

2024 NGA Spring Operations Conference

Energy Needed to Meet the Clean Energy Revolution

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MARKET DESIGN, ECONOMICS AND POWER SYSTEMS

Vulnerability of Northeast Gas Infrastructure

Northeast gas systems have been resilient, durable and diversified during cold snaps, except when gas-side contingencies occur which cause operational challenges along discrete segments for brief durations.

January 2004 Cold Snap

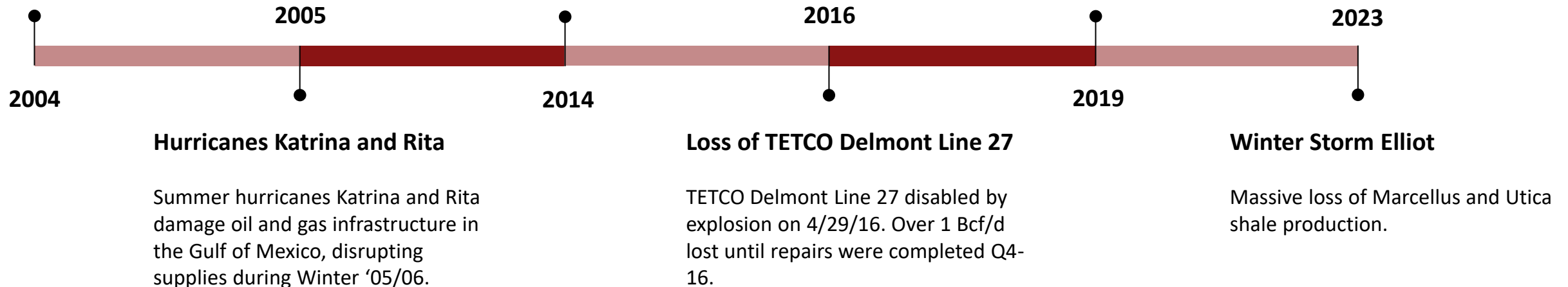
Extended January cold snap spotlights fuel security risks.

Polar Vortex

Record lows in January 2014 resulted in generator outages and severely constrained available gas for generation.

Aquidneck Outage

AGT "G" lateral constraints, loss of Field Points LNG, other malfunction caused line pressure decay resulting in loss of Aquidneck Island, R.I.



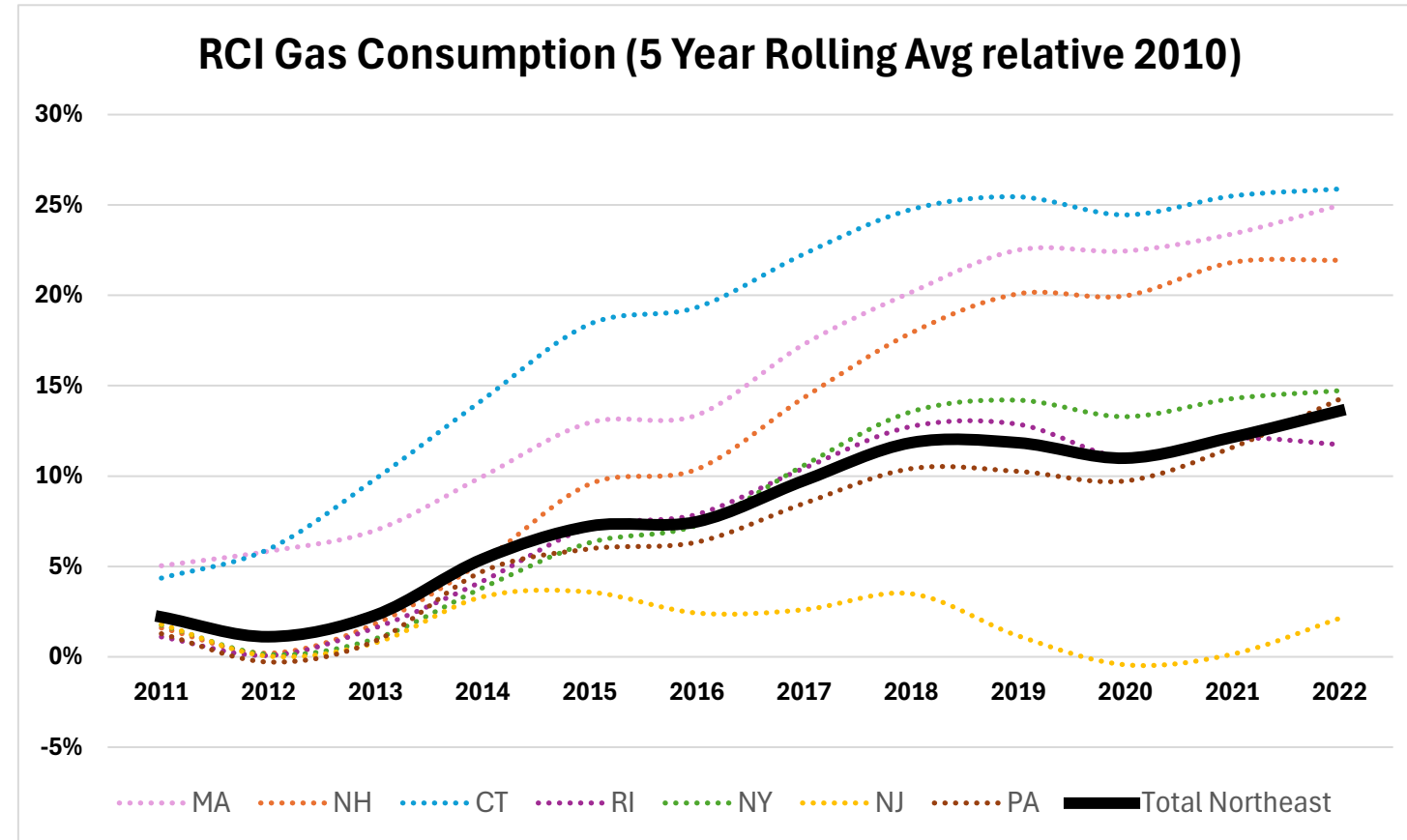


Northeast Natural Gas Short Term Outlook



Short-Term Outlook (RCI Demand) in the Northeast

- Since 2010, gas demand has grown ~1% annually
- IRPs show gas heating demand growth through '28
- 5-year outlook (average LDC forecast peak day sendout):
 - New England: +1.3%
 - New York: +0.8%

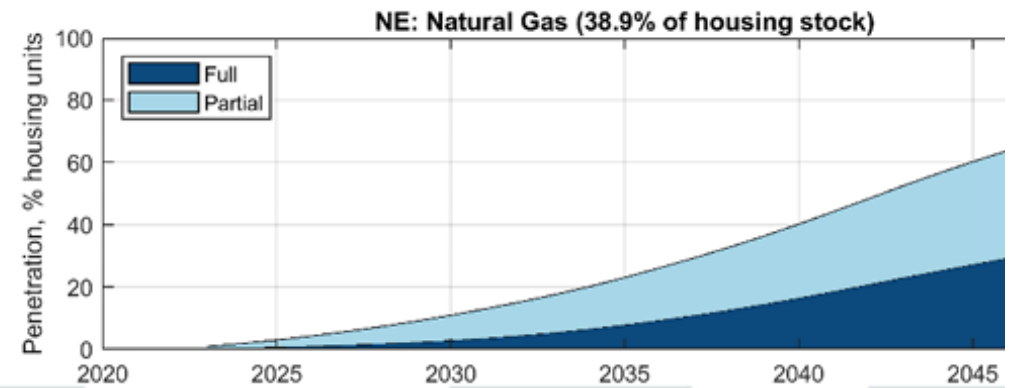
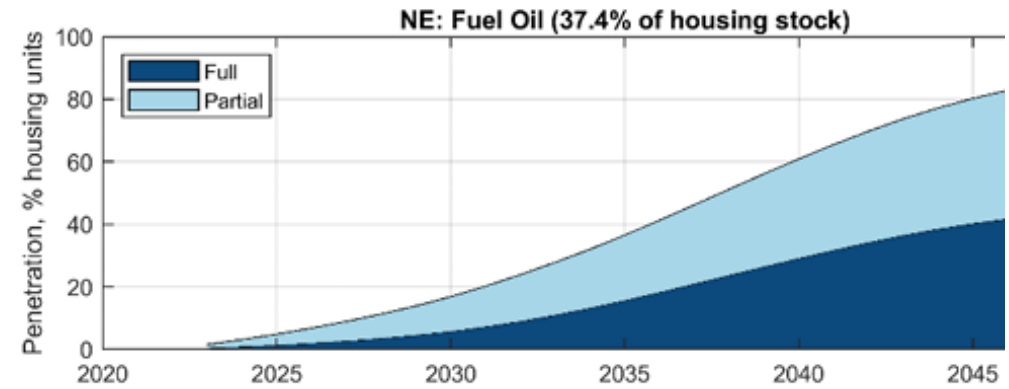
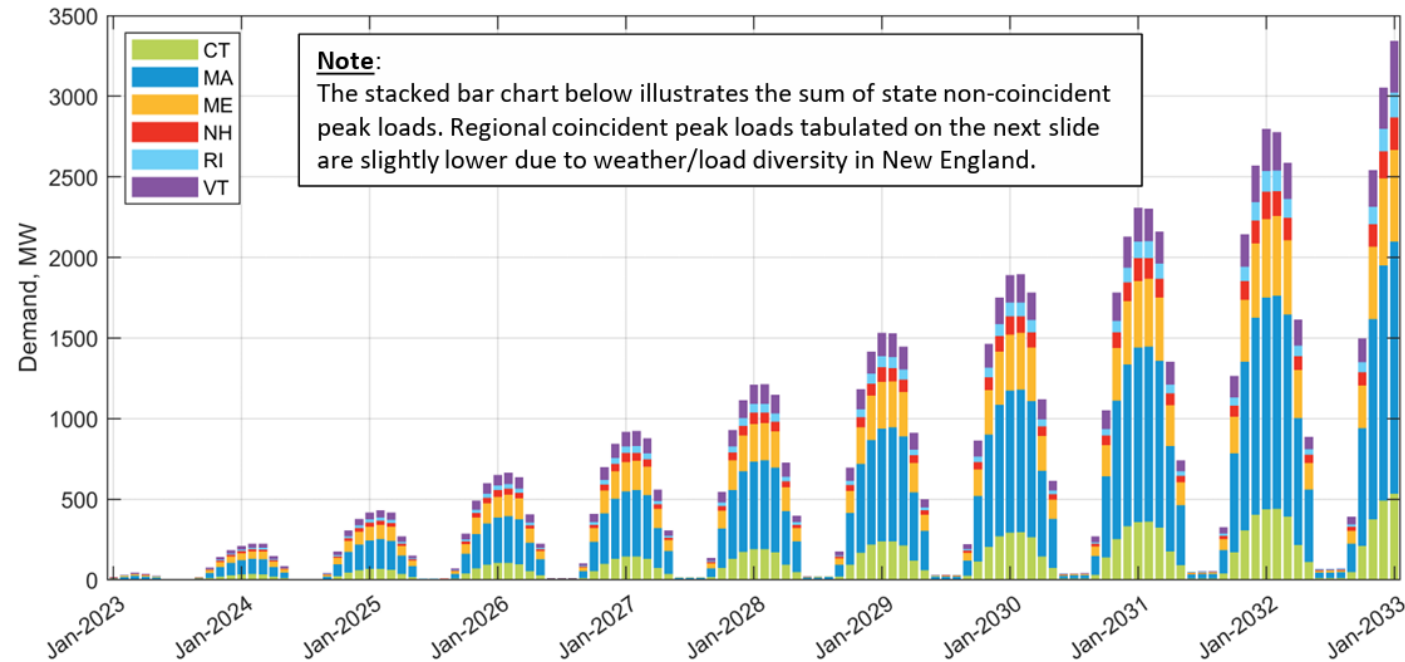


Source: EIA

Heating Electrification Outlook

Key drivers:

- Concentrated in buildings with oil or propane heat
- Technology progress (ccASHP)
- Increased number of trained installers



Source: ISO-NE [heatfx2023_final.pdf \(iso-ne.com\)](https://www.iso-ne.com/heatfx2023_final.pdf)

Northeast Gas Infrastructure Expansion

- Large scale projects into downstate NY and New England have failed
 - Access Northeast (Algonquin)
 - Northeast Energy Direct (Tennessee)
 - Northeast Supply Enhancement (Transco)
- Small scale projects (compression-only) have had limited success
 - Tennessee East 300 Project (Nov '23)
 - Portland Xpress (2018-21)
 - Iroquois Enhancement (Nov '25)
- Williams 0.8 Bcf/d Regional Energy Access (Transco) into NJ, PA/MD certificated by FERC and nearing completion
- Enbridge (Algonquin) Project Maple Open Season

Transitional Stressors on Gas Infrastructure

- Mystic retirement heightens ISO-NE's reliance on pipeline rendered supply, alternate sources of LNG

- LDC commitments to Everett Marine Terminal (EMT)
 - NGrid, Eversource, Unitil have filed multi-year contracts w/ EMT, pending MA DPU approval
 - MA regulatory approval would likely keep truck-transported LNG from Everett to region's satellite tanks to bolster local system pressures and peak day send-out
 - Uncertain replenishment logistics from PA and Quebec (absent EMT)
 - Uncertain LNG substitution prospects from Repsol Canaport and/or Excelerate buoy (absent EMT)

- Favorable outlook for OSW through rebid procurements in New England, New York, New Jersey
 - Significant delays in Commercial Operation Dates
 - Global supply chain constraints likely to persist

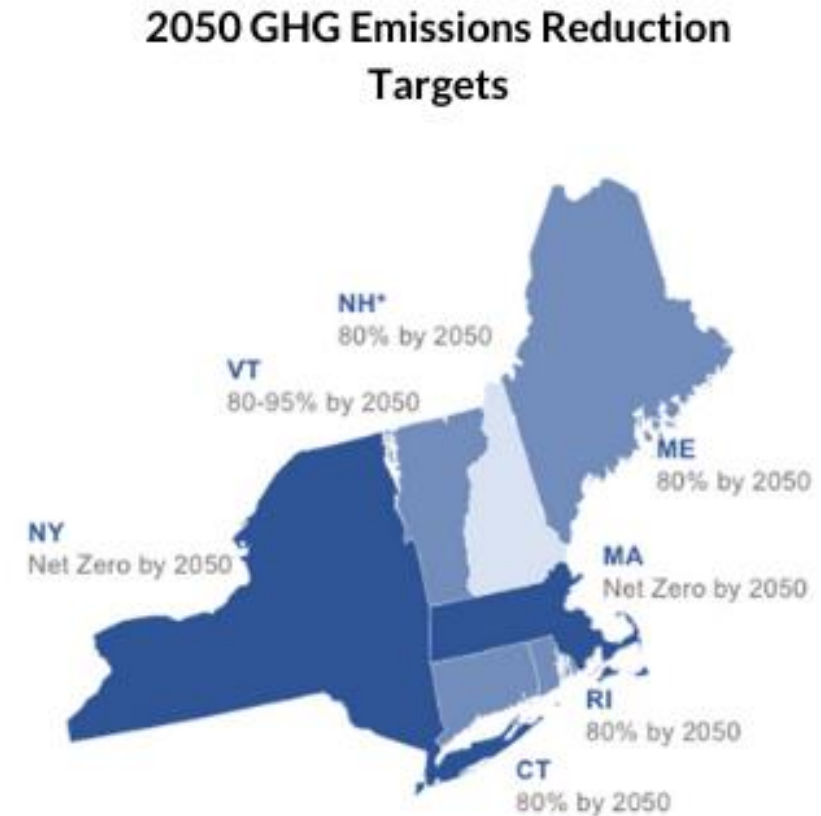


Long-Term Outlook



Northeast Decarbonization Targets

- Aggressive emissions reduction targets through 2050
 - 5 of 6 NE states have legislative mandates
 - NH's target is aspirational (not mandated)



*NH has an aspirational goal of 80% emissions reduction by 2050, but no legislative mandate

Source: Northeast Clean Energy Council, 2021

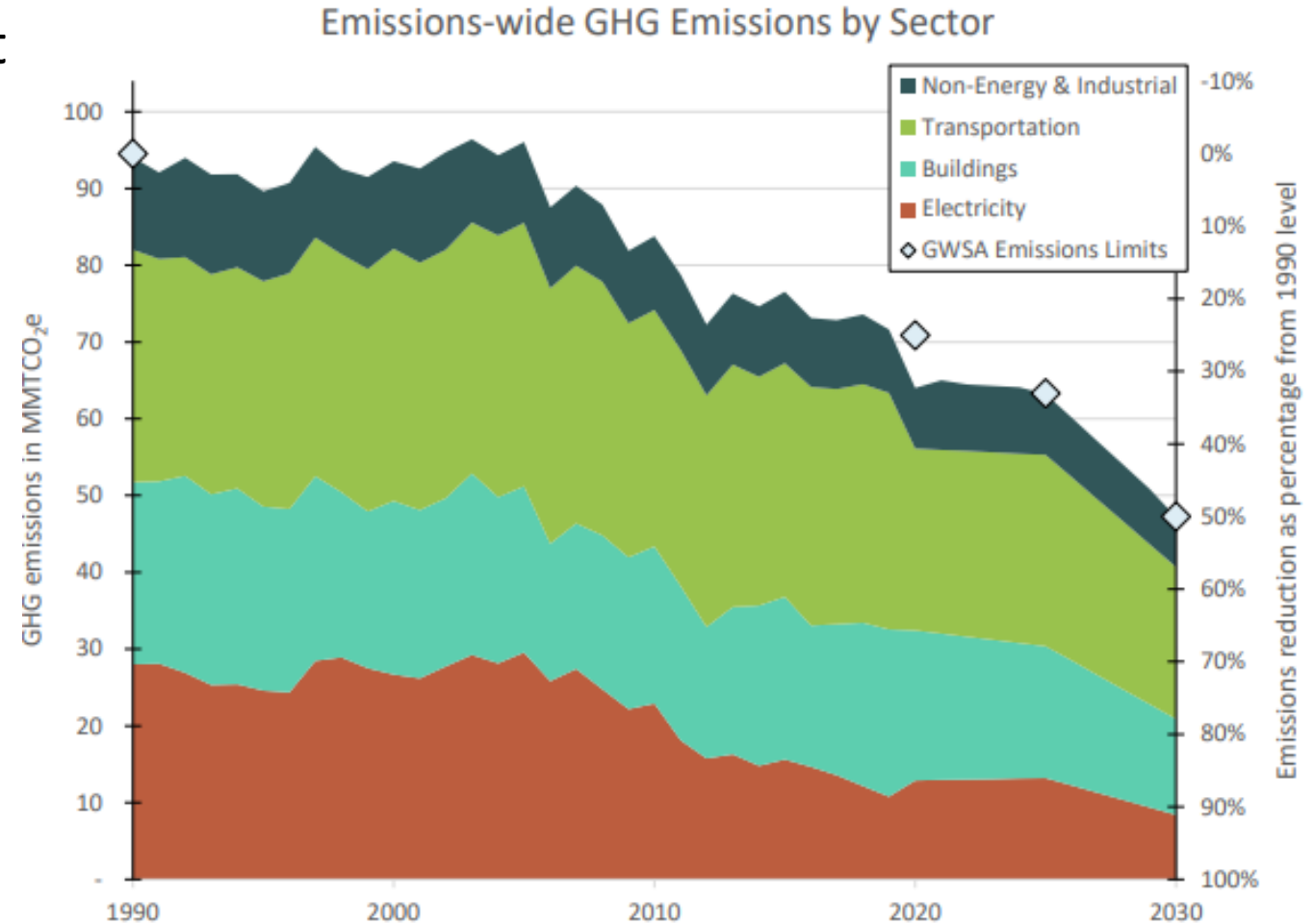
MA Decarbonization Legislation

➤ MA's 2008 Global Warming Solutions Act and amendments set goals:

- -50% by 2030
- -75% by 2040
- -85% (net zero) by 2050

➤ Sector Specific emissions reduction targets established for 2030:

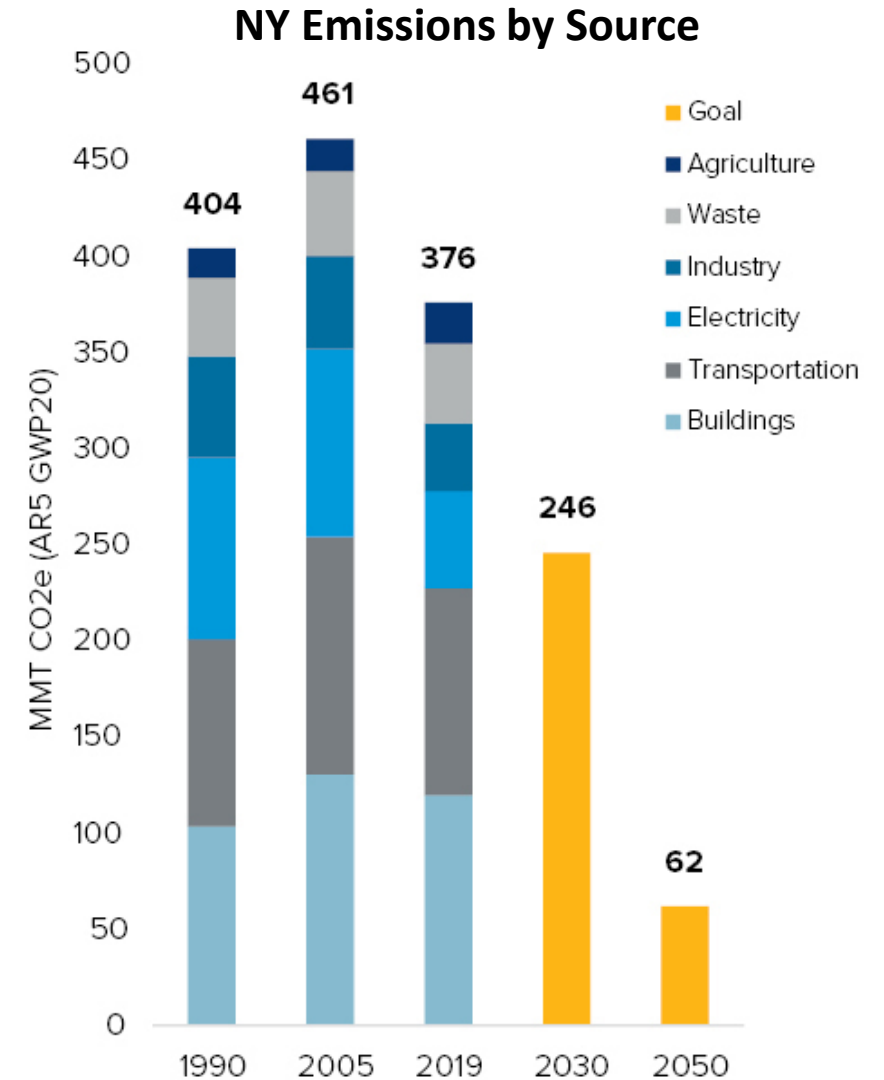
- Transportation: 34%
- Res/Com Heating: 47%
- Electric: 70%
- Industrial and non-energy: 48%



Source: MA Clean Energy and Climate Plan for 2025 and 2030

NY Decarbonization Legislation

- NY's 2019 Climate Leadership and Community Protection Act established reduction targets:
 - -40% by 2030
 - -85% by 2050 (net zero)
- Also established electricity targets:
 - 70% renewable by 2030
 - 100% emission free by 2040



Source: NYSERDA

Decarbonization of Heating

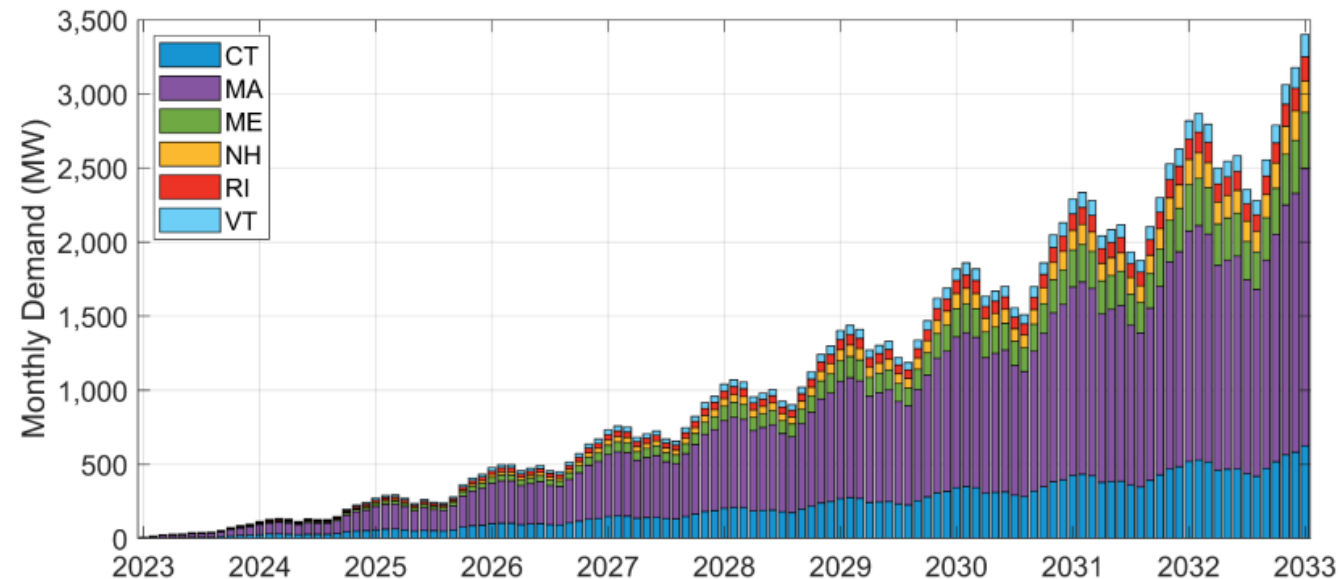
- LDCs have proposed broad spectrum of solutions
 - RNG, H2 blending
 - Eversource geothermal pilot
 - Outlook on cost and quantities
 - Logistical constraints re interchangeability and safety
- Policymakers' preference for electrification
 - E3 pathways study for LDCs
 - NY gas ban on certain new construction beginning in 2025
 - MA DPU dissuades RNG and H2 blending as a local solution
- Who pays

Increasing Electric Demand for Transportation

- Expected growth + 3.4 GW by 2033
- Pace of transport electrification beset with uncertainty
- Projected skyrocketing EV growth does not offset demand for pipeline gas

2023 Transportation Electrification Forecast

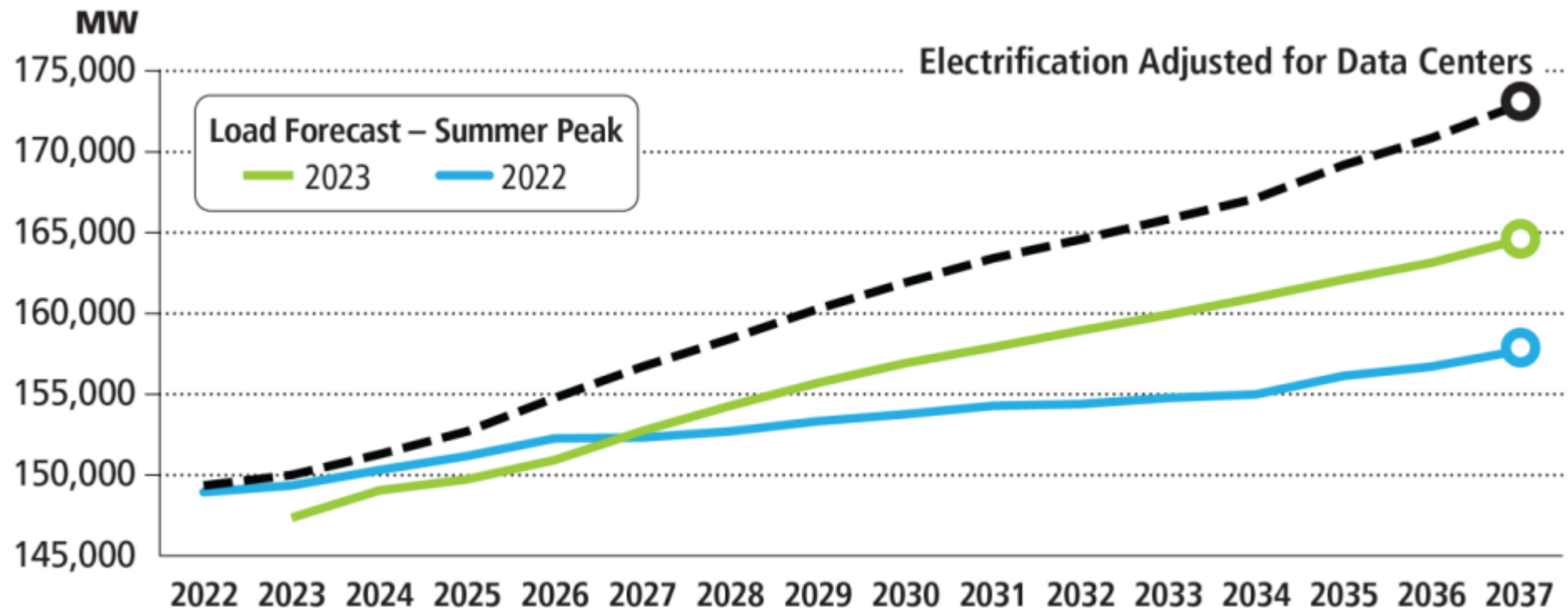
Monthly 50/50 Peak Demand by State



Source: ISO-NE 2023
Transportation
Electrification
Forecast

Increasing Electric Demand from Data Centers

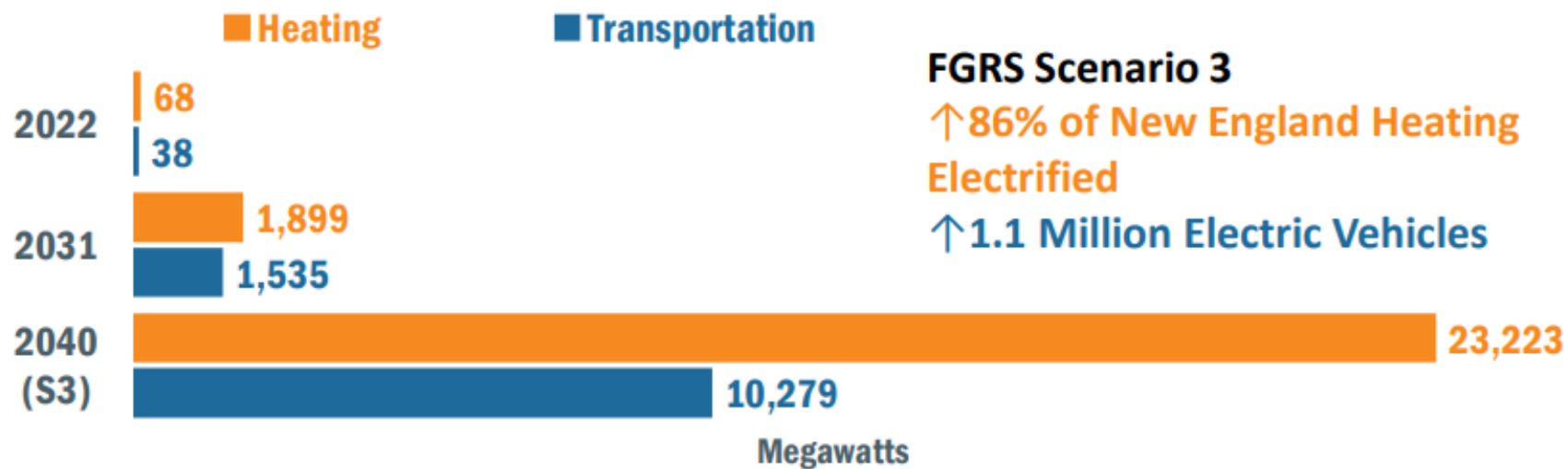
- In PJM, rapid growth in data centers will compound demand from heating and transportation electrification



Source: Energy Transition in PJM: Resource Retirements, Replacements & Risks (2023)

Decarbonization of Electric Generation in New England

- Decarbonization requires both replacement and retrofitting of the current fossil fleet, including batteries to ensure grid reliability
- Electrification of heating and transportation projected to add 23.5 GW of peak electric demand by 2040 (Deep Decarbonization scenario)

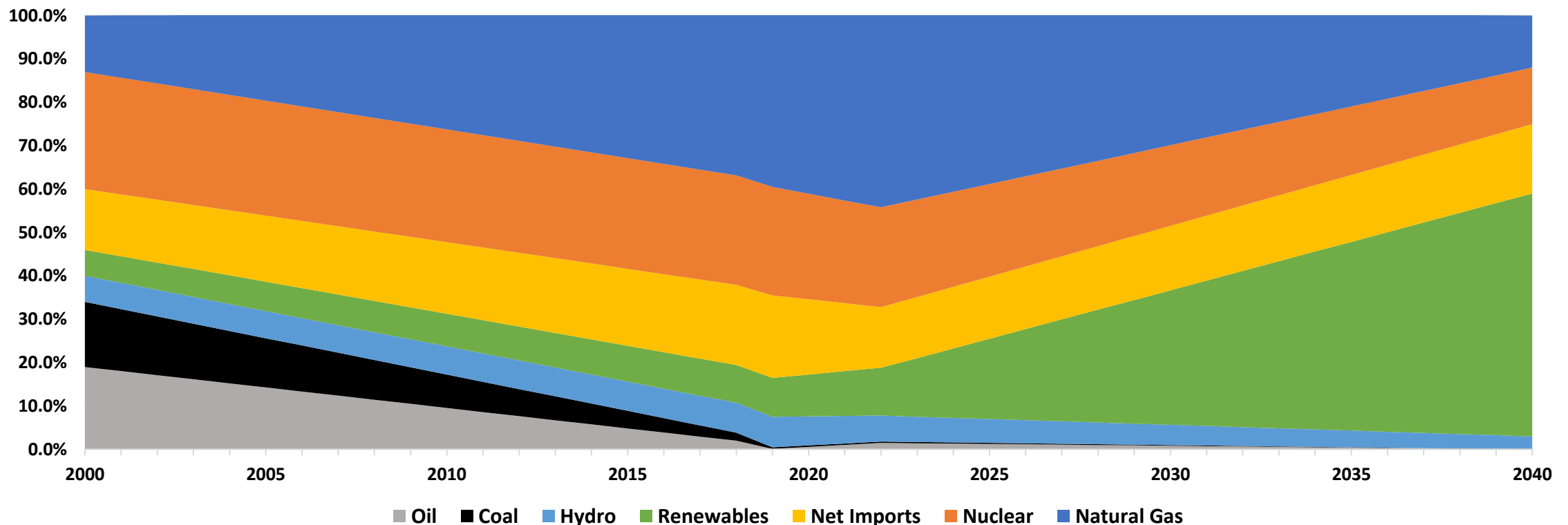


Source: ISO-NE Future Grid Reliability Study (2022)

Status of Gas for Generation

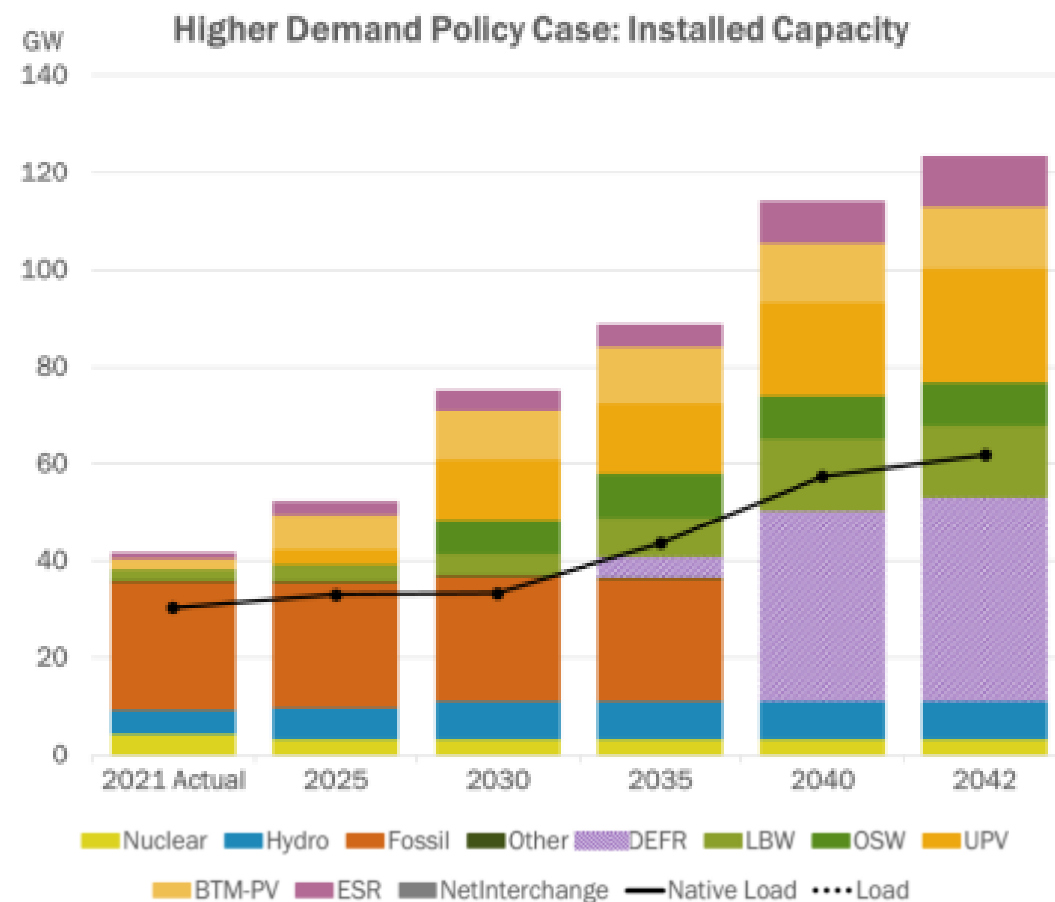
- Share of electric demand served by gas-fired generation has increased
 - Retirements of baseload coal and nuclear (existing fleet expected to continue)
 - Cost-competitiveness of gas since shale revolution

Sources of Grid Electricity in New England (Annual Net Energy for Load)



Challenges of a Decarbonized Grid

- Lack of flexibility requires regulatory innovation
 - Grid operators must be able to manage VER
 - Need for new ancillary services (CAISO's Flexible Ramping Product) to compensate for loss of dispatchable gen
- Evolving capacity accreditation principles
 - ~65-90 GW of new resources needed by 2040 to achieve policy mandates (peak load growth ~ 15-25GW)
 - Revisitation of basic planning criteria



Source: NYISO 2023-2042 System & Resource Outlook Update Draft

Concluding Thoughts

- Are both policymakers and society braced for the energy revolution?
- What economic sacrifices are needed to achieve decarbonization goals by 2040?
 - Who pays and what are they paying for?
 - Can the cost of the transition be securitized?
- What choice do we have?