Clean Energy Transition

PILLAR ONE

Clean Energy

Significant amounts of clean energy to power the economy with a greener grid

PILLAR TWO

Balancing Resources

Resources that can supply electricity, reduce demand, or provide other services to maintain power system equilibrium

PILLAR THREE

Energy Adequacy

A dependable energy supply chain and/or a robust energy reserve to manage through extended periods of severe weather or energy supply constraints

PILLAR FOUR

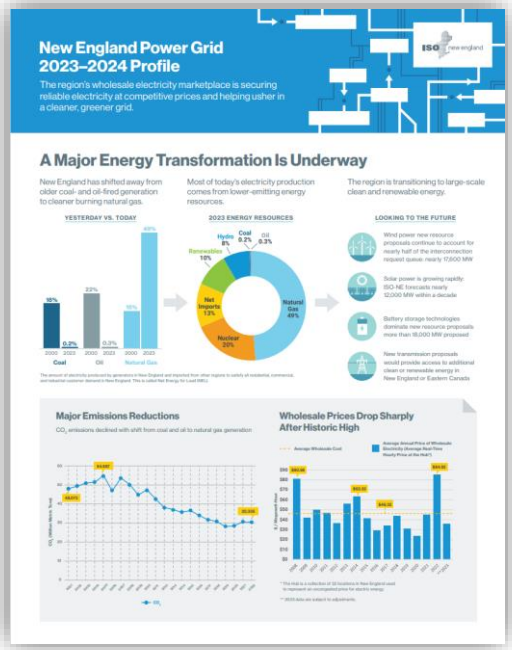
Robust Transmission

To integrate renewable resources and move clean energy to consumers across New England

ISO New England Publications

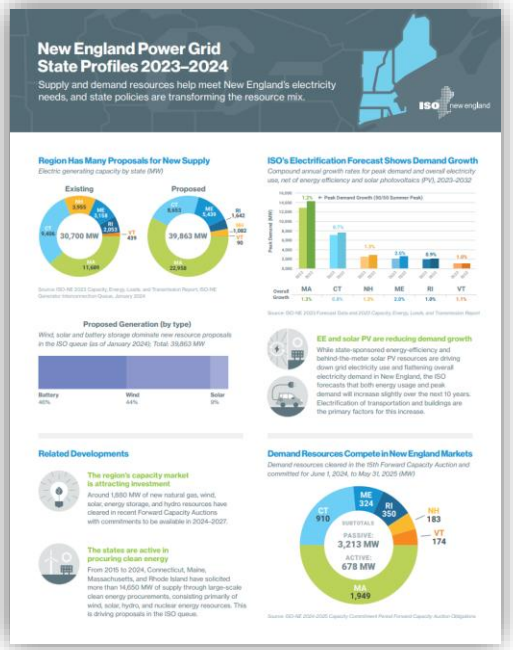
[2024 Regional Electricity Outlook]

Provides an in-depth look at New England's biggest challenges to power system reliability, the solutions the region is pursuing, and other ISO New England efforts to improve services and performance



[New England Power Grid Profile]

Provides key grid and market stats on how New England's wholesale electricity markets are securing reliable electricity at competitive prices and helping usher in a cleaner, greener grid



[New England State Profiles]

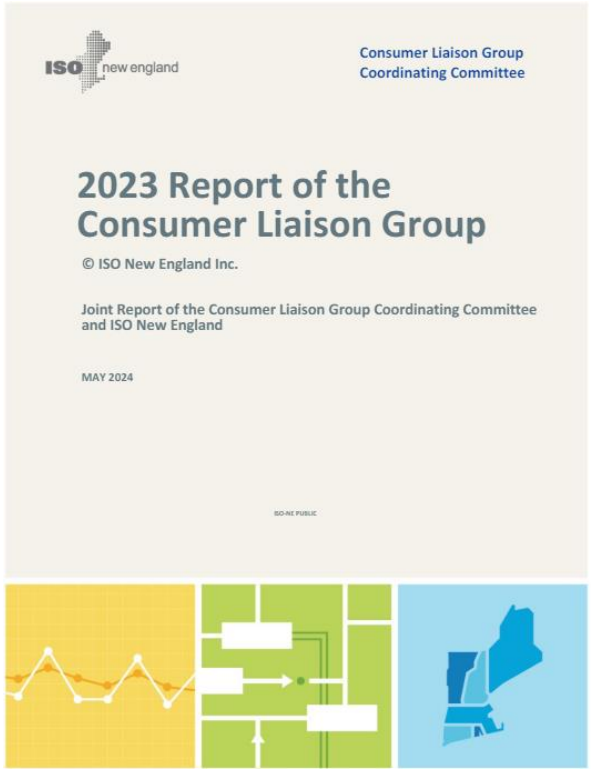
Provides state-specific facts and figures relating to supply and demand resources tied into the New England electric grid and state policies transforming the resource mix in the region

Consumer Liaison Group Provides a Forum for Consumers to Learn about Regional Electricity Issues

- A forum for sharing information between the ISO and electricity consumers in New England
- The CLG Coordinating Committee consists of 14 members who represent various stakeholder groups
- Quarterly meetings are free and open to the public, with in-person and virtual options to participate

2025 CLG Meeting dates:

Rhode Island: March 27
Massachusetts: June 4
New Hampshire: September 24
Massachusetts (Boston): December 3



2023 CLG Annual Report

More information on the CLG is available at: https://www.iso-ne.com/committees/industry-collaborations/consumer-liaison/

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Other ISO New England Publications and Resources

- ISO Newswire
  - a source for regular news about ISO New England and the wholesale electricity industry within the six-state region
- ISO Press Releases
  - Access current and archived press releases detailing significant developments at the ISO and in New England's power system and wholesale electricity markets
- Government and Industry Affairs Presentations, Speeches, Papers, and Other Materials
  - Presentations and speeches delivered by our technical experts, senior management, and External Affairs team at industry events in New England and across the nation
  - Includes the monthly issues memo—a rundown of federal, regional, and state issues that the ISO provides to the New England Conference of Public Utilities Commissioners (NECPUC) and state consumer advocates

ISO Glossary and Acronyms

- ISO maintains a glossary with short definitions of industry terms appearing in ISO materials
- The glossary is available at the ISO's website under the **Participate** then **Support** menus
  - The feature is presented on the ISO website for use by anyone needing to get a handle on a term
  - As terms morph or emerge over time, the glossary is regularly updated
  - The page also includes links to official documents that include full-length legal definitions for many terms

Participate > Support

Glossary and Acronyms

IN THIS SECTION

- Support
- Participant Readiness Project Outlook
- Request Data and Information
- Request CEII Access
- Request Software
- Mailing Lists
- Web Feeds
- Web Conferencing Support
- User Guides
- Glossary and Acronyms
- Web Browser Support
- Web Services Data
- Library of Participant Support Forms
- Upload and Download File Format Protocols
- FAQs
- Website Help

Here, you'll find general definitions of frequently used terms related to New England's wholesale electricity markets and power system.

Precise legal definitions can be found in the following documents:

- Section I: General Terms and Conditions PDF of the Tariff
- ISO New England Manual for Definitions and Abbreviations (Manual M-35)
- Participants Agreement
- Second Restated NEPOOL Agreement PDF

0-9 | A-C | D-F | G-I | J-M | N-Q | R-U | V-Z

0 - 9		
(2.5-; 10-) micron particulate matter	PM (2.5); PM(10)	Two sizes—2.5 microns ($PM_{2.5}$) and 10 microns (PM_{10})—of particulate matter identified in the US *Clean Air Act* as considered harmful to human health, property, and ecosystems.
10-minute nonspinning reserve	TMNSR	Operating reserve provided by off-line generation that can be electrically synchronized to the bulk electric power system and increase output within 10 minutes in response to a contingency; also called 10-minute nonsynchronized reserve. (Also see 10-minute spinning reserve.)
10-minute nonsynchronized reserve	TMNSR	(See 10-minute nonspinning reserve, the more common term.)
10-minute spinning reserve	TMSR	Operating reserve provided by on-line operating generation that can increase output within 10 minutes in response to a contingency; also called 10-minute synchronized reserve. (Also see 10-minute nonspinning reserve.)
2 x 16; 2/16		2 days per week, 16 hours per day—typically the weekend peak hours of 6:01 a.m. to 10:00 p.m. (aka, hour ending 7 to hour ending 22).

FOR MORE INFORMATION…

Subscribe to the *ISO Newswire*

ISO Newswire is your source for regular news about ISO New England and the wholesale electricity industry within the six-state region

Log on to ISO Express

ISO Express provides real-time data on New England's wholesale electricity markets and power system operations

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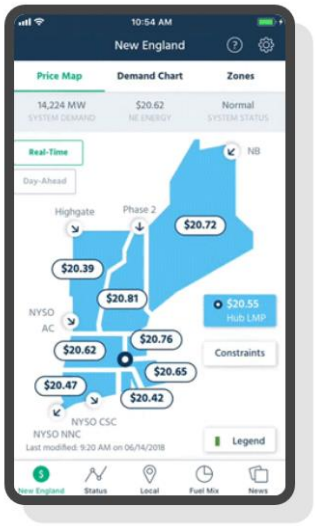
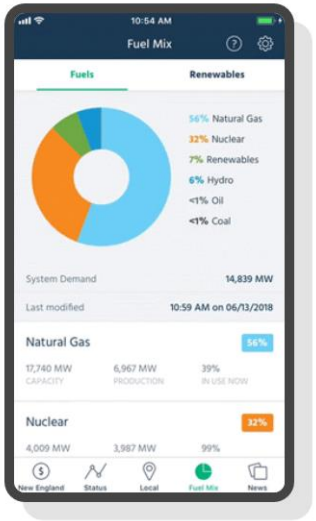
Download the ISO to Go App

ISO to Go is a free mobile application that puts real-time wholesale electricity pricing and power grid information in the palm of your hand





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Questions