Effects of Future Peak Loads: Ten-Year Forecast and Longer-Term Outlook

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Ten-Year Forecast: Electrification Impacts

- ISO-NE forecasts increases in load over the next 10 years due to electrification of transportation and heating
- By 2032, transportation and heating are forecasted to be…
  - 14.2% of year-round net energy consumption
  - 8.9% of summer peak demand
  - 24.3% of winter peak demand
- Forecasts are based on current federal, state, and local policies and economic trends

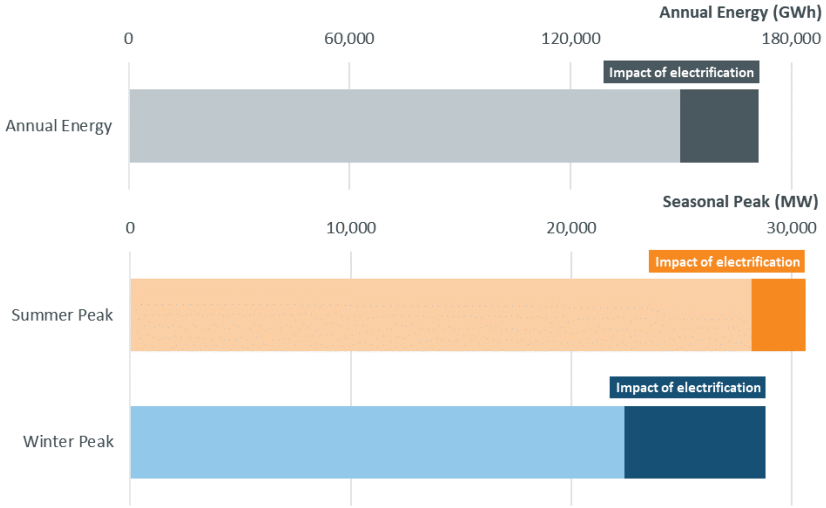


Figure source: 2023 Regional System Plan, Figure 1-2
Data Source: 2023 CELT Report

Timing of Shift to Winter Peaking

- As the growth of transportation and heating electrification continues, New England is likely to return to a winter-peaking system
- Other factors being equal, shift from summer-peaking to winter-peaking is likely in the mid-2030s
- Relative severity of winter and summer weather may result in an earlier/later shift to winter peaks

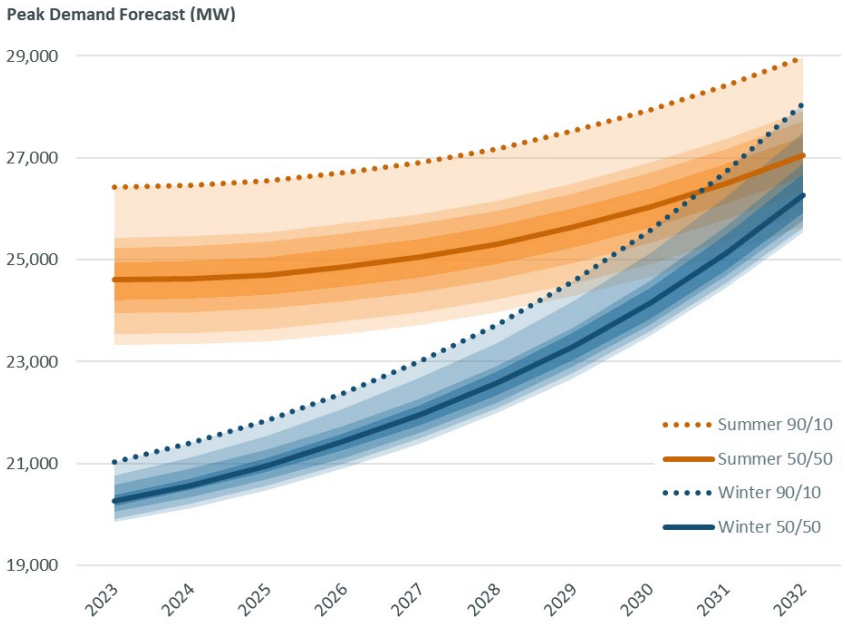


Figure source: 2023 Regional System Plan, Figure 4-9
Data Source: 2023 CELT Report

Beyond Ten Years: Peak Load Out to 2050

- Load data beyond 2032 is based on a Massachusetts-commissioned “Energy Pathways to Deep Decarbonization” study
  - ISO-NE translated data from this study to a 2019 weather year
- Winter peak demand projected to reach 57 GW – over double New England’s previous all-time peak

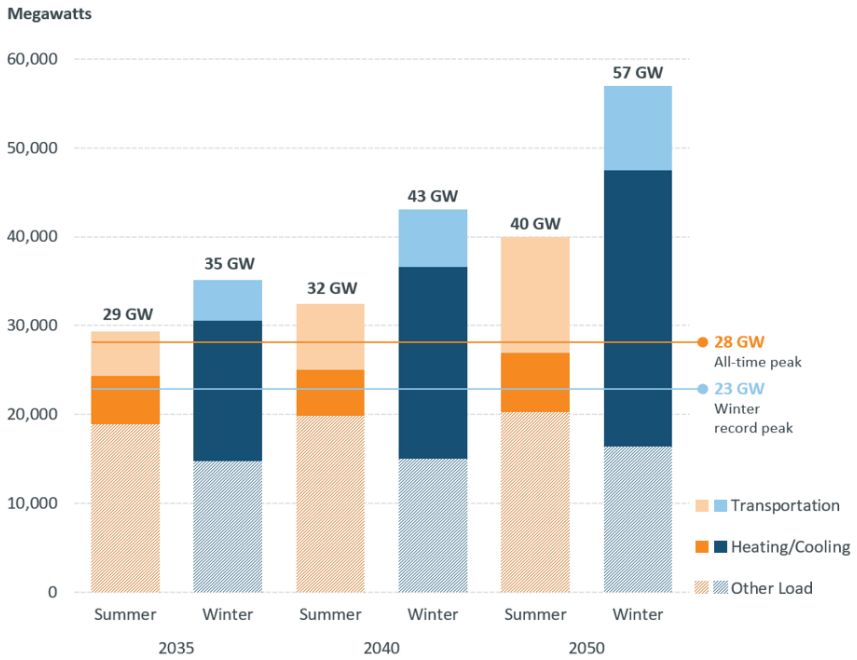


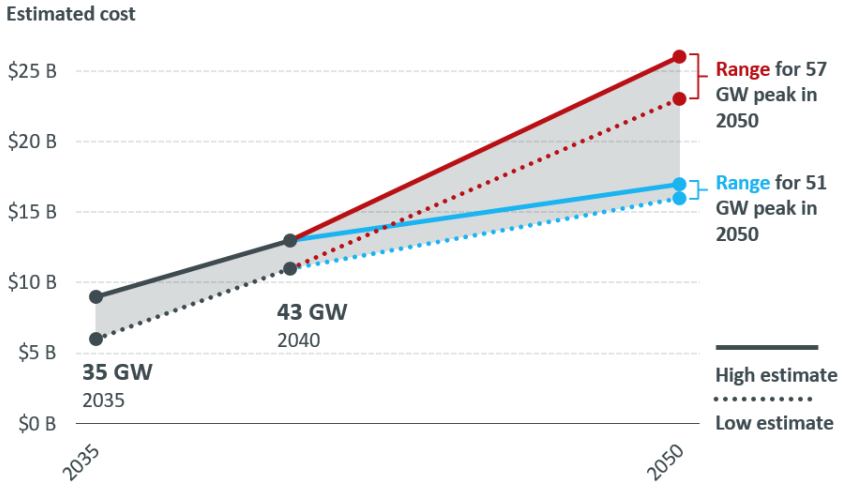
Figure source: 2050 Transmission Study, Figure 1-1
Data Source: Energy Pathways to Deep Decarbonization

Load Flexibility in Longer-Term Assumptions

- The “Energy Pathways to Deep Decarbonization” study assumed:
  - 50% of all light-duty EV charging could be delayed by up to eight hours
  - 15% of space heating/cooling could be shifted by up to one hour
  - 25% of water heating load could be shifted by up to two hours
- Without this load management, 57 GW winter peak demand would likely be even higher
- Any further load reduction through load flexibility/demand response would have to be in addition to these assumptions

Transmission Cost for Serving Winter Peak Load

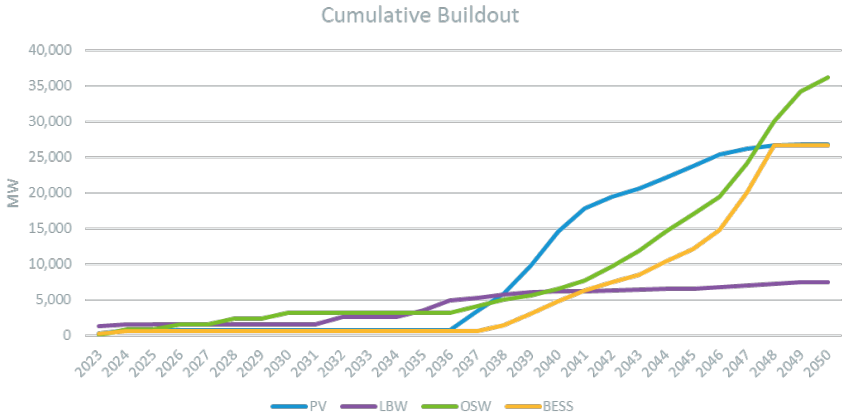
- The 2050 Transmission Study found that a 6 GW (~10%) reduction in winter peak could save $8 billion (~35-45%) in costs of addressing overloads
- The costs for addressing voltage/stability concerns and distribution system expansion were not included in the 2050 Transmission Study, and will also be driven by load growth



Source: 2050 Transmission Study, Figure 2-1

Shifting Load vs. Reducing Energy Consumption

- As load electrifies and grows, carbon constraints require increasing amounts of wind/solar/battery storage
  - In a pure wind/solar/battery scenario, 97 GW (nameplate) are added by 2050
- Challenge is not just in serving the peak load hour, but supplying energy over multi-day/week periods of peak load and/or low renewable generation
- Addressing this challenge requires reducing total energy consumption, seasonal storage, or clean dispatchable resources
  - Shifting load by a few hours may address transmission needs, but *not* energy sufficiency needs



Source: Economic Planning for the Clean Energy Transition

Questions