

2025 Draft Energy and Seasonal Peak Forecasts

Load Forecast Committee



Jon Black

MANAGER, ADVANCED FORECASTING & ANALYTICS



Draft 2025 Forecast

Agenda

- [Introduction](#)
- [Background & Review](#)
- [Forecast Results](#)
- [Annual Energy Forecast](#)
- [Summer Peak Demand Forecast](#)
- [Winter Peak Demand Forecast](#)
- [Next Steps](#)

Acronyms

ASOS	Automated Surface Observing System	EIA	Energy Information Administration
ARA	Annual reconfiguration auction	EV	Electric Vehicle
AEO	EIA's Annual Energy Outlook	GCM	Global Climate Model
BTMPV	Behind the meter photovoltaic	FCM	Forward Capacity Market
CDD	Cooling degree day	GWH	Gigawatt hour
CELT	Capacity, Energy, Load, and Transmission	HDD	Heating degree day
COP	Coefficient of performance	HP	Heat pump
DER	Distributed energy resource	ICR	Installed Capacity Requirement
DGFWG	Distributed Generation Forecast Working Group	IPSL	Institut Pierre-Simon Laplace (Climate Modelling Center)
ECMWF	European Center for Medium-Range Weather Forecasts	LFC	Load Forecast Committee
EE	Energy Efficiency	MAPE	Mean absolute percent error
EEFWG	Energy Efficiency Forecast Working Group	MW	Megawatt
EPRI	Electric Power Research Institute	SAE	Statistically-adjusted end-use
ERA5	ECMWF Reanalysis Version 5	SSP	Shared Socioeconomic Pathway

Introduction

- The ISO annually develops 10-year forecasts of energy and demand that are published as part of the [Capacity, Energy, Loads, and Transmission \(CELT\) report](#)
- The ISO has developed a new hourly forecast methodology that will be used for the CELT 2025 report and other annual load forecast publications
 - These forecasts are the focus of this presentation
- Final forecasts will be published in the 2025 CELT Report



CELT 2025 Load Forecast Timeline

Working Group and Committee Meetings

- Load Forecast Committee (LFC)
 - September 27, 2024 – [Introduction to the 2025 long-term load forecast, updates to forecast data sources, forecast modeling, initial results and next steps](#)
 - November 8, 2024 – [Enhancements to heating, transportation, and BTM PV forecasts for CELT 2025](#)
 - December 13, 2024 – [Electrification adoption forecast updates, trend variables in the base load forecast, base load modeling and preliminary results](#)
 - February 21, 2025 – Draft electric vehicle forecast, draft heat pump forecast, draft annual energy and peak demand forecast
 - **March 28, 2025 – Final draft annual energy and seasonal peak forecasts, gross load forecasts for ARAs**
- Distributed Generation Forecast Working Group (DGFWG)
 - December 9, 2024 – State DG policy updates from [MA](#), [CT](#), [RI](#), [VT](#), [NH](#), and [ME](#), [DER Forecast Improvements](#)
 - February 10, 2025 – [DGFWG DER PV interconnection data update](#), [Draft 2025 PV forecast](#)
 - March 25, 2025 – Final 2025 PV forecast
- Energy Efficiency Forecast Working Group Meetings (EEFWG)
 - September 30, 2024 – [EE forecast process changes for CELT 2025, introduction to statistically adjusted end-use \(SAE\) modeling](#)
 - December 9, 2024 – [Trend variables in the base load forecast](#)



BACKGROUND & REVIEW



Long-Term Forecast Components for CELT 2025

- Each of the 4 load components entail distinct modeling steps which have been updated or changed for CELT 2025
- The base load forecast reflects significant updates as discussed at the [December 13th LFC meeting](#)
- The HP, EV, and BTM PV forecasts have undergone improvements to enable:
 - Adoption forecasting and potential future accounting at the county level
 - Hourly modeling
 - Inclusion of climate-adjusted weather data

Base Load Forecast

- Statistically modeled based on historical load reconstituted for BTM PV
- Is combined with electrification forecasts to yield the gross and net load forecasts

DER (BTM PV) Forecast

- Adoption forecasting based on NREL's dGen™ tool
- Demand reductions derived using zonal, historical hourly capacity factors

Heat Pump (HP) Forecast

- Adoption forecast along possible heating pathways
- Demand derived from simulated weather-dependent building heating needs and HP coefficient of performance (COP) curves

Electric Vehicle (EV) Forecast

- Policy-based adoption forecast (5 vehicle types)
- Demand derived from weather-sensitive battery efficiency curves and daily charging profiles

Key Elements of the Hourly Methodology

Re-defining Gross Load

- $Load_{Gross} = Load_{Net} + BTM\ PV$
- Historical and forward looking impacts of EE are captured via SAE drivers included as inputs to the model

Improved Base Load Modeling

- A daily energy model that feeds 24 individual hourly models
- Combination of linear regression and neural networks
- Expanded set of weather and calendar explanatory variables

Temporal Granularity

- Modeling includes simulations of all hours for all load components, enabling the forecast to capture the dynamic interplay between components and their profiling

Expanded Weather Data

- Use of ERA5 reanalysis weather data from ECMWF
- Climate-adjusted weather data reflecting 70 weather years
- 23 weather locations, 8 weather concepts

Hierarchical Forecasting

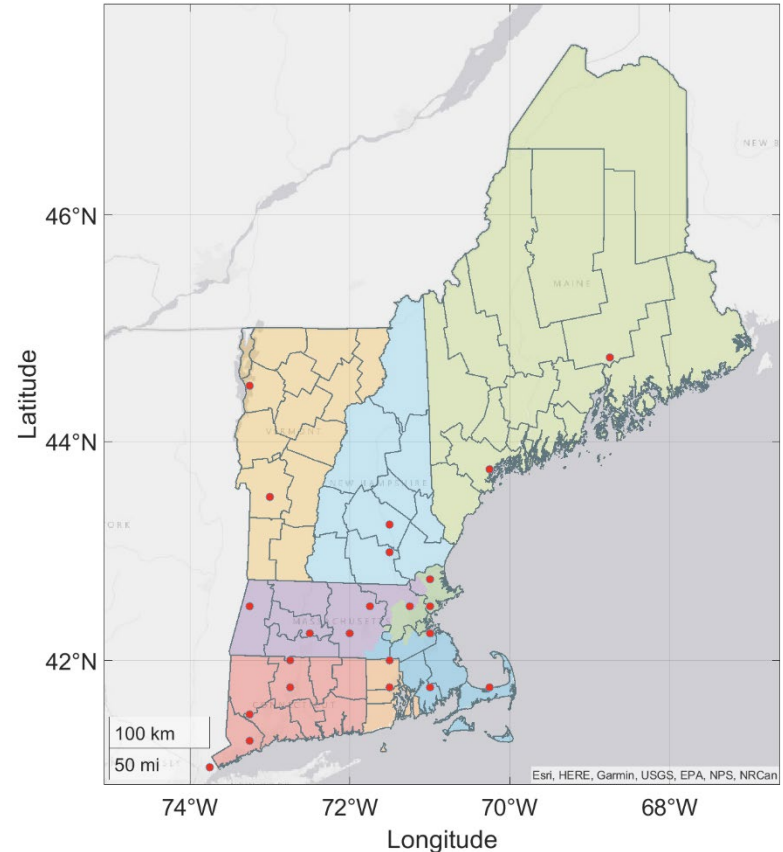
- Regional forecast is the sum of zonal forecasts to capture the spatial diversity of weather and load characteristics
- Zonal EV, HP, and BTMPV forecasts start at the county-level

Extended Forecast Horizon

- All load components are forecast out 20+ years, enabling the forecast to support longer-term planning studies

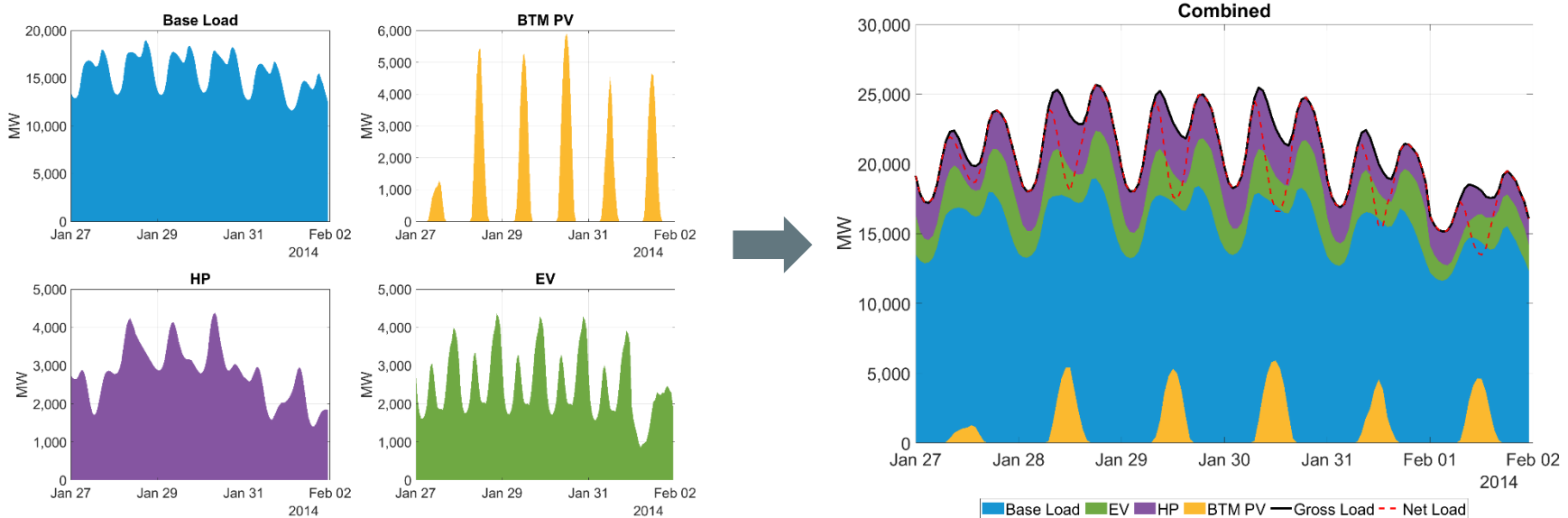
Advancements to Forecast Components

- Development of hourly forecasts
 - Each forecast component is simulated on an hourly basis for the entire forecast horizon
 - Each year's forecast is based on 70 years of climate-adjusted weather
- County-level forecast accounting implemented to EV, HP, and BTMPV forecasts
 - Map illustrates county boundaries overlaid with load zones
 - Red dots indicate weather stations
 - County forecasts utilize weather at station closest to county center
 - County-level forecasts are aggregated to load zones before combining with the base load forecast

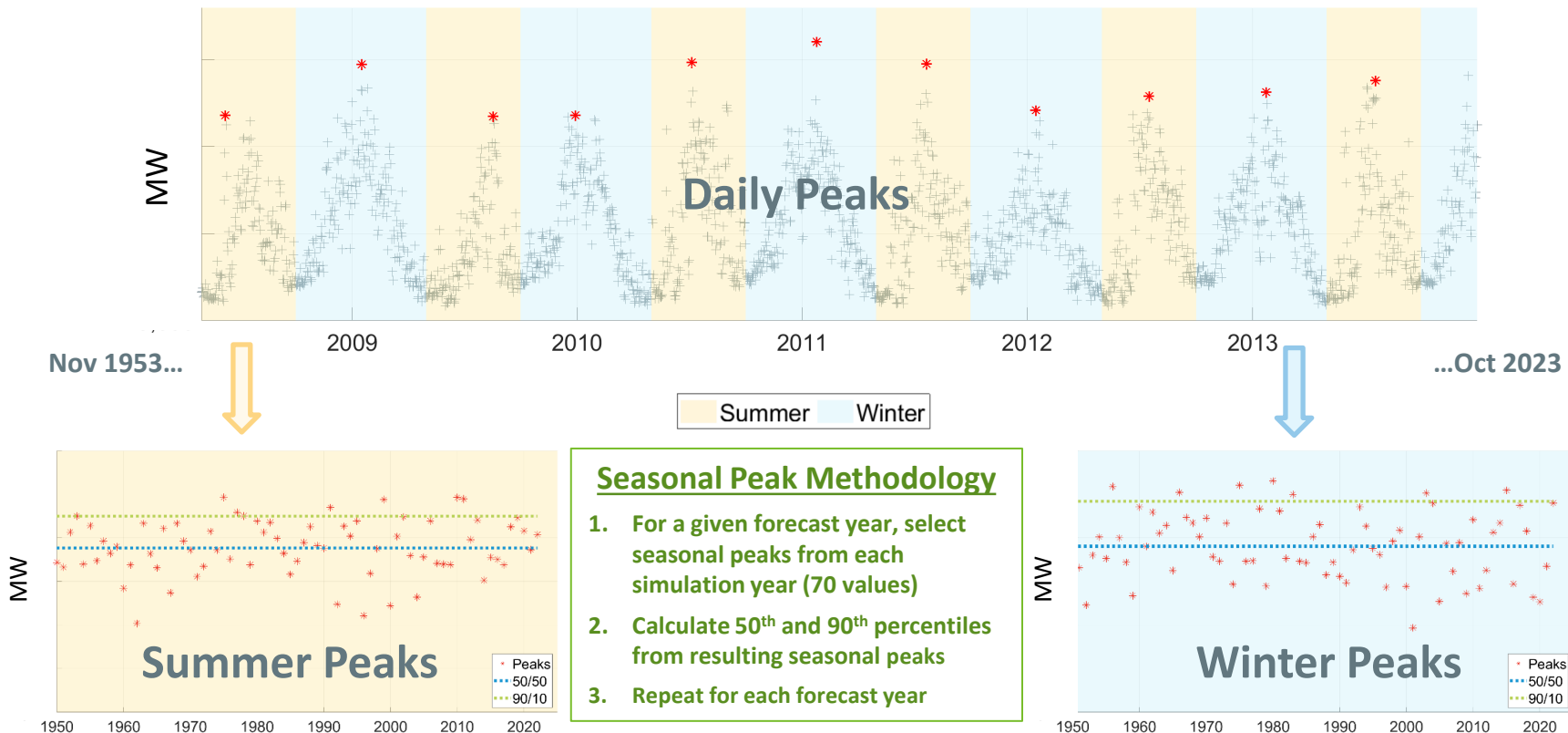


Load Forecast Compilation

- Each forecast component (base load, EV, HP, and BTM PV) reflects coincident weather over a 70-year simulation period and are combined into forecasts of net and gross load for each zone and the region



Calculation of Seasonal Peaks



DRAFT FORECAST RESULTS



Draft CELT 2025 Forecast

Annual Energy, Summer Peak, and Winter Peak

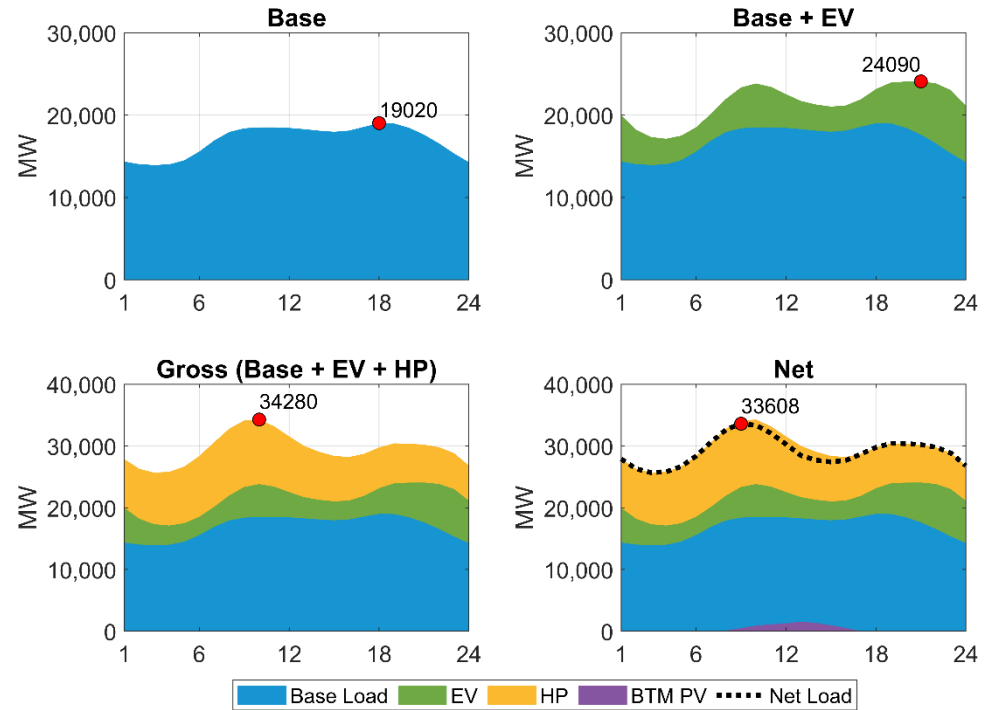
- The following slides summarize the draft CELT 2025 annual energy and seasonal, coincident peak demand forecasts resulting from the new hourly forecast methodology
 - The charts and figures presented are draft and subject to change
 - Given that hourly forecasts are net of EE and do not involve a separate EE forecast, the forecasts presented herein focus on net energy and demand forecasts
 - A gross load forecast based on preexisting methodology is under development and will be discussed at the March LFC
- The following inputs are not yet finalized and may affect the final forecast:
 - Resettled load values and other minor refinements used in finalizing base load modeling
 - Final 2025 heating and transportation electrification forecasts
 - Final 2025 BTM PV forecasts (impacts net forecast only)
- Net forecasts presented reflect the final 2024 BTM PV forecast, and will change when the 2025 BTM PV forecasts are finalized
 - The BTM PV forecast is still under development
 - As part of the hourly forecast, BTM PV forecast now impacts both summer and winter peak demand

Demand Impacts of Load Components

Waterfall Approach

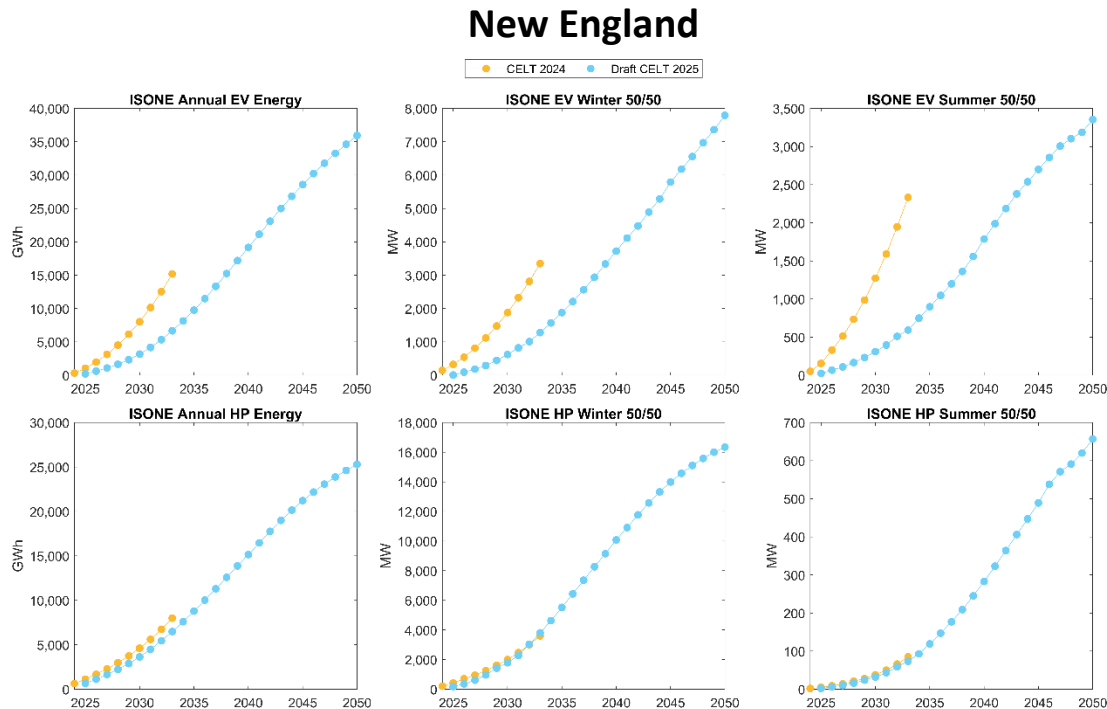
- The hourly forecast results in a dynamic interplay of modeled load components
 - Peak hour shifts due to the growth of one component affect the peak attribution of other components
 - Attribution of peak load values to components is path dependent
- A waterfall approach to the attribution of peak load contributions is used to standardize this forecast accounting
- Waterfall method steps (refer to plot):
 - Base = Base peak load value
19,020 MW
 - EV = (Base+EV) – Base
24,090 – 19,020 = 5,070 MW
 - HP = Gross – (Base+EV)
34,280 – 24,090 = 10,190 MW
 - BTMPV = Gross – Net
34,280 – 33,608 = 672 MW

Winter Peak Day, 2045



Draft 2025 Electrification Forecasts

- Draft 2025 electrification forecasts assume reduced EV and HP adoption relative to 2024 CELT assumptions
- The plot compares the electrification impacts on regional annual energy and 50/50 winter and summer peak demand
 - EV (top) and HP (bottom)
- Aside from changes to adoption assumptions, the hourly forecast reveals:
 - Greater HP impacts on winter peak demand due to morning peaks becoming prevalent by the early 2030s
 - Lower EV impacts on winter and summer demand (per EV adopted)



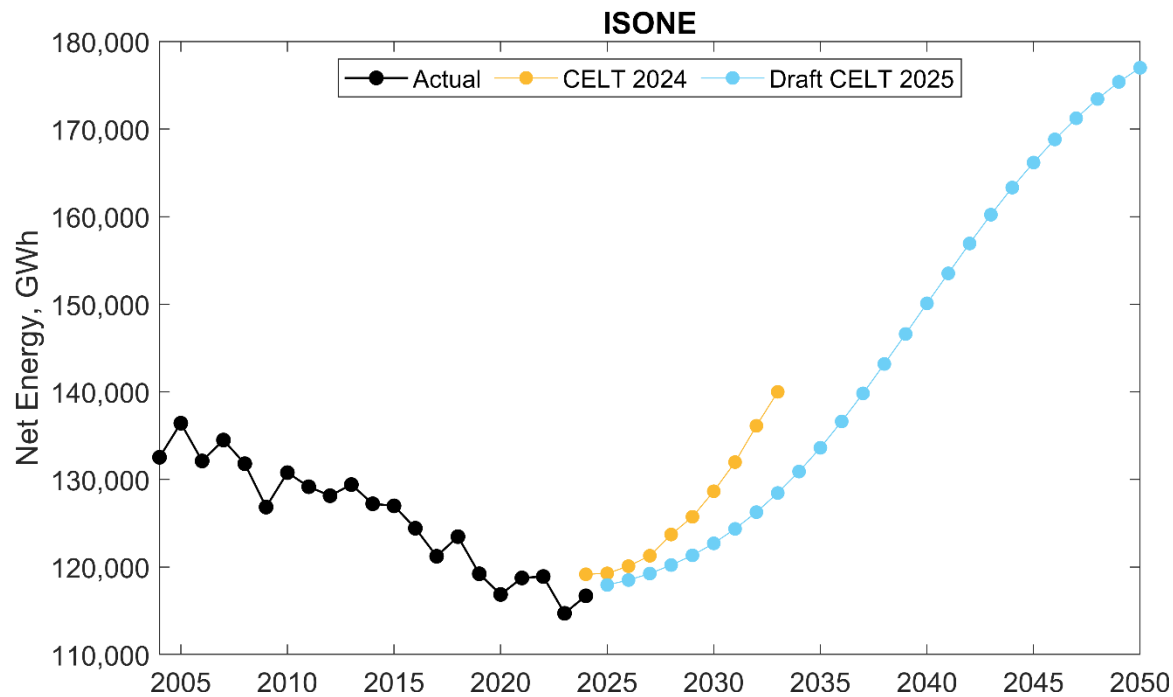
DRAFT 2025 ANNUAL ENERGY FORECAST



Annual Net Energy Forecast

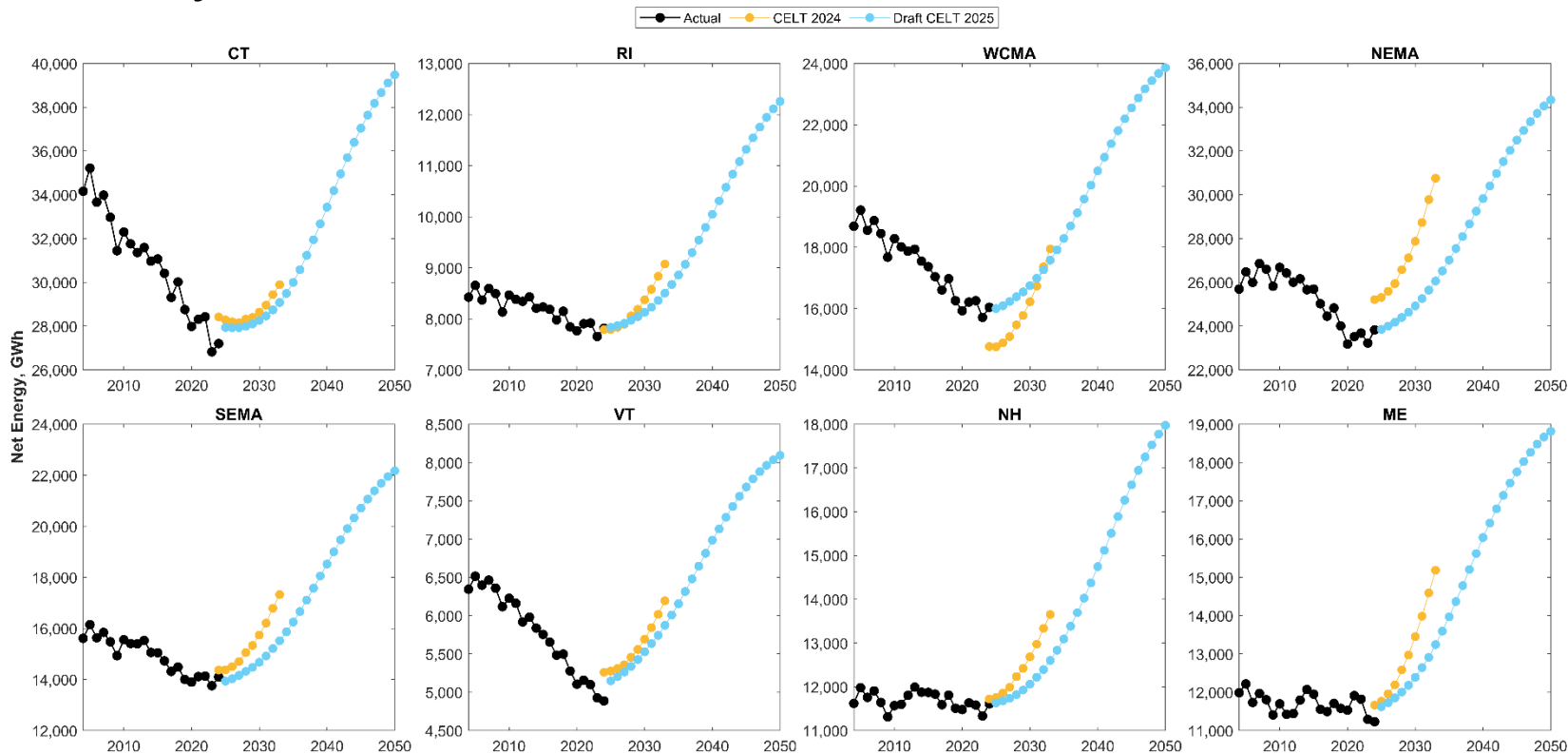
New England – Draft CELT 2025 Vs. CELT 2024

Year	Net CELT 2024 (GWh)	Draft Net CELT 2025 (GWh)	Change (GWh)	Change (%)
2025	119,285	117,964	-1,321	-1.1%
2026	120,106	118,520	-1,586	-1.3%
2027	121,298	119,264	-2,034	-1.7%
2028	123,720	120,232	-3,488	-2.8%
2029	125,741	121,338	-4,403	-3.5%
2030	128,655	122,710	-5,945	-4.6%
2031	131,983	124,367	-7,616	-5.8%
2032	136,126	126,272	-9,854	-7.2%
2033	140,001	128,460	-11,541	-8.2%
2034		130,905		



Annual Net Energy Forecast

Zones – Draft CELT 2025 Vs. CELT 2024



Draft 2025 Annual Energy Forecasts

New England - Summary

Year	Base (GWh)	Transportation Electrification* (GWh)	Heating Electrification* (GWh)	Gross (GWh)	BTM PV** (GWh)	Net** (GWh)
2025	122,833	209	654	123,697	-5,735	117,964
2026	123,013	619	1,121	124,756	-6,234	118,520
2027	123,207	1,084	1,647	125,940	-6,675	119,264
2028	123,509	1,644	2,234	127,385	-7,156	120,232
2029	123,797	2,335	2,891	129,021	-7,685	121,338
2030	124,115	3,170	3,634	130,920	-8,210	122,710
2031	124,454	4,171	4,487	133,113	-8,744	124,367
2032	124,780	5,338	5,453	135,570	-9,300	126,272
2033	125,167	6,664	6,487	138,322	-9,860	128,460
2034	125,559	8,142	7,604	141,305	-10,400	130,905

* Electrification forecasts are included in both gross and net peak forecasts.

** Net figures utilize the final 2024 PV forecast

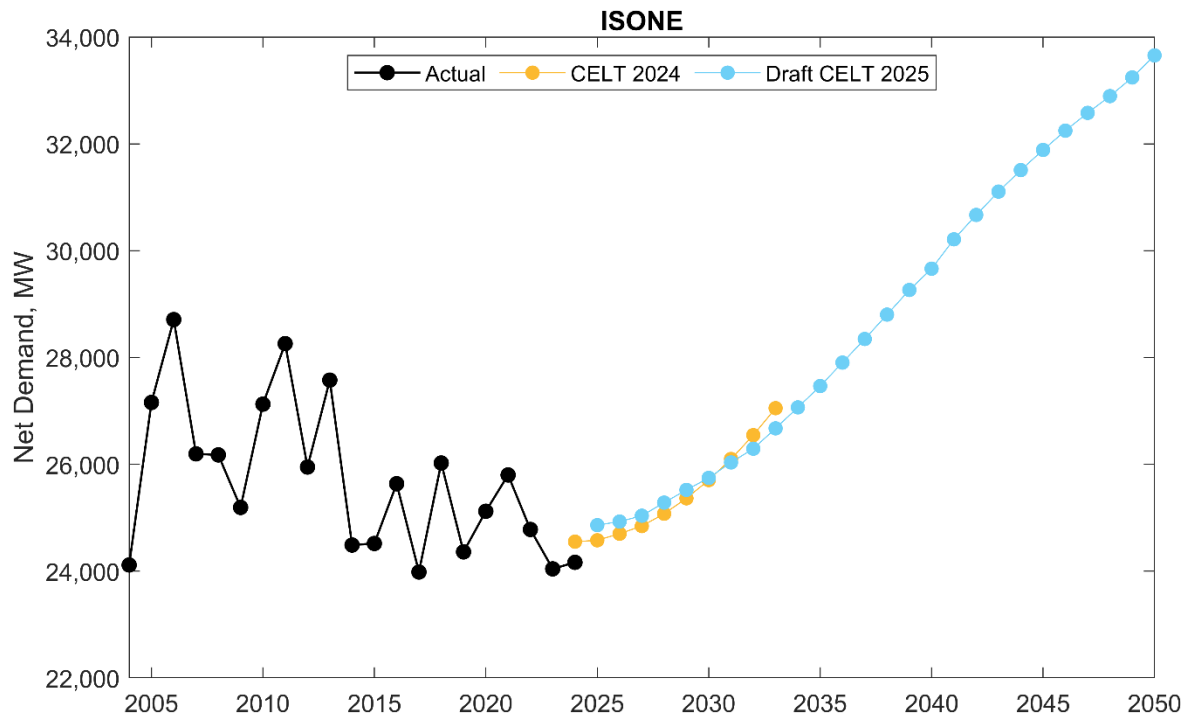
DRAFT 2025 SUMMER PEAK DEMAND FORECAST



Summer Net 50/50 Peak Forecast

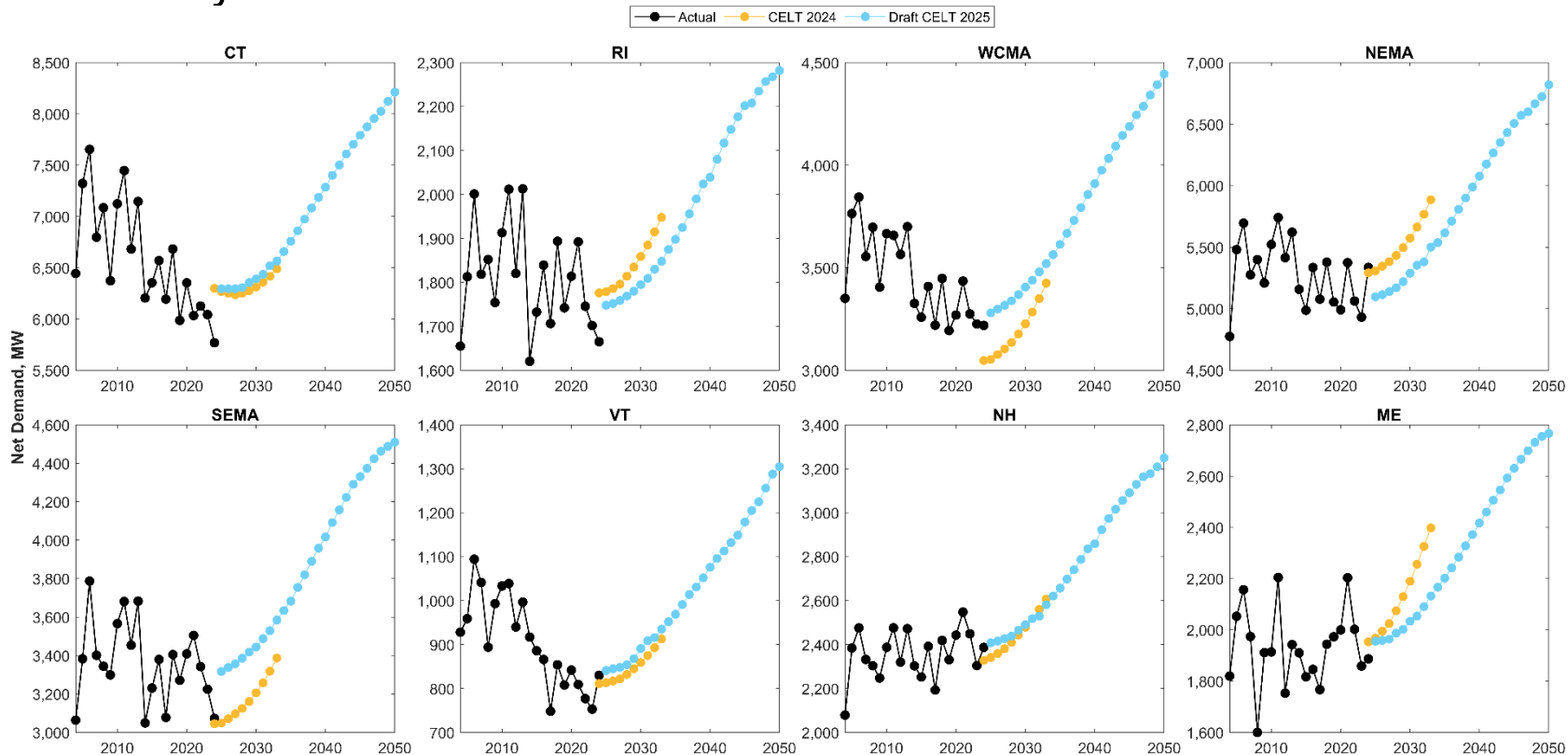
New England – Draft CELT 2025 Vs. CELT 2024

Year	Net CELT 2024 (MW)	Draft Net CELT 2025 (MW)	Change (MW)	Change (%)
2025	24,579	24,824	245	1.0%
2026	24,702	24,950	248	1.0%
2027	24,845	25,073	228	0.9%
2028	25,076	25,229	153	0.6%
2029	25,364	25,502	138	0.5%
2030	25,706	25,790	84	0.3%
2031	26,100	26,041	-59	-0.2%
2032	26,547	26,338	-209	-0.8%
2033	27,052	26,663	-389	-1.4%
2034		27,061		



Summer Net 50/50 Coincident Peak Forecast

Zones – Draft CELT 2025 Vs. CELT 2024



Draft 2025 Summer Peak Forecasts

New England 50/50 - Summary

Year	Base (MW)	Transportation Electrification* (MW)	Heating Electrification* (MW)	Gross (MW)	BTM PV** (MW)	Net** (MW)
2025	26,388	25	2	26,415	-1,591	24,824
2026	26,458	67	6	26,531	-1,581	24,950
2027	26,536	109	10	26,656	-1,583	25,073
2028	26,653	166	16	26,835	-1,606	25,229
2029	26,858	232	24	27,114	-1,612	25,502
2030	27,070	310	32	27,412	-1,622	25,790
2031	27,232	396	43	27,670	-1,629	26,041
2032	27,393	510	59	27,961	-1,623	26,338
2033	27,591	593	73	28,259	-1,596	26,663
2034	27,784	749	93	28,629	-1,568	27,061

* Electrification forecasts are included in both gross and net peak forecasts.

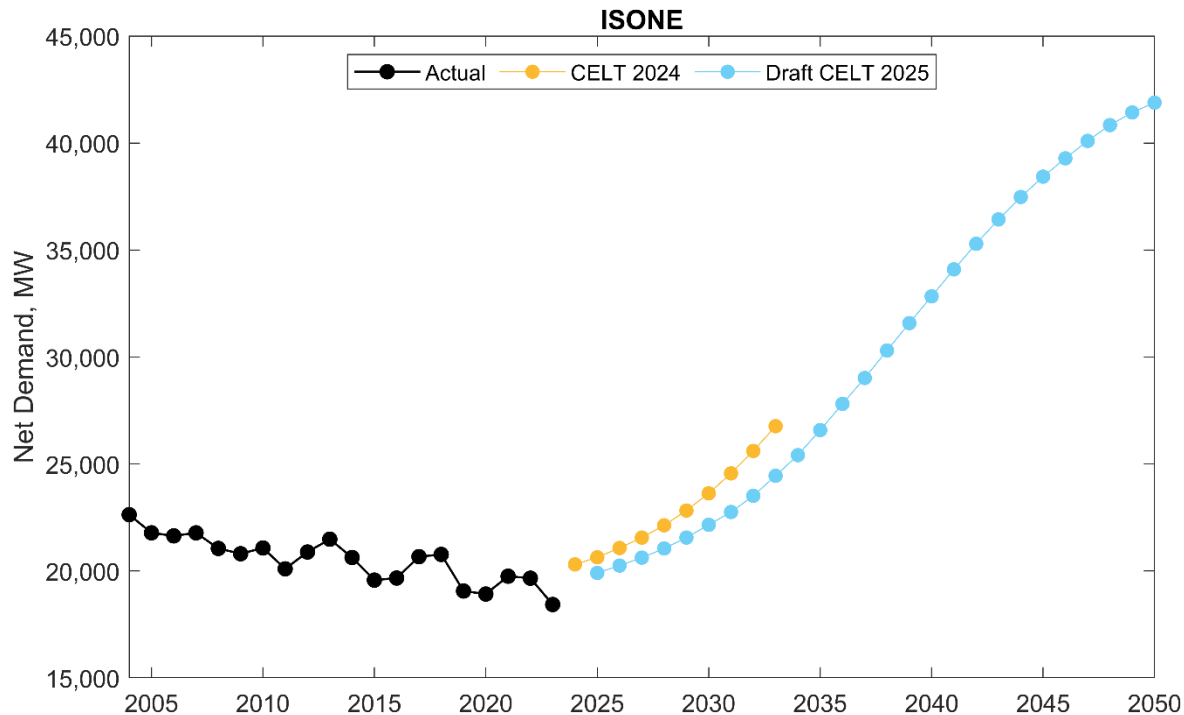
** Net figures utilize the final 2024 PV forecast

DRAFT 2025 WINTER PEAK DEMAND FORECAST

Winter Net 50/50 Peak Forecast

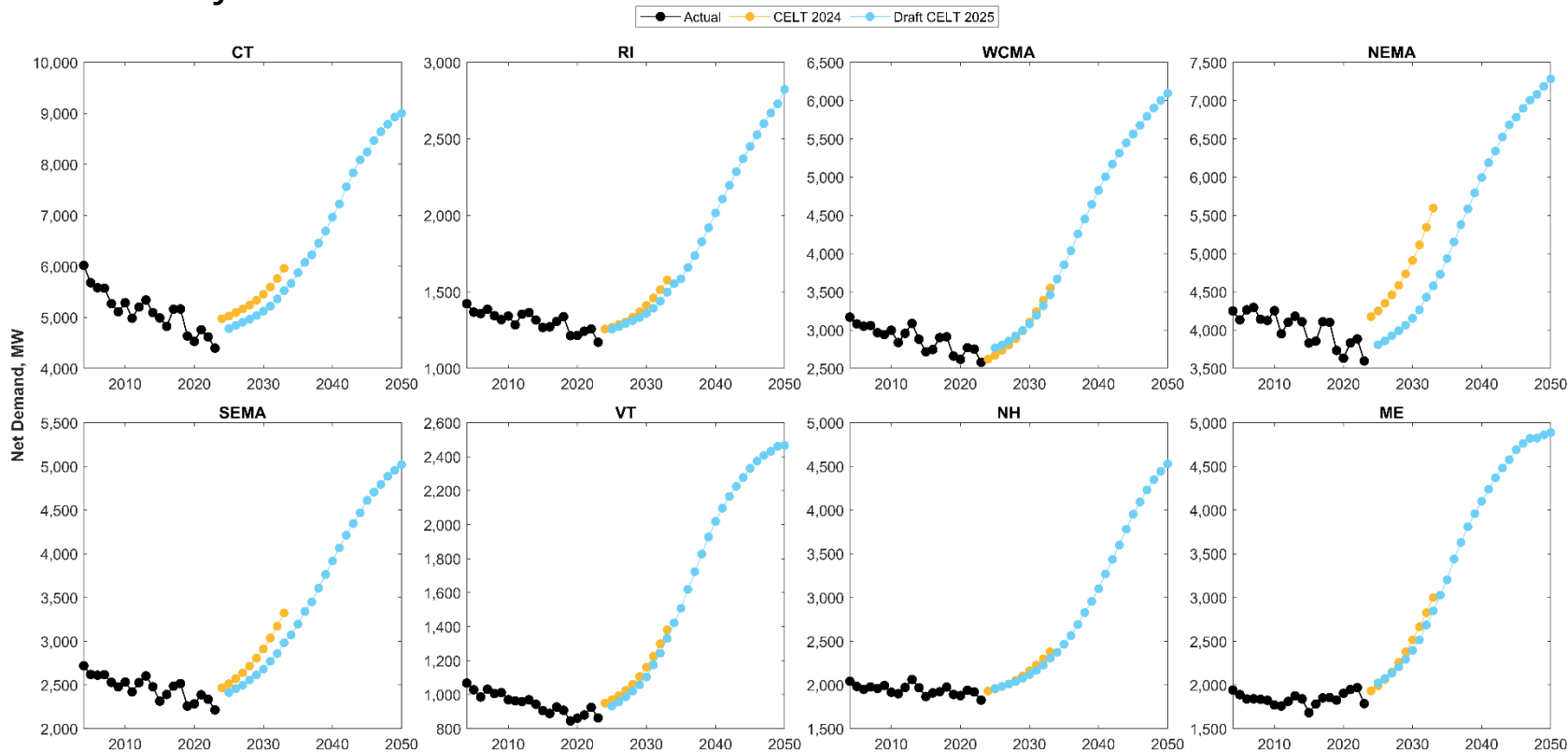
New England – Draft CELT 2025 Vs. CELT 2024

Year	Net CELT 2024 (MW)	Draft Net CELT 2025 (MW)	Change (MW)	Change (%)
2025	20,638	19,870	-768	-3.7%
2026	21,075	20,274	-801	-3.8%
2027	21,559	20,658	-901	-4.2%
2028	22,136	20,997	-1,139	-5.1%
2029	22,824	21,541	-1,283	-5.6%
2030	23,628	22,201	-1,427	-6.0%
2031	24,562	22,761	-1,801	-7.3%
2032	25,609	23,559	-2,050	-8.0%
2033	26,768	24,440	-2,328	-8.7%
2034		25,409		



Winter Net 50/50 Coincident Peak Forecast

Zones – Draft CELT 2025 Vs. CELT 2024



Draft 2025 Winter Peak Forecasts

New England 50/50 - Summary

Year	Base (MW)	Transportation Electrification* (MW)	Heating Electrification* (MW)	Gross (MW)	BTM PV** (MW)	Net** (MW)
2025	19,720	8	210	19,938	-11	19,927
2026	19,741	92	424	20,257	-17	20,240
2027	19,761	183	679	20,623	-30	20,593
2028	19,779	291	1,014	21,084	-33	21,051
2029	19,794	444	1,409	21,647	-57	21,590
2030	19,814	625	1,763	22,202	-113	22,089
2031	19,837	822	2,218	22,877	-177	22,700
2032	19,841	1,008	2,946	23,795	-262	23,533
2033	19,879	1,281	3,644	24,804	-375	24,429
2034	19,901	1,568	4,458	25,927	-474	25,453

* Electrification forecasts are included in both gross and net peak forecasts.

** Net figures utilize the final 2024 BTM PV forecast.

Next Steps

- Next LFC meeting will be on March 28, 2025
 - Final draft energy and seasonal peak forecasts (gross and net)
 - Inclusive of finalized 2025 EV, HP, and BTM PV forecasts
 - Gross load forecast used in ICR calculations for ARAs, based on preexisting methodology that has not changed
- May 1, 2025–Publish final forecasts as a part of the 2025 CELT

Questions

