

# Market Evolution and Resource Adequacy

*Nodal Trader Conference, S&P Global*



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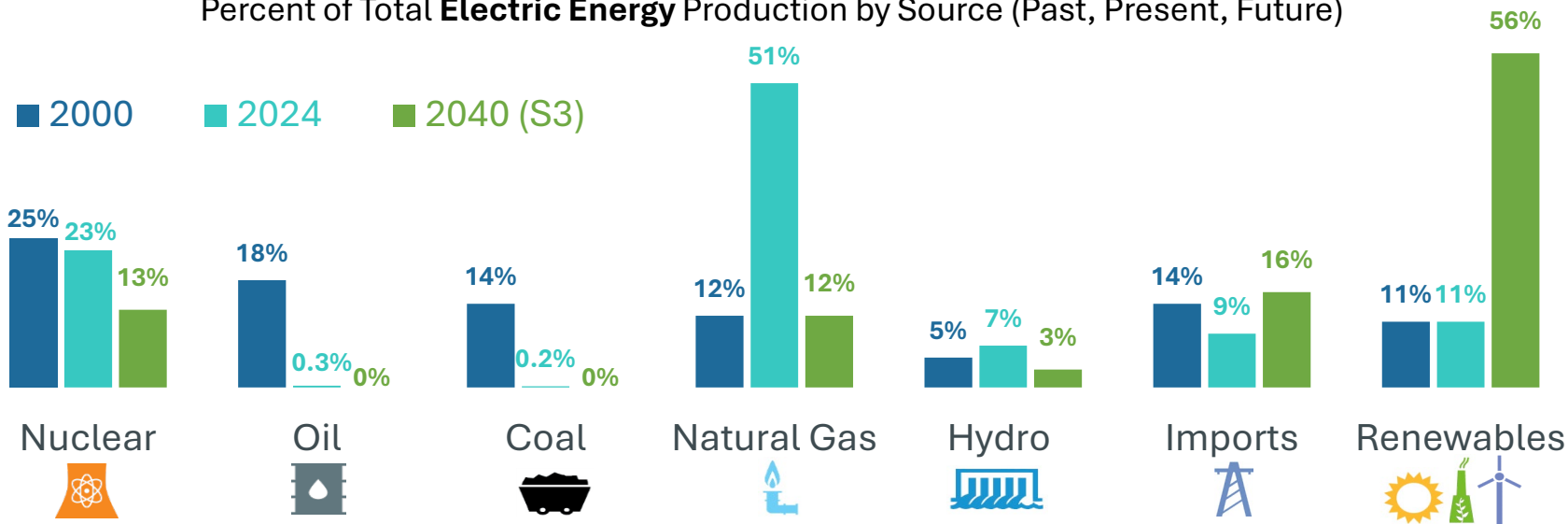
# THE ENERGY TRANSITION AND ISO'S MODELING OF FUTURE SYSTEM SCENARIOS



# 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*

Percent of Total **Electric Energy** Production by Source (Past, Present, Future)

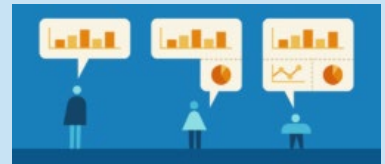


Source: ISO New England [Net Energy and Peak Load by Source](#); data for 2024 is preliminary and subject to resettlement; data for 2040 is based on Scenario 3 of the ISO New England 2021 Economic Study: [Future Grid Reliability Study Phase 1](#). Renewables include landfill gas, biomass, other biomass gas, wind, grid-scale solar, behind-the-meter solar, municipal solid waste, and miscellaneous fuels.

# Economic Planning for the Clean Energy Transition

## *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 4x its current capacity to achieve state emissions goals and maintain reliability
- **Firm, dispatchable, zero-carbon generation could help address challenges**
  - May support reliability and reduce build-out costs



**Learn More!**

**Dec. 2024 EPCET Public Webinar  
[Presentation & Recording](#)**

Source: *Economic Planning for the Clean Energy Transition: Illuminating the Challenges of Tomorrow's Grid*

# 2024 ECONOMIC STUDY: 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](#)

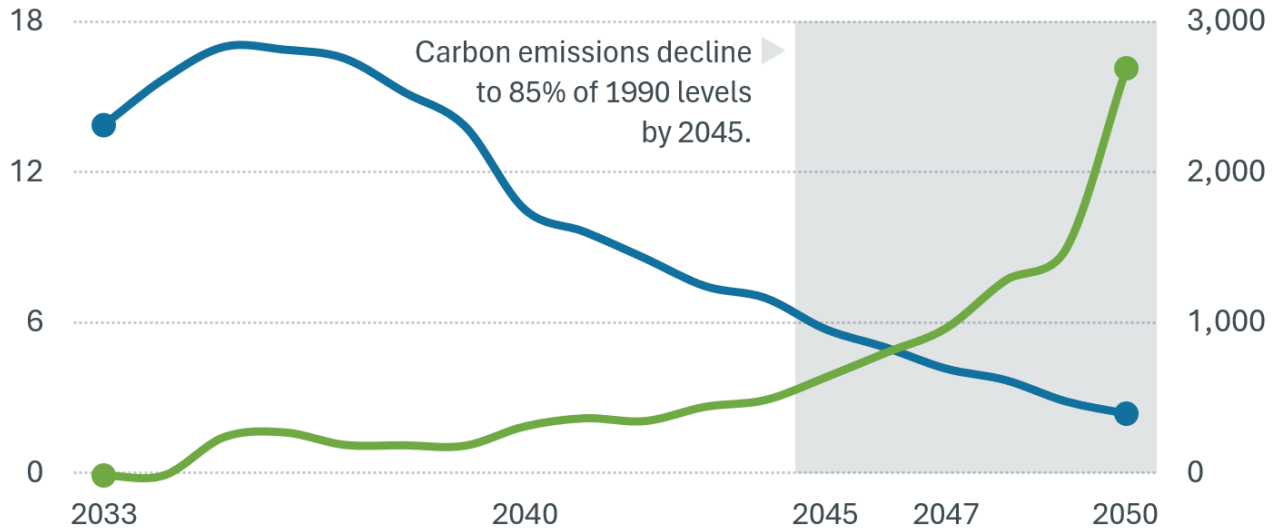
# Emissions Reductions Beyond 85% of Policy Goals Drive Escalating Costs

## Key Finding 3

The lower emissions get, the costlier it is to reduce them further

**Electric Sector CO<sub>2</sub> Production**  
(million tons/year)

**Cost of Mitigating Carbon**  
(\$/ton)

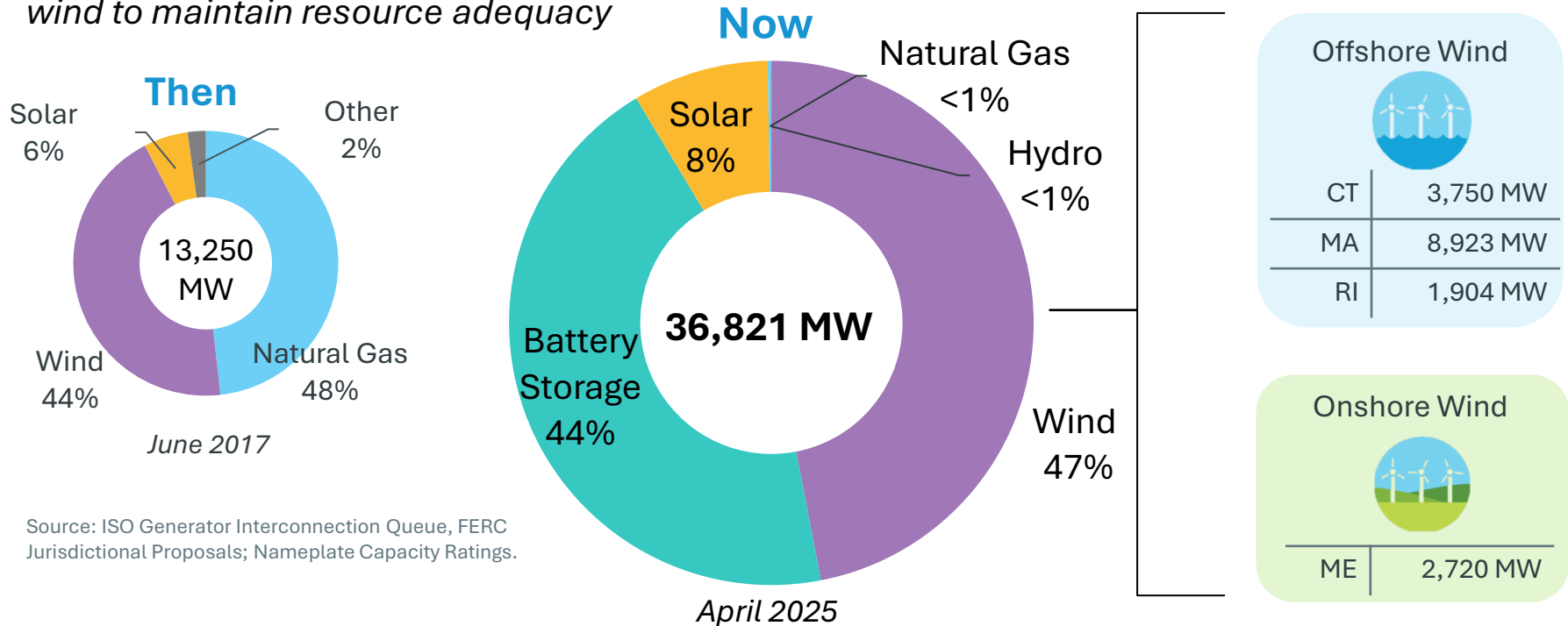


# RESOURCE PROPOSALS AND DEMAND FORECASTS



# The ISO Generator Interconnection Queue Provides a Snapshot of Resource Proposals

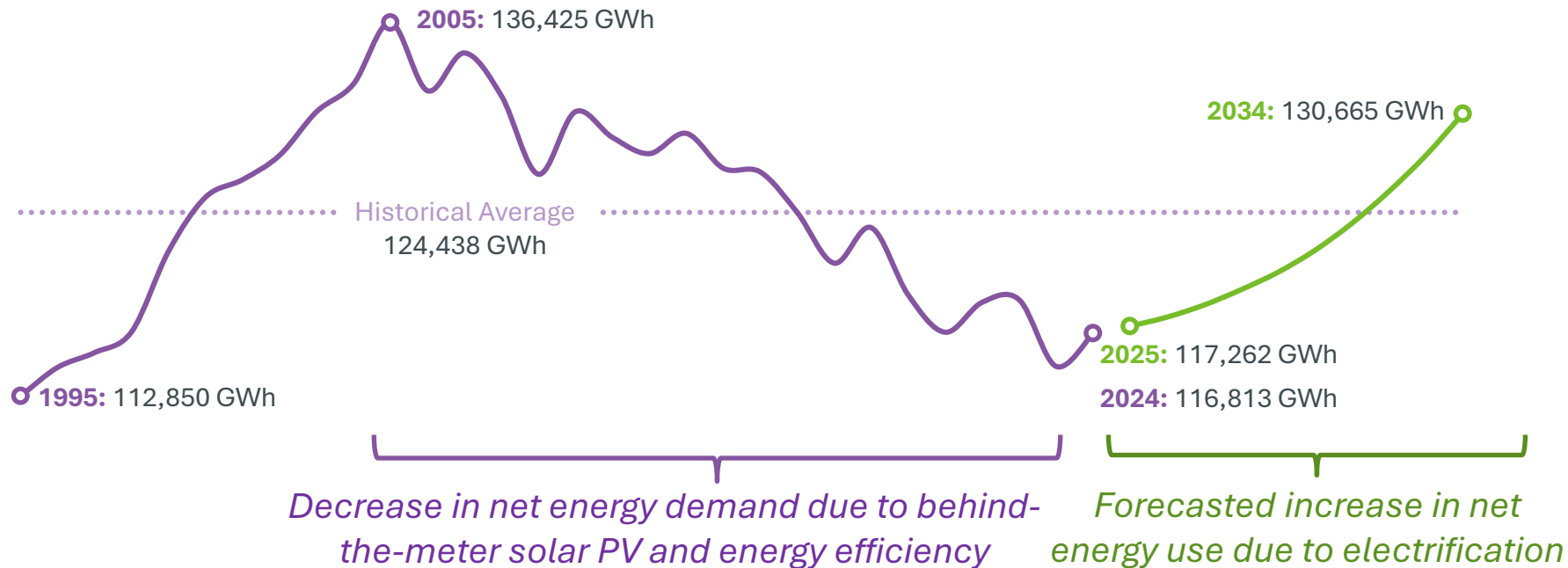
*The region is counting on the entry of resources in the form of large quantities of offshore wind to maintain resource adequacy*



Source: ISO Generator Interconnection Queue, FERC Jurisdictional Proposals; Nameplate Capacity Ratings.

# Steady Growth Expected in Annual Net Energy Use

## Historical and Forecast Net Energy Use

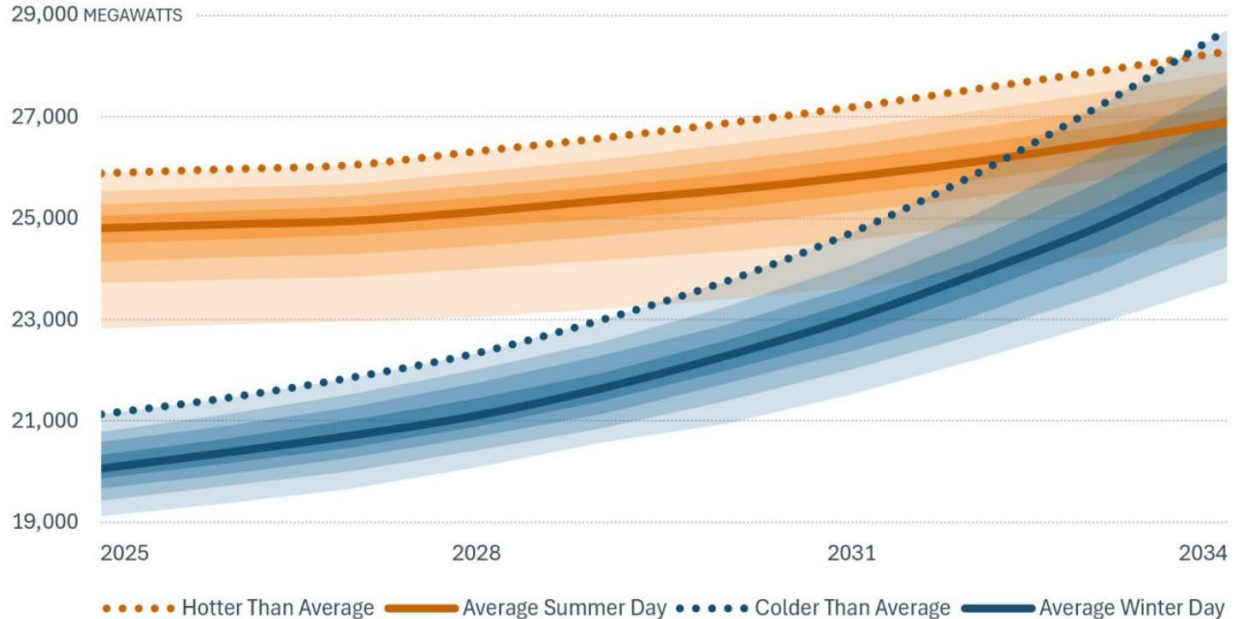


Source: [ISO New England 2025-2034 Forecast Report of Capacity, Energy, Loads, and Transmission \(2025 CELT Report\)](#) (May 2025)

# Ensuring a Diverse Supply of Energy Resources is an Important Component of Resource Adequacy

*A dependable energy supply chain and/or robust energy reserve to manage through extended periods of severe weather or energy supply constraints is necessary to support regional energy adequacy*

Summer and winter peak loads may converge within 10 years



Source: [Draft 2025 Regional System Plan \(August 2025\)](#)

# A RETROSPECTIVE

*Revisiting the Assumptions/Expectations Underpinning the Move to Competitive Markets – Nearly 30 Years after FERC Orders 888 and 889 and Ensuing State Restructuring Laws*



# Positive Results



- Wholesale **energy markets** are highly competitive and have produced significant economic efficiencies
- **LMP-based security-constrained unit commitment and economic dispatch** are fundamental to reliable and efficient system operations (aligning prices with system reliability), and provide clear indications of transmission constraints
- Higher-efficiency generators have displaced lower efficiency units, leading to **production efficiencies** and emission reductions
- **Consumers** are shielded from poor investment decisions

# Mixed Results



- **Retail competition** got off to a promising start in New England, but has since receded
- Penetration of **active demand response** is limited
- **Resource adequacy** mechanisms are needed due to reliability requirements and energy market price caps
  - New England is moving to a **prompt/seasonal market** with **marginal ELCC** and modeling of gas constraints
- States and ISO/RTOs have “**joint and complementary**” roles in ensuring resource adequacy

# Poor or Concerning Results



- “Resource Adequacy” does not ensure “**Energy Adequacy**”
- **Legacy reliability standards** are no longer sufficient
- The original concept underpinning wholesale markets was that **ISOs would run spot markets** to price prevailing supply and demand dynamics and that **buyers would transact bilaterally with suppliers** to ensure their needs are met (including resource adequacy)
- State mandated retail pricing provides short-term price hedging for end customers, but there is **little explicit hedging of long-term supply risks**, and in particular, resource adequacy risks

# Do These Assumptions Still Hold Up?



- **Supply would respond promptly** to shortages and higher prices and **infrastructure siting would be manageable**
- **Exit and entry** would be reasonably well coordinated by the markets, facilitated by bilateral trading
- Wholesale electricity **markets would facilitate** healthy long term **bilateral trading**
- **Federal and state policies** would be aligned, or at least not be in conflict
- **Out-of-market policy directives** would be limited
- **Externalities** (e.g., carbon) would be appropriately priced

# Preparing for the Future

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