2021 Final Draft Energy and Seasonal Peak Forecasts

Planning Advisory Committee

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LOAD FORECASTING, SYSTEM PLANNING

Today's Presentation

- Provide the PAC with further updates on the long-term energy and demand forecasts that will be published in the 2021 Capacity, Energy, Loads, and Transmission (CELT) report
  - The ISO provided an initial update at the March 17, 2021 PAC meeting

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 gave an overview of its methodology for developing the 10-year load forecast at the September 25, 2020 Load Forecast Committee (LFC) meeting

CELT 2021 Forecast Timeline

Working Group and Committee Meetings

- Load Forecast Committee Meetings (LFC)
  - September 25, 2020 – Long-term load forecast methodology, electrification forecast update, 2020 summer peak review and COVID-19 impacts
  - November 13, 2020 – heating electrification update, transportation electrification update
  - December 11, 2020 - Updated Moody's economic outlook, draft 2021 energy forecast, draft 2021 heating electrification forecast, draft 2021 transportation electrification forecast
  - February 19,2021 – Final 2021 heating electrification forecast, final 2021 transportation electrification forecast, draft 2021 peak demand forecast
  - March 26, 2021 – Final draft energy and peak demand forecasts and final economic forecast

- Distributed Generation Forecast Working Group (DGFWG)
  - December 7, 2020 – State DG policy updates from MA, CT, RI, VT, NH, and ME, December 2020 Distributed Generation Survey Results
  - February 22, 2021 – Draft 2021 PV forecast
  - March 22, 2021 – Final draft PV forecast

- Energy Efficiency Forecast Working Group Meetings (EEFWG)
  - September 11, 2020 – Upcoming changes for the 2021 forecast, EE data collection
  - October 23, 2020 – EE forecast model methodology, impact of revised PDR reconstitution methodology on the EE forecast
  - December 7, 2020 – EE program data review, EE measures data review, accounting for embedded expiring measures in the EE forecast
  - February 12, 2021 – Draft 2021 EE forecast
  - March 19, 2021 – Final draft 2021 EE forecast

Overview of Gross and Net Load Forecasts

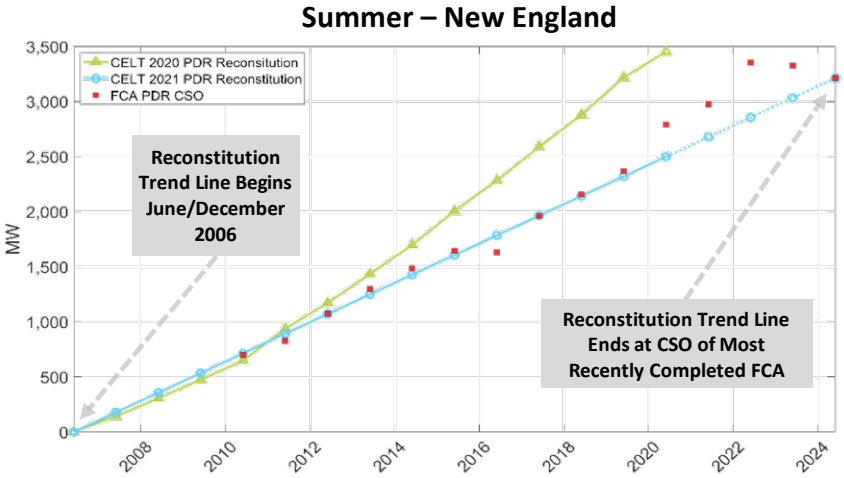
- The *gross load forecast* reflects a forecast of load:
  - Before reductions from Demand Capacity Resources
    - Includes energy efficiency (EE), passive distributed generation (DG) resources, and price-responsive demand (PRD)
  - Before reductions from BTM PV
  - After load additions associated with forecasts of transportation and heating electrification
- The *net load forecast* reflects the gross load forecast minus forecasts of EE and BTM PV
  - The annual BTM PV forecast is developed through the Distributed Generation Forecast Working Group (DGFWG)
  - The annual EE forecast is developed though the Energy Efficiency Forecast Working Group (EEFWG)

New Features in the 2021 Long Term Forecasts

- There were two changes in this year's load forecast process:
  1. In a letter order on October 30, 2020, the Federal Energy Regulatory Commission (FERC) accepted Tariff changes that the ISO filed joined by NEPOOL to modify the reconstitution methodology for passive demand resources (PDR)
     - As expected, the new methodology has resulted in a lower gross load forecast
       - See slide 7
  2. Consideration of the evolving impacts of the pandemic as reported in Moody's Analytics Economic Outlook
     - The ISO utilized multiple versions (November 2020 and February 2021) of the economic outlook to ensure that the latest data related to the pandemic was used
       - See slide 8

PDR Reconstitution Changes in 2021 CELT

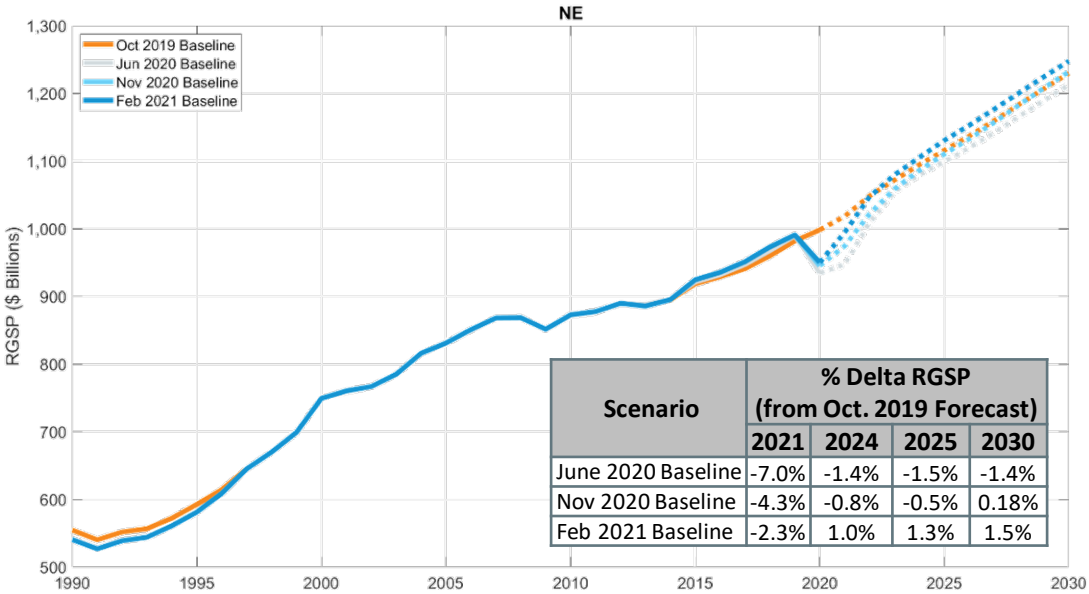
- A primary objective of the gross load forecast is to ensure that PDRs, the majority of which are energy efficiency (EE) measures, are not double-counted in the development of ICR and Related Values for the FCA
  - PDRs receive compensation as a supply-side resource
  - PDRs also reduce demand, and their demand-reducing impact becomes embedded in historical load data
- To ensure that PDRs are not double-counted, ISO must add (i.e., "reconstitute") PDR demand reductions into historical loads, which are used to forecast future loads
  - The amount reconstituted should approximate the amount of PDRs participating as supply in the FCA
- The new reconstitution methodology, which is included in the Tariff, results in improved accounting for the amount of PDR that participates in the FCA, and not EE installations in excess of their CSO and EE measures that have expired and are no longer participating as supply in FCM
  - Results in a lower gross load forecast since EE measures installed in excess of their CSO or that have expired as of the CCP of the most recently completed FCA are no longer reconstituted
- A comparison of the new and old summer PDR reconstitution values for the region are depicted in the figure



Moody's Analytics Economic Outlook

February 2021

- More optimistic than prior economic forecasts in June 2020 and November 2020
  - A comparison of real gross state product (RGSP) is illustrated in the adjacent figure
- Key assumptions:
  - New COVID-19 infections peaked in January 2021
  - Herd immunity is expected to be achieved by September 2021
  - A relaxing of state and local government restrictions
  - Incorporates the impacts of an early 2021 pandemic relief package
  - President Biden's "Build Back Better" agenda totaling less than $1 trillion will be passed in the second half of 2021



Scenario	% Delta RGSP (from Oct. 2019 Forecast)			
	2021	2024	2025	2030
June 2020 Baseline	-7.0%	-1.4%	-1.5%	-1.4%
Nov 2020 Baseline	-4.3%	-0.8%	-0.5%	0.18%
Feb 2021 Baseline	-2.3%	1.0%	1.3%	1.5%

FINAL DRAFT ANNUAL ENERGY FORECAST

Final Draft Gross 2021 Annual Energy Forecast

Overview

- Other than implementing the new methodology for PDR reconstitution, the ISO made no changes to the energy forecast methodology since CELT 2020
- The final draft 2021 gross annual energy forecast for the region is lower than CELT 2020 forecast by 4.5% in 2021 and 3.1% in 2029
- Gross annual energy for the region is forecast to increase at a compound annual growth rate (CAGR) of 1.6% from 2021 through 2030, up from 1.4% for CELT 2020

Final Draft Gross Annual Energy Forecast Comparison

New England – Final Draft CELT 2021 Vs. CELT 2020

Year	Final Draft Gross CELT 2021 (GWh)	Gross CELT 2020 (GWh)	Change (GWh)	% Change
2021	140,836	147,409	-6,574	-4.5%
2022	144,436	150,120	-5,684	-3.8%
2023	146,772	152,311	-5,539	-3.6%
2024	149,157	154,836	-5,679	-3.7%
2025	150,943	156,581	-5,638	-3.6%
2026	153,037	158,697	-5,660	-3.6%
2027	155,356	160,957	-5,601	-3.5%
2028	158,178	163,659	-5,481	-3.3%
2029	160,430	165,603	-5,173	-3.1%
2030	163,116			

Final Draft Net Annual Energy Forecast Comparison

New England – Final Draft CELT 2021 Vs. CELT 2020

Year	Final Draft Net CELT 2021* (GWh)	Net CELT 2020 (GWh)	Change (GWh)	% Change
2021	121,692	123,268	-1,576	-1.3%
2022	123,847	123,688	158	0.1%
2023	124,567	123,864	703	0.6%
2024	125,393	124,539	854	0.7%
2025	125,747	124,678	1,069	0.9%
2026	126,557	125,350	1,207	1.0%
2027	127,948	126,303	1,645	1.3%
2028	130,020	127,834	2,186	1.7%
2029	131,702	128,781	2,921	2.3%
2030	133,960			

** Net figures utilize the final draft 2021 EE forecast and the final draft 2021 PV forecast*

FINAL DRAFT SUMMER PEAK FORECAST

Final Draft 2021 Gross Summer Peak Forecast

Overview

- Other than implementing the new methodology for PDR reconstitution, the ISO made no changes to the summer demand forecast methodology since CELT 2020
- The final draft 2021 gross 50/50 summer peak demand forecast for the region is lower than CELT 2020 by 3.9% in 2021 and 5.4% in 2029
- Gross summer peak demand for the region is forecast to increase at a compound annual growth rate (CAGR) of 0.7% from 2021 through 2030, down slightly from 0.9% for CELT 2020

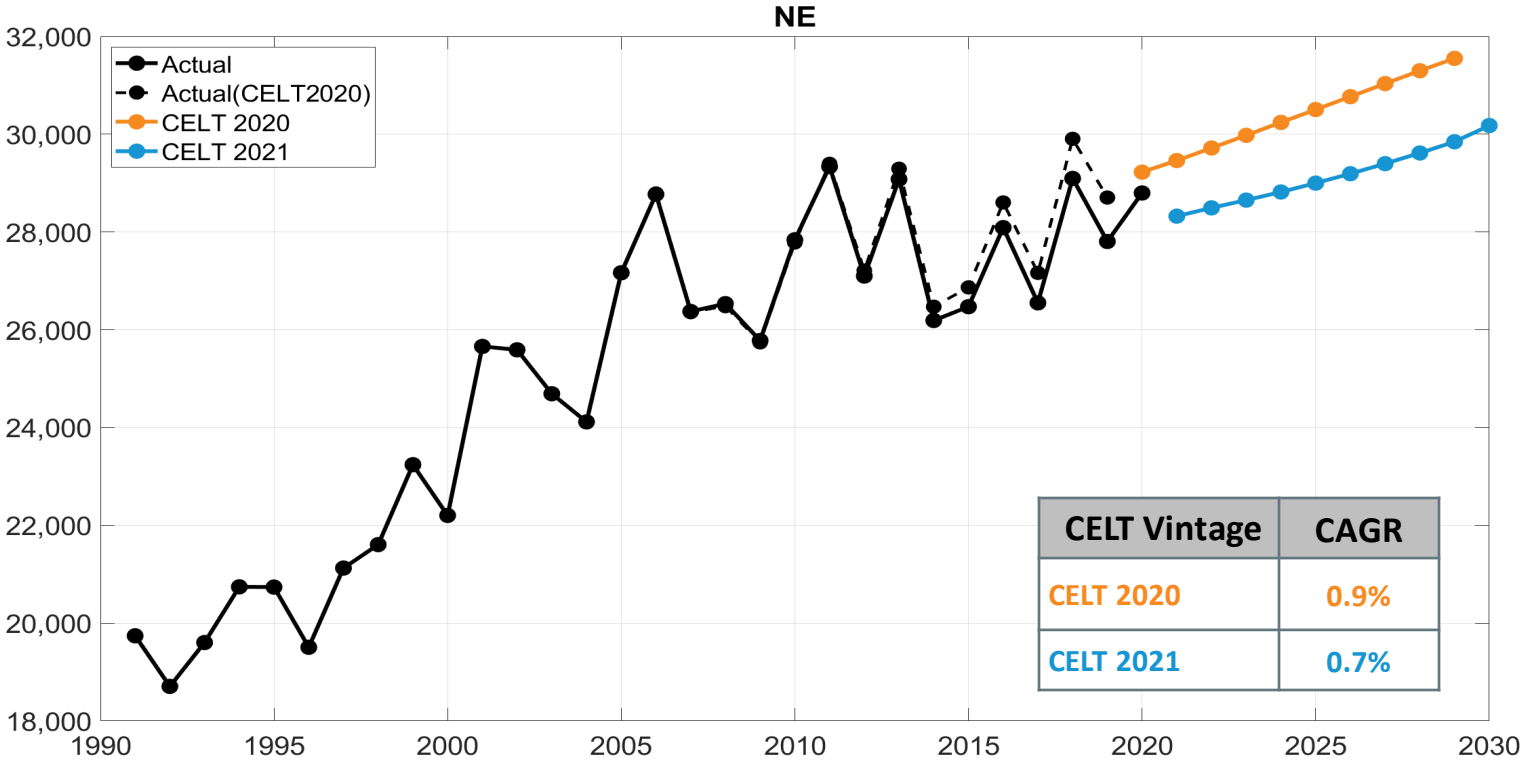
Final Draft Gross 50/50 Summer Peak Forecast Comparison

New England – Final Draft CELT 2021 Vs. CELT 2020

Year	Final Draft Gross CELT 2021 (MW)	Gross CELT 2020 (MW)	Change (MW)	% Change
2021	28,324	29,461	-1,137	-3.9%
2022	28,493	29,717	-1,224	-4.1%
2023	28,651	29,977	-1,326	-4.4%
2024	28,818	30,241	-1,423	-4.7%
2025	29,000	30,504	-1,504	-4.9%
2026	29,192	30,768	-1,576	-5.1%
2027	29,397	31,034	-1,637	-5.3%
2028	29,615	31,297	-1,682	-5.4%
2029	29,845	31,550	-1,705	-5.4%
2030	30,177			

Final Draft Gross 50/50 Summer Peak Forecast

New England



CELT Vintage	CAGR
CELT 2020	0.9%
CELT 2021	0.7%

Final Draft Net 50/50 Summer Peak Forecast Comparison

New England - Final Draft CELT 2021 Vs. CELT 2020

Year	Final Draft Net CELT 2021* (MW)	Net CELT 2020 (MW)	Change (MW)	% Change
2021	24,810	24,981	-171	-0.7%
2022	24,789	24,861	-72	-0.3%
2023	24,713	24,783	-70	-0.3%
2024	24,672	24,703	-31	-0.1%
2025	24,552	24,657	-105	-0.4%
2026	24,479	24,640	-161	-0.7%
2027	24,458	24,656	-198	-0.8%
2028	24,491	24,694	-203	-0.8%
2029	24,574	24,755	-181	-0.7%
2030	24,796			

** Net figures utilize the final 2021 EE forecast and the final 2021 PV forecast*

Final Draft 2021 Gross and Net Summer Peak Forecasts

New England - Summary

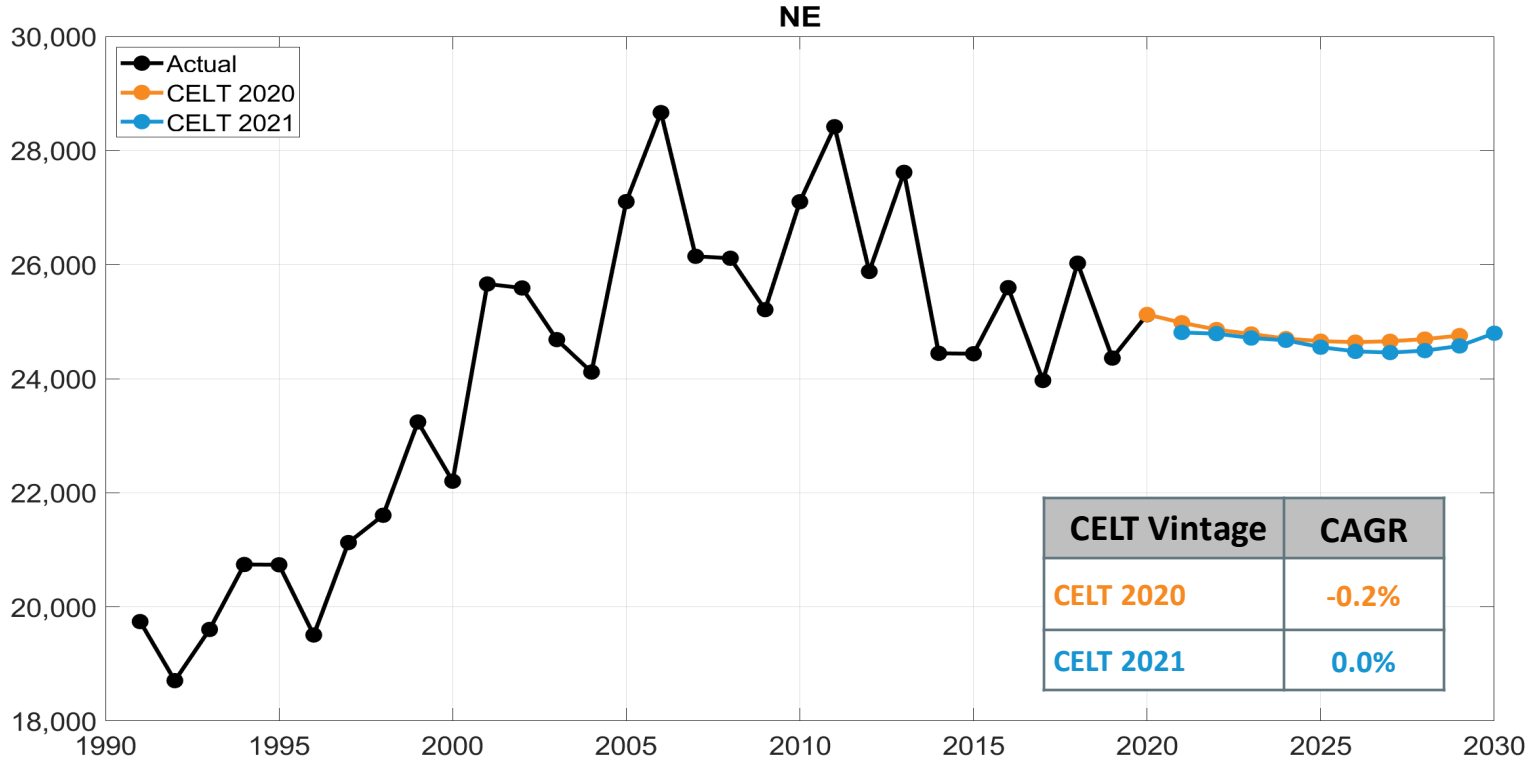
Year	Transportation Electrification* (MW)	Heating Electrification* 50/50 (MW)	Heating Electrification* 90/10 (MW)	Gross 50/50 (MW)	Gross 90/10 (MW)	EE** (MW)	BTM PV** (MW)	Net** 50/50 (MW)	Net** 90/10 (MW)
2021	7	0	0	28,324	30,225	2,677	836	24,810	26,711
2022	25	0	0	28,493	30,413	2,856	849	24,789	26,709
2023	47	0	0	28,651	30,588	3,034	905	24,713	26,650
2024	84	0	0	28,818	30,770	3,213	933	24,672	26,625
2025	136	0	0	29,000	30,964	3,473	975	24,552	26,516
2026	202	0	0	29,192	31,167	3,703	1,011	24,479	26,453
2027	279	0	0	29,397	31,383	3,900	1,039	24,458	26,444
2028	368	0	0	29,615	31,612	4,064	1,060	24,491	26,489
2029	470	0	0	29,845	31,853	4,195	1,076	24,574	26,582
2030	675	0	0	30,177	32,197	4,294	1,087	24,796	26,816

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

*** Net figures utilize the final 2021 EE forecast and the final 2021 PV forecast*

Final Draft Net 50/50 Summer Peak Forecast

New England



FINAL DRAFT WINTER PEAK FORECAST

Final Draft 2021 Gross Winter Peak Forecast

Overview

- Other than implementing the new methodology for PDR reconstitution, the ISO made no changes to the winter demand forecast methodology since CELT 2020
- The final draft 2021 gross 50/50 winter peak demand forecast for the region is lower than CELT 2020 by 6.0% in 2021 and 4.5% in 2029
- Gross winter peak demand for the region is forecast to increase at a compound annual growth rate (CAGR) of 1.3% from 2021 through 2030, up from 1.1% for CELT 2020

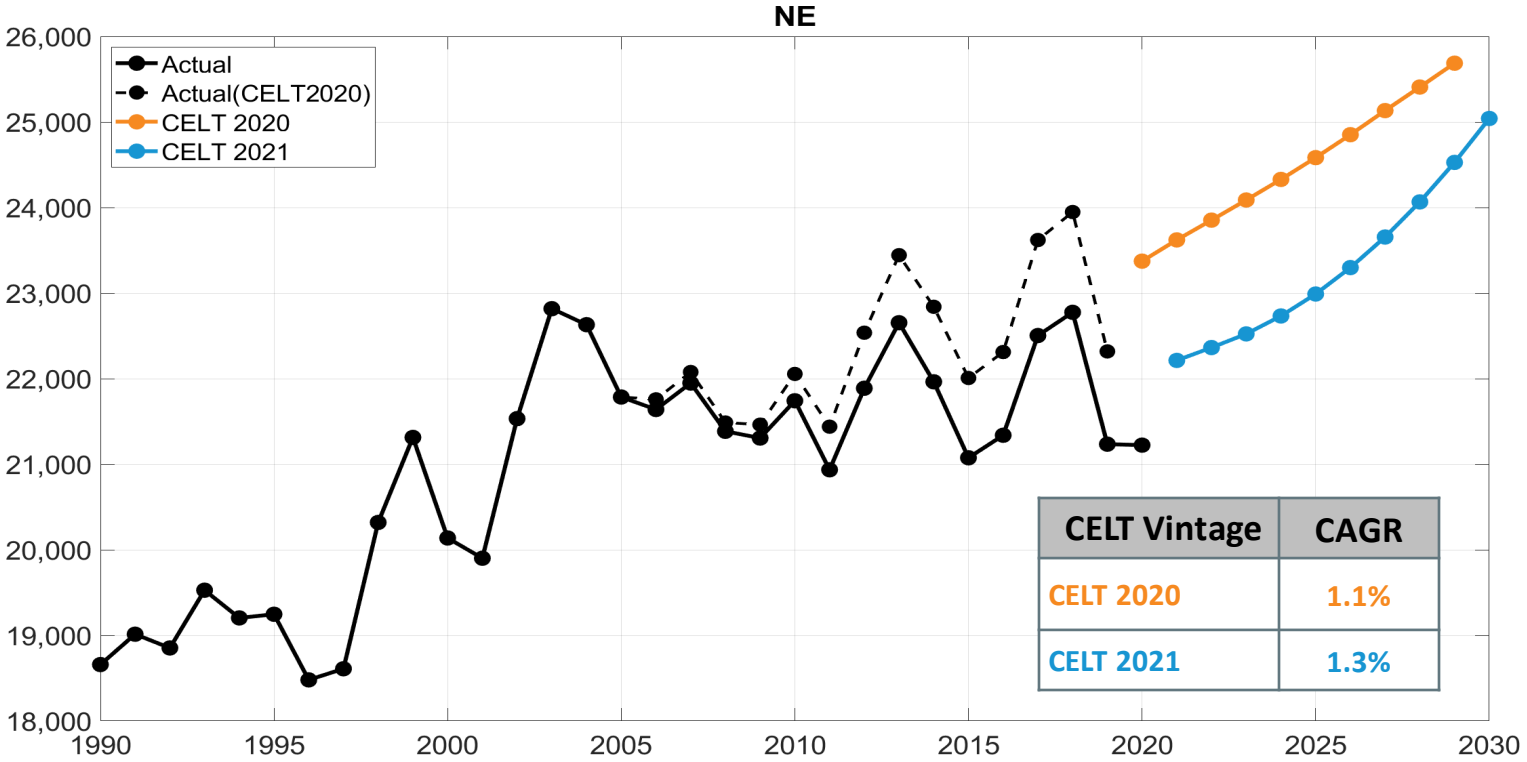
Final Draft Gross 50/50 Winter Peak Forecast Comparison

New England – Final Draft CELT 2021 Vs. CELT 2020

Year (Winter Of)	Final Draft Gross CELT 2021* (MW)	Gross CELT 2020 (MW)	Change (MW)	% Change
2021/2022	22,214	23,622	-1,408	-6.0%
2022/2023	22,363	23,853	-1,489	-6.2%
2023/2024	22,523	24,088	-1,565	-6.5%
2024/2025	22,733	24,329	-1,596	-6.6%
2025/2026	22,989	24,583	-1,594	-6.5%
2026/2027	23,298	24,851	-1,553	-6.2%
2027/2028	23,655	25,133	-1,477	-5.9%
2028/2029	24,066	25,408	-1,342	-5.3%
2029/2030	24,527	25,687	-1,159	-4.5%
2030/2031	25,041			

Final Draft Gross 50/50 Winter Peak Forecast

New England



CELT Vintage	CAGR
CELT 2020	1.1%
CELT 2021	1.3%

Draft Net 50/50 Winter Peak Forecast Comparison

New England – Final Draft CELT 2021 Vs. CELT 2020

Year (Winter Of)	Final Draft Net CELT 2021* (MW)	Net CELT 2020 (MW)	Change (MW)	% Change
2021/2022	19,710	20,075	-365	-1.8%
2022/2023	19,693	19,993	-300	-1.5%
2023/2024	19,686	19,942	-256	-1.3%
2024/2025	19,729	19,922	-193	-1.0%
2025/2026	19,774	19,943	-169	-0.8%
2026/2027	19,895	20,000	-105	-0.5%
2027/2028	20,093	20,093	0	0.0%
2028/2029	20,370	20,200	170	0.8%
2029/2030	20,726	20,334	392	1.9%
2030/2031	21,158			

** Net figures utilize the final 2021 EE forecast. The PV forecast does not impact the winter peak forecast.*

Final Draft 2021 Gross and Net Winter Peak Forecasts

New England - Summary

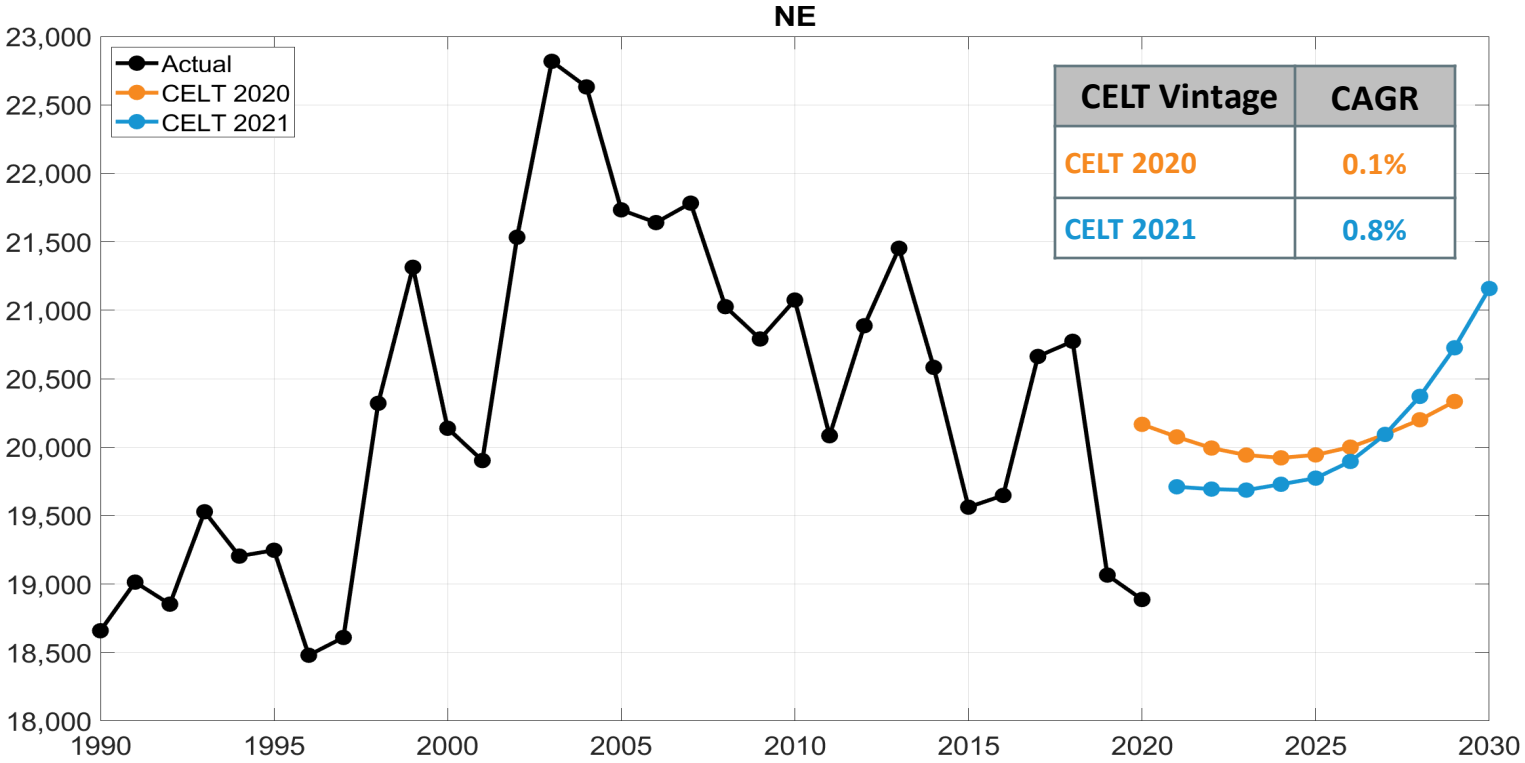
Year (Winter Of)	Transportation Electrification* (MW)	Heating Electrification* 50/50 (MW)	Heating Electrification* 90/10 (MW)	Gross 50/50 (MW)	Gross 90/10 (MW)	EE** (MW)	BTM PV** (MW)	Net** 50/50 (MW)	Net** 90/10 (MW)
2021/2022	22	52	57	22,214	22,853	2,503	0	19,710	20,349
2022/2023	49	114	123	22,363	23,006	2,670	0	19,693	20,336
2023/2024	87	187	200	22,523	23,171	2,837	0	19,686	20,335
2024/2025	152	280	307	22,733	23,393	3,004	0	19,729	20,389
2025/2026	237	405	444	22,989	23,662	3,216	0	19,774	20,446
2026/2027	338	562	617	23,298	23,986	3,403	0	19,895	20,584
2027/2028	456	751	824	23,655	24,364	3,562	0	20,093	20,802
2028/2029	592	995	1,071	24,066	24,798	3,695	0	20,370	21,102
2029/2030	745	1,259	1,355	24,527	25,283	3,802	0	20,726	21,481
2030/2031	916	1,556	1,702	25,041	25,821	3,883	0	21,158	21,939

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

*** Net figures utilize the final 2021 EE forecast. The PV forecast does not impact the winter peak forecast.*

Final Draft Net 50/50 Winter Peak Forecast

New England



CELT Vintage	CAGR
CELT 2020	0.1%
CELT 2021	0.8%

Next Steps

- All CELT 2021 forecast values presented herein are final draft
  - Final values will be published as part of CELT 2021 by May 1st
- The ISO will also publish the “2021 Forecast Data” workbook at: https://www.iso-ne.com/system-planning/system-forecasting/load-forecast/
  - A guide to the various forecast data, including sub-regional forecast values, is available in the Appendix

APPENDIX

Forecast Data Workbook Description

Forecast Data Workbook (1 of 3)

Description of Contents

Worksheet	Description of Contents
1	ISONE Control Area & New England States Net Energy for Load (NEL) and Seasonal Peak Load History
2A	Summer Peak Load Forecast: ISONE Control Area, States, Regional System Plan (RSP) Sub-areas, and SMD Load Zone Forecasts • Expected weather case (50th percentile), extreme weather case (90th percentile) and compound annual growth rates
2B	Winter Peak Load Forecast (Same details as 2A)
2C	Annual Energy Forecast: ISONE Control Area, States, RSP Sub-areas, and SMD Load Zones Forecasts
3	Confidence Intervals: Energy and Seasonal Peak Load Forecast and 90% confidence Intervals for ISONE Control Area, States, and RSP Sub-areas
4	ISONE Control Area and New England States Monthly Peak Load Forecast
5	Weather Normalized History & Forecast (ISONE Control Area only) **[Will be delayed for CELT 2021]**

Forecast Data Workbook (2 of 3)

Description of Contents

Worksheet	Description of Contents
6	Monthly Net Energy for Load Forecast: ISONE Control Area and States
7	Seasonal Peak Load Forecast Distributions: ISONE Control Area and States
8	Energy Model Economic/Demographic Variables: ISONE Control Area and States
9	Adjusting the State Energy Forecasts to the ISONE Energy Forecast
10G	Current CELT Gross forecast differences from prior year: ISONE and the New England States
10N	Current CELT Net forecast differences from prior year: ISONE and the New England States
11	Percentage of ISONE Control Area, operating companies, and load zones portioned out to the RSP sub-areas (Summer 2019 and Summer 2028)
12	Annual Energy and Seasonal Peak Forecast (Transpose of Tab 2 data)

Forecast Data Workbook (3 of 3)

Description of Contents

Worksheet	Description of Contents
13	Westinghouse Capacity Model Program Load Inputs (Power Years)
14	Summary Tables: ISONE Control Area, States, Regional System Plan Sub-areas, and SMD Load Zones Energy and Seasonal Peak Load Forecast
15	Current CELT forecast differences from prior year: BTM PV and EE for ISONE and states
16	Heating and Transportation Electrification Forecasts
17	Values used to reconstitute historical loads for the impact of Passive Demand Resources (PDRs) participating in the FCM for the purposes of producing the gross load forecast

Questions