

Future Representative Capacity Requirements for CCP 2022-2023 through CCP 2026-2027



- *Net Installed Capacity Requirements (NICR)*
- *Local Sourcing Requirements (LSR)*
- *Maximum Capacity Limit (MCL)*

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BACKGROUND - NICR for RSP17

- The 2017 Regional System Plan (RSP17) covers Net Installed Capacity Requirement (NICR) values for 2017 through 2026
- NICR values for Capacity Commitment Period (CCP) 2017-2018 through CCP 2020-2021 reflect the latest values that were filed and approved by FERC
- NICR values for CCP 2021-2022 are currently under development, in other words: 'to be determined' (TBD)
- NICR values for CCP 2022-2023 through CCP 2026-2027 reflect Representative ICR values that ISO-NE has calculated and are being presented to you today



Recap - Actual NICR Values for CCP 2020-2021

- The actual NICR, Local Sourcing Requirement (LSR), and Maximum Capacity Limit (MCL) calculated for the Forward Capacity Auction #11 (FCA #11) were based on the 2016 Capacity, Energy Loads and Transmission Report (CELT) load forecast and capacity and transmission assumptions reviewed by the Power Supply Planning Committee and Reliability Committee
- Three Capacity Zones were modeled for FCA#11
 - The Southeast New England (SENE) import-constrained Capacity Zone comprised of NEMA/Boston, SEMA and RI
 - The Northern New England (NNE) export-constrained Capacity Zone comprised of Maine, New Hampshire and Vermont
 - The rest-of-pool Capacity Zone comprised of Connecticut and Western/Central MA

Helpful Links:

- Summary of all ICR Values can be found on [ISO-NE website](#)
- Reliability Committee (RC)_presentation on the ICR Values for CCP 2020-2021 -FCA #11 is available [here](#)



Objective of this Power Point

To present the Representative ICR Values* for the forecast period of CCP 2022-2023 through CCP 2026-2027 using the same capacity and transmission transfer capability assumptions used to develop ICR values for FCA #11 but with the 2017 CELT load forecast. The representative values include:

- Representative NICR
- Representative values for the SENE import-constrained Capacity Zone comprising:
 - Local Resource Adequacy (LRA) Requirements
 - Transmission Security Analysis (TSA) Requirements
 - Local Sourcing Requirements (LSR)
- Representative MCL values for NNE export-constrained Capacity Zone

*For this presentation the ICR Values consist of ICR, NICR, LRA, TSA and MCL



Methodology and Assumptions

- The NICR Values (actual and representative) are calculated according to Market Rule 1 Section III.12 *Calculation of Capacity Requirements*, http://www.iso-ne.com/static-assets/documents/2014/12/mr1_sec_1_12.pdf
- Detailed capacity and transmission transfer capability assumptions are included in the Representative ICR Values Calculation Assumptions section



Net Installed Capacity Requirements

| Status | CCP | CELT Forecast 50/50 Peak (MW) ^[a] | Actual and Representative Future NICR (MW) ^[b] | Actual Resulting Reserves ^[c] |
|--------|------------------|---|---|--|
| A | 2017-2018 | 28,571 | 33,138 | 16.0% |
| A | 2018-2019 | 28,764 | 33,421 | 16.2% |
| A | 2019-2020 | 28,970 | 33,755 | 16.5% |
| A | 2020-2021 | 29,191 | 34,075 | 16.7% |
| | 2021-2022 | TBD ^[d] | | |
| R | 2022-2023 | 29,694 | 34,300 | 15.5% |
| R | 2023-2024 | 29,960 | 34,600 | 15.6% |
| R | 2024-2025 | 30,231 | 35,000 | 15.7% |
| R | 2025-2026 | 30,507 | 35,300 | 15.8% |
| R | 2026-2027 | 30,785 | 35,700 | 15.9% |

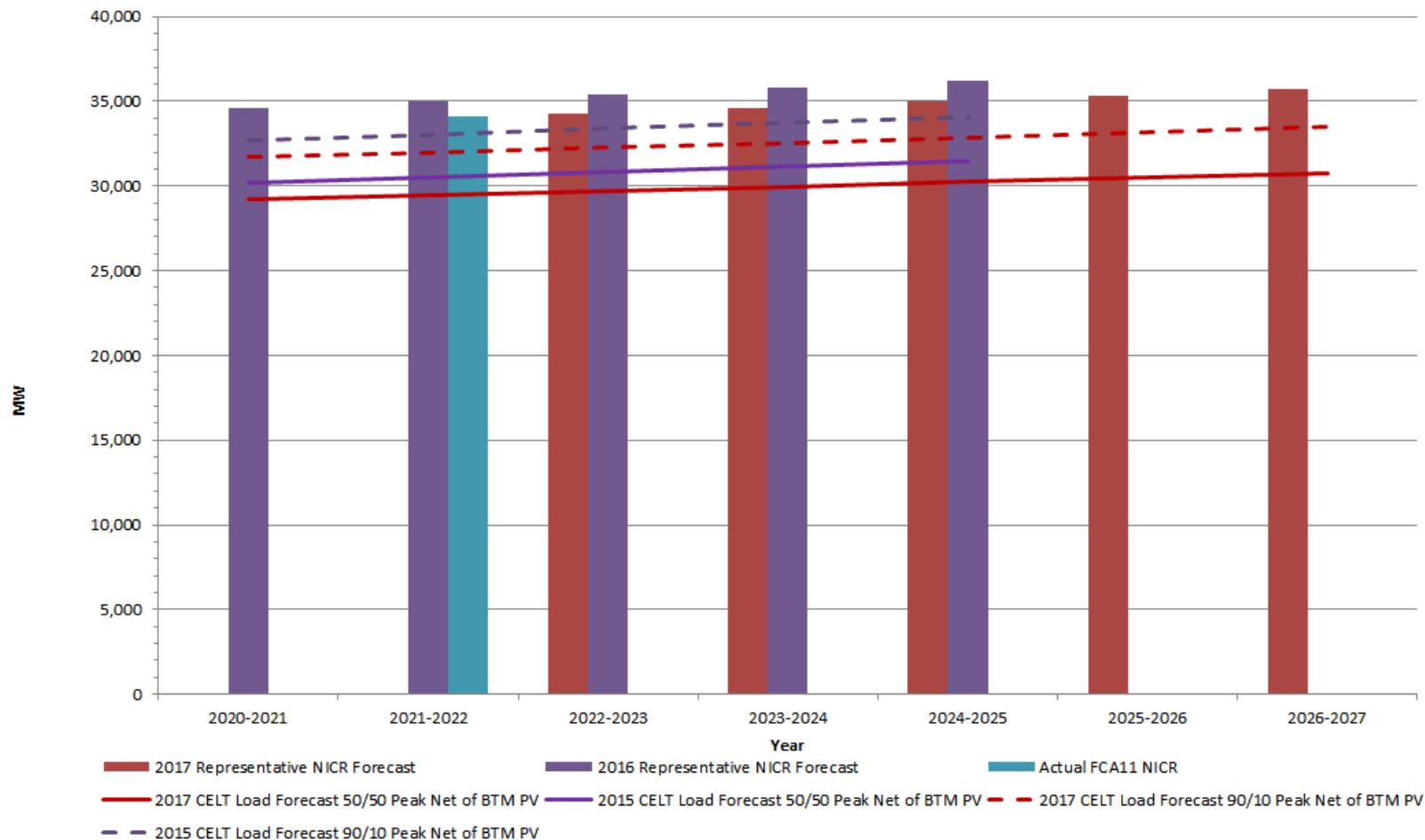
- [a] The 2017 CELT forecast 50/50 peak loads reflect the load reduction associated with the behind-the-meter PV forecast (BTM PV) from the gross load forecast
- [b] NICR values for 2017-2018 to 2020-2021 are the latest values approved by FERC. These NICR values were developed using the 2016 CELT Report load forecast
- [c] The table shows the resulting reserves percentage calculated using the 2017 CELT Report load forecast. The resulting reserves percentage for 2017-2018 to 2020-2021, when calculated using their respective 2016 CELT Report loads, ranged from 15.0% to 15.1% (These values are not shown in the above table)
- [d] The NICR for 2021-2022 is under development and scheduled to be filed with FERC in November 2017

Notes:

- Status field A: Actual Values, R: Representative Values
- The Representative NICR values are rounded to the nearest 100 MWs
- The resulting reserves increase through time because the contribution of capacity to meet the Loss of Load Expectation (LOLE) increases through time while the tie benefits contribution to meet the LOLE stays constant



Comparison of 2017 and 2016 NICR Forecasts



Note:

- This chart compares the Representative NICR forecast presented last year to the PAC on Jan 21, 2016 calculated with the 2015 load forecast versus the Representative NICR forecast with the 2017 load forecast



ICR Calculation Details (MW)

| Total Capacity Breakdown | 2020-2021 (FCA #11) | 2021-2022 | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 |
|--|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Generating Resources | 31,375 | TBD | 31,375 | 31,375 | 31,375 | 31,375 | 31,375 |
| Demand Resources | 2,926 | | 2,779 | 2,779 | 2,779 | 2,779 | 2,779 |
| Import Resources | 89 | | 89 | 89 | 89 | 89 | 89 |
| Tie Benefits | 1,950 | | 1,950 | 1,950 | 1,950 | 1,950 | 1,950 |
| OP4 - Action 6 & 8 (Voltage Reduction) | 437 | | 442 | 447 | 451 | 456 | 461 |
| Minimum Reserve Requirement | (200) | | (200) | (200) | (200) | (200) | (200) |
| Proxy Unit Capacity | - | | 400 | 400 | 800 | 1,200 | 1,600 |
| Total Capacity | 36,576 | | 36,835 | 36,840 | 37,244 | 37,649 | 38,054 |

| Installed Capacity Requirement Calculation Details | 2020-2021 (FCA #11) | 2021-2022 | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 |
|--|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Annual Peak | 29,601 | TBD | 29,694 | 29,960 | 30,231 | 30,507 | 30,785 |
| Total Capacity | 36,576 | | 36,835 | 36,840 | 37,244 | 37,649 | 38,054 |
| Tie Benefits | 1,950 | | 1,950 | 1,950 | 1,950 | 1,950 | 1,950 |
| HQICCs | 959 | | 959 | 959 | 959 | 959 | 959 |
| OP4 - Action 6 & 8 (Voltage Reduction) | 437 | | 442 | 447 | 451 | 456 | 461 |
| Minimum Operating Reserve Requirement | (200) | | (200) | (200) | (200) | (200) | (200) |
| ALCC | 273 | | 291 | 10 | 53 | 88 | 130 |
| Installed Capacity Requirement | 35,034 | | 35,265 | 35,590 | 35,940 | 36,300 | 36,651 |
| NICR | 34,075 | | 34,306 | 34,631 | 34,981 | 35,341 | 35,692 |
| | | | | | | | |
| Reserve Margin with HQICCs | 18.4% | | 18.8% | 18.8% | 18.9% | 19.0% | 19.1% |
| Reserve Margin without HQICCs | 15.1% | | 15.5% | 15.6% | 15.7% | 15.8% | 15.9% |

$$\text{Installed Capacity Requirement (ICR)} = \frac{\text{Capacity} - \text{Tie Benefits} - \text{OP4 Load Relief}}{1 + \frac{\text{ALCC}}{\text{APk}}} + \text{HQICCs}$$

Notes:

- ALCC is the “Additional Load Carrying Capability” used to bring the system to the 0.1 Days/Year LOLE reliability criterion
- ICR for 2021-2022 (FCA #12) is currently under development and shown as “To Be Determined (TBD)”

Summary of RSP 17 Capacity Zone Values

| Status | Commitment Period | | LSR (MW) | | | | MCL (MW) | |
|--------|-------------------|---------|----------|-----------------|---------|--------|----------|-------|
| | | | CT | NEMA/ Boston | SEMA/RI | SENE | Maine | NNE |
| A | 2017-2018 | FCA #8 | 7,319 | 3,428 | N/A | N/A | 3,960 | N/A |
| A | 2018-2019 | FCA #9 | 7,331 | 3,572 | 7,479 | N/A | N/A | N/A |
| A | 2019-2020 | FCA #10 | N/A | N/A | N/A | 10,028 | N/A | N/A |
| A | 2020-2021 | FCA #11 | N/A | N/A | N/A | 9,810 | N/A | 8,980 |
| | 2021-2022 | FCA #12 | N/A | N/A | N/A | TBD | N/A | TBD |
| R | 2022-2023 | FCA #13 | N/A | N/A | N/A | 10,200 | N/A | 8,950 |
| R | 2023-2024 | FCA #14 | N/A | N/A | N/A | 10,400 | N/A | 9,000 |
| R | 2024-2025 | FCA #15 | N/A | N/A | N/A | 10,550 | N/A | 9,050 |
| R | 2025-2026 | FCA #16 | N/A | N/A | N/A | 10,750 | N/A | 9,150 |
| R | 2026-2027 | FCA #17 | N/A | N/A | N/A | 10,900 | N/A | 9,250 |

Note:

- Status field A: Actual Values, R: Representative Values
- LSR and MCL for CCP 2021-2022 (FCA #12) is currently under development and shown as “To Be Determined (TBD)”
- The representative LSR and MCL values were rounded to the nearest 50 MW from the simulated values

SENE Requirements for CCP 2022-2023 through CCP 2026-2027 (MW)

| Status | CCP | LRA | TSA | LSR |
|--------|-----------|--------|--------|--------|
| A | 2020-2021 | 9,580 | 9,810 | 9,810 |
| | 2021-2022 | TBD | | |
| R | 2022-2023 | 9,807 | 10,222 | 10,222 |
| R | 2023-2024 | 10,014 | 10,390 | 10,390 |
| R | 2024-2025 | 10,199 | 10,562 | 10,562 |
| R | 2025-2026 | 10,468 | 10,738 | 10,738 |
| R | 2026-2027 | 10,633 | 10,915 | 10,915 |

Notes:

- Status field A: Actual Values, R: Representative Values
- LRA/TSA for CCP 2021-2022 (FCA #12) is currently under development and shown as “To Be Determined (TBD)”
- LSR is determined as the higher of the LRA or TSA Requirement

SENE LRA Calculation Details

| Southeast New England Capacity Zone | 2020-21 (FCA #11) | 2021-2022 | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 |
|--|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Resource, [1] | 11,403 | TBD | 11,365 | 11,365 | 11,365 | 11,365 | 11,365 |
| Proxy Units, [2] | 0 | | 0 | 0 | 0 | 0 | 0 |
| Firm Load Adjustment, [3] | 1,669 | | 1,428 | 1,238 | 1,070 | 824 | 673 |
| FOR, [4] | 0.085 | | 0.084 | 0.084 | 0.083 | 0.082 | 0.081 |
| LRA, [5]=[1]+[2]-([3]/(1-[4])) | 9,580 | | 9,807 | 10,014 | 10,199 | 10,468 | 10,633 |
| Rest of New England Zone | | | | | | | |
| Resource [6] | 22,986 | | 22,877 | 22,877 | 22,877 | 22,877 | 22,877 |
| Proxy Units [7] | 0 | | 400 | 400 | 800 | 1,200 | 1,600 |
| Firm Load Adjustment [8] = -[3] | -1,669 | | -1,428 | -1,238 | -1,070 | -824 | -673 |
| Total System Resources [9]=[1]+[2]-[3]+[6]+[7]-[8] | 34,389 | | 34,643 | 34,643 | 35,043 | 35,443 | 35,843 |

Notes:

- All values in the table are in MW except the Forced Outage Rate (FOR₂)
- ICR Values for 2021-2022 (FCA #12) is currently under development and shown as “To Be Determined (TBD)”

SENE TSA Calculation Details (MW)

| TSA Requirement for SENE | 2020-2021 FCA #11 | 2021-2022 | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 |
|--|----------------------|-----------|---------------|---------------|---------------|---------------|---------------|
| Capacity Zone 90/10 Load | 13,190 | TBD | 13,563 | 13,716 | 13,872 | 14,031 | 14,192 |
| Reserves (Largest unit or loss of import capability) | 1,413 | | 1,413 | 1,413 | 1,413 | 1,413 | 1,413 |
| Sub-area Transmission Security Need | 14,603 | | 14,976 | 15,129 | 15,285 | 15,444 | 15,605 |
| Existing Resources | 11,403 | | 11,365 | 11,365 | 11,365 | 11,365 | 11,365 |
| Assumed Unavailable Capacity | -1,054 | | -1,052 | -1,052 | -1,052 | -1,052 | -1,052 |
| Sub-area N-1 Import Limit | 5,700 | | 5,700 | 5,700 | 5,700 | 5,700 | 5,700 |
| Sub-area Available Resources | 16,049 | | 16,014 | 16,014 | 16,014 | 16,014 | 16,014 |
| TSA Requirement | 9,810 | | 10,222 | 10,390 | 10,562 | 10,738 | 10,915 |

$$\text{TSA Requirement} = \frac{(\text{Need} - \text{Import Limit})}{1 - (\text{Assumed Unavailable Capacity} / \text{Existing Resources})}$$

Note:

- ICR Values for 2021-2022 (FCA #12) is currently under development and shown as “To Be Determined (TBD)”



NNE MCL Calculation Details (MW)

| Rest of New England Zone | 2020-21 (FCA #11) | 2021-2022 | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 |
|--|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Resource _z [1] | 26,147 | TBD | 26,024 | 26,024 | 26,024 | 26,024 | 26,024 |
| Proxy Units _z [2] | 0 | | 400 | 400 | 800 | 1,200 | 1,600 |
| Surplus Capacity Adjustment _z [3] | 305 | | 430 | 140 | 202 | 277 | 339 |
| Firm Load Adjustment _z [4] | 671 | | 550 | 590 | 630 | 700 | 752 |
| FOR _z [5] | 0.072 | | 0.072 | 0.072 | 0.072 | 0.071 | 0.071 |
| LRA _z [6]=[1]+[2]-([3]/(1-[5]))-([4]/(1-[5]))] | 25,095 | | 25,368 | 25,637 | 25,928 | 26,172 | 26,450 |
| NNE Zone | | | | | | | |
| Resource [7] | 8,243 | | 8,219 | 8,219 | 8,219 | 8,219 | 8,219 |
| Proxy Units [8] | 0 | | 0 | 0 | 0 | 0 | 0 |
| Surplus Capacity Adjustment [9] =-[3] | -305 | | -430 | -140 | -202 | -277 | -339 |
| Firm Load Adjustment [10] =-[4] | -671 | | -550 | -590 | -630 | -700 | -752 |
| Total System Resources [11]=[1]+[2]-[3]-[4]+[7]+[8]-[9]-[10] | 34,389 | | 34,643 | 34,643 | 35,043 | 35,443 | 35,843 |

| Maximum Capacity Limit - NNE | | | | | | | |
|---|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Commitment Period | 2020-21 (FCA #11) | 2021-2022 | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 |
| NICR for New England [1] | 34,075 | TBD | 34,306 | 34,631 | 34,981 | 35,341 | 35,692 |
| LRA _{RestofNewEngland} [2] | 25,095 | | 25,368 | 25,637 | 25,928 | 26,172 | 26,450 |
| Maximum Capacity Limit _y [3]=[1]-[2] | 8,980 | | 8,938 | 8,994 | 9,054 | 9,169 | 9,242 |

Notes:

- All values in the table are in MW except the Forced Outage Rate (FOR_z)
- ICR Values for 2021-2022 (FCA #12) is currently under development and shown as “To Be Determined (TBD)”

REPRESENTATIVE ICR VALUES CALCULATION ASSUMPTIONS



Load Forecast

- 2017 CELT Load Forecast was used to calculate Representative ICR Values
- The load forecast used is net of the “*Behind the Meter- Photovoltaic*” (BTM PV) resources forecast. The load forecast used is labeled in the 2017 CELT Report as “1.2 REFERENCE - With reduction for BTM PV”
- The Energy Efficiency forecast is not included since this is a forecast of passive Demand Resources which are expected to be part of the Forward Capacity Market (FCM) in the future and will, as such, be modeled as a supply-side capacity resource in the ICR calculations



Modeling of BTM PV in the Representative ICR Values (MW)

| Month | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 |
|-------|-----------|-----------|-----------|-----------|-----------|
| Jun | 926 | 961 | 990 | 1,013 | 1,033 |
| Jul | 929 | 963 | 992 | 1,014 | 1,035 |
| Aug | 933 | 966 | 994 | 1,016 | 1,037 |
| Sep | 936 | 969 | 996 | 1,018 | 1,039 |
| Oct | 0 | 0 | 0 | 0 | 0 |
| Nov | 0 | 0 | 0 | 0 | 0 |
| Dec | 0 | 0 | 0 | 0 | 0 |
| Jan | 0 | 0 | 0 | 0 | 0 |
| Feb | 0 | 0 | 0 | 0 | 0 |
| Mar | 0 | 0 | 0 | 0 | 0 |
| Apr | 0 | 0 | 0 | 0 | 0 |
| May | 959 | 988 | 1,011 | 1,032 | 1,053 |

| | | | | | |
|---|------|------|------|------|------|
| Estimated Summer Seasonal Peak Load Reduction - % of BTM AC Nameplate (%) | 31.9 | 31.2 | 30.6 | 30.1 | 29.6 |
|---|------|------|------|------|------|

- Table shows the monthly estimated peak load reduction. These are the values of BTM PV subtracted from the gross load forecast to determine the net load forecast in the 2017 CELT
 - includes 8% Transmission & Distribution Gross-up
- In the TSA, the published 90/10 net load forecast for the SENE sub-areas are used

Note:

Future net load scenarios are based on coincident, historical hourly load and PV production data for the years 2012-2015. For more info, see https://www.iso-ne.com/static-assets/documents/2017/05/2017_solar_forecast_details_final.pdf

Load Forecast Data – Applicable 50/50 & 90/10 Load Forecast for New England & Sub-areas (MW)

| Peak Load Forecast Net of BTM PV | | | | |
|----------------------------------|-------------|--------|--------|-------|
| | New England | SENE | | NNE |
| CCP | 50/50 | 50/50 | 90/10 | 50/50 |
| 2022-2023 | 29,694 | 12,459 | 13,563 | 5,761 |
| 2023-2024 | 29,960 | 12,593 | 13,716 | 5,810 |
| 2024-2025 | 30,231 | 12,731 | 13,872 | 5,859 |
| 2025-2026 | 30,507 | 12,872 | 14,031 | 5,907 |
| 2026-2027 | 30,785 | 13,015 | 14,192 | 5,955 |

Notes:

- Load forecast is based on the 2017 CELT Report load forecast
- Capacity Zone load forecasts are the values for the Regional System Plan (RSP) sub-areas used as proxies for the Load Zone values as the interface Transmission Transfer Capability (TTC) limits are calculated using the 13 RSP sub-area representation
- 50/50 load forecast values shown for informational purposes. The GE Mars model sees a distribution of peak loads to calculate ICR and LRA
- 90/10 load forecast values shown are a direct input into the calculation of TSA for import-constrained Capacity Zones

Comparison of Sub-area Load Forecasts

- Comparisons of the 2017 versus the 2016 CELT load forecasts show that while the overall New England load forecast went down, the forecast for the SENE sub-areas has increased
- Some of the increase is due to changes in the operating company distribution of the load to the buses used in the Transmission Planning Network Model
 - The share of operating companies to the sub-areas is based on bus data provided by Transmission Owners
 - The 2017 CELT has more load moving into the Southeast Massachusetts (SEMA) sub-area than the 2016 CELT
- Some of the increase is also due to the Massachusetts economy growing faster relative to the other New England states
 - Gross State Product (GSP) in Massachusetts is expected to grow at a compound annual growth rate of 2.1% through the forecast horizon, more than any other New England state



LRA, TSA & MCL Internal Transmission Transfer Capability Assumptions (MW)

- Internal Transmission Transfer Capability
 - Southeast New England Import
 - N-1 Limit: 5,700
 - N-1-1 Limit: 4,600
 - Northern New England Export (North-South interface)
 - N-1 Limit: 2,725

Notes:

- [Transmission transfer capability limits](#) – presented at the Planning Advisory Committee (PAC) on March 22, 2017 (CEII)
- Includes The Greater Boston Upgrades - the certification of this project to be in service by June 2019 has been accepted by ISO New England



Summary of Resource Assumptions for CCP 2022-2023 – CCP 2026-2027 (MW)

| | CCP | Generating Resources | Intermittent Power Resources | Demand Resources | Import Resources | Total Resources |
|-------------|-----------------------|----------------------|------------------------------|------------------|------------------|-----------------|
| New England | 2020-2021 (FCA #11) | 30,469 | 906 | 2,926 | 89 | 34,389 |
| | 2022-2023 - 2026-2027 | 30,469 | 906 | 2,779 | 89 | 34,243 |
| SENE | 2020-2021 (FCA #11) | 9,930 | 181 | 1,292 | - | 11,403 |
| | 2022-2023 - 2026-2027 | 9,930 | 181 | 1,254 | - | 11,365 |
| NNE | 2020-2021 (FCA #11) | 7,244 | 455 | 538 | 6 | 8,243 |
| | 2022-2023 - 2026-2027 | 7,244 | 455 | 514 | 6 | 8,219 |

Note:

- Removal of RTEG resources is reflected for the forecast period



TSA Resource Assumptions

– Based on FCA #11 Resource Assumptions

- Resource Data based on FCA 11
 - CCP 2020-2021 Existing Capacity Qualification data
 - Generating capacity: 10,011 MW
 - Includes 8,950 MW of regular generation resources, 181 MW of intermittent generation resources and 980 MW of peaking generation resources
 - Passive Demand Resources: 1,109 MW
 - Active Demand Resources*: 144 MW

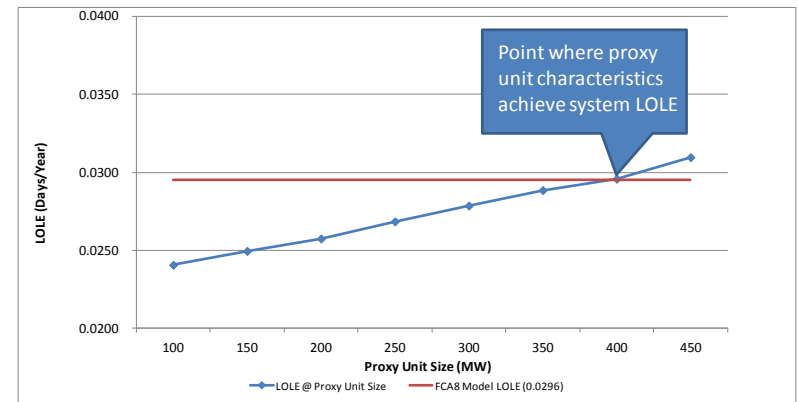
Notes:

- * RTEG Qualified Capacity of 38 MWs has been removed from the calculations of future representative TSA
- All values have been rounded off to the nearest whole number



Proxy Unit Characteristics

- Proxy unit characteristics based on a study conducted in 2014 using the 2017/18 FCA8 ICR Model
- Current proxy unit characteristics:
 - Proxy unit size equal to 400 MW
 - EFORd of proxy unit = 5.47%
 - Maintenance requirement = 4 weeks
- Proxy unit characteristics are determined using the average system availability and a series of LOLE calculations. By replacing all system capacity with the correct sized proxy units, the system LOLE and resulting capacity requirement unchanged



Note:

- The 2014 Proxy Unit Study was reviewed at the May 22, 2014 PSPC Meeting and is available at:
http://www.iso-ne.com/static-assets/documents/committees/comm_wkgrps/reblty_comm/pwrsuppln_comm/mtrls/2014/may222014/proxy_unit_2014_study.pdf

Summary of Resource Availability Assumptions

-Based on the FCA #11 ICR Model

| Resource Category | Summer MW | Assumed Average EFORD or FOR Weighted by Summer Ratings (%) | Assumed Average Maintenance Weeks Weighted by Summer Ratings |
|-------------------------------------|-------------------|---|--|
| Total System Generation | 30,468.645 | 7.1 | 4.8 |
| Combined Cycle | 14,399.224 | 3.8 | 5.1 |
| Fossil | 6,088.065 | 17.5 | 5.9 |
| Nuclear | 3,344.333 | 2.1 | 4.5 |
| Hydro (Includes Pumped Storage) | 2,878.297 | 3.3 | 4.7 |
| Combustion Turbine | 3,509.537 | 10.5 | 2.6 |
| Diesel | 191.095 | 6.5 | 1.0 |
| Miscellaneous | 58.094 | 17.6 | 3.0 |
| Intermittent Power Resources | 906.179 | 0.0 | 0.0 |
| Import Resources | 88.800 | 0.0 | 0.1 |
| Total Demand Resources | 2,779.094 | 98.2 | 0.0 |
| On-Peak | 1,865.731 | 0.0 | 0.0 |
| Seasonal Peak | 485.409 | 0.0 | 0.0 |
| Real-time Demand Response | 427.954 | 89.7 | 0.0 |

Notes:

- Generator EFORD is calculated as a 5-year average of the latest ISO submitted NERC GADS data
- Intermittent Power Resources are assumed as 100% available since their outage history is incorporated in their ratings
- Imports are modeled with historical tie line availability factors and deratings for firm capacity contracts
- FOR (for Demand Resources) is an assumed Forced Outage Rate based on historical performance of Demand Resources in summer & winter 2011 – 2015; RTEG resources have been removed for the forecast period

TSA Requirements Unavailability Assumptions

-Based on the FCA #11 TSA Requirement Calculation

- Resource Unavailability Assumptions
 - Regular Generation Resources - Weighted average EFORd
 - SENE sub-area: 11%
 - Peaking Generation Resources – adjustment factor: 20%
 - Passive Demand Resources: 0%
 - Active Demand Resources* - De-rating based on performance factors
 - Boston sub-area: 14%
 - SEMA sub-area: 20%
 - RI sub-area: 21%

Note:

- All values have been rounded off to the nearest whole number
- *RTEG resources are removed in future Representative TSA calculations



OP 4 Assumptions (MW)

- Load Relief Available from 5% Summer Voltage Reduction (OP4 Actions 6 & 8)

| CCP | Action 6 & 8 5% Voltage Reduction |
|-----------|---|
| 2022-2023 | 442 |
| 2023-2024 | 447 |
| 2024-2025 | 451 |
| 2025-2026 | 456 |
| 2026-2027 | 461 |

Notes:

- Impact of implementing a 5% voltage reduction expressed as a percent of load is calculated using the ISO Operations value of 1.5%
- Calculated as [90-10 Peak Load Forecast] – [all Passive DR & Active DR] *1.5%



OP 4 Assumptions (MW)

- Tie Benefits

The following Tie Benefit assumptions are used for the Representative NICR Calculations for CCPs 2022-2023 through 2026-2027

| Control Area | 2022-2023 - 2026-2027 |
|---------------------|-----------------------|
| Québec via Phase II | 959 |
| Québec via Highgate | 145 |
| Maritimes | 500 |
| New York | 346 |
| Total Tie Benefits | 1,950 |

Notes:

- Modeled with tie line availability assumptions
- The values are the same as those used for FCA #11



Summary of Resource and OP 4 Assumptions for (MW)

| Type of Resource/OP4 Action | 2020-2021 FCA #11 | 2021-2022 | 2022-2023 | 2023-2024 | 2024-2025 | 2025-2026 | 2026-2027 |
|--|----------------------|-----------|---------------|---------------|---------------|---------------|---------------|
| Generating Resources | 30,599 | TBD | 30,599 | 30,599 | 30,599 | 30,599 | 30,599 |
| Intermittent Power Resources | 906 | | 906 | 906 | 906 | 906 | 906 |
| Demand Resources | 2,926 | | 2,779 | 2,779 | 2,779 | 2,779 | 2,779 |
| Import Resources | 89 | | 89 | 89 | 89 | 89 | 89 |
| Export Delist & Import Derating | (130) | | (130) | (130) | (130) | (130) | (130) |
| OP 4 Voltage Reduction (Actions 6 & 8) | 437 | | 442 | 447 | 451 | 456 | 461 |
| Minimum Operating Reserve | (200) | | (200) | (200) | (200) | (200) | (200) |
| Tie Benefits (includes 959 MW HQICCs) | 1,950 | | 1,950 | 1,950 | 1,950 | 1,950 | 1,950 |
| Proxy Units | - | | 400 | 400 | 800 | 1,200 | 1,600 |
| Total MW Modeled in ICR | 36,576 | | 36,835 | 36,840 | 37,244 | 37,649 | 38,054 |

Notes:

- Intermittent Power Resources have both the summer and winter capacity values modeled
- OP 4 5% Voltage Reduction includes both Action 6 and Action 8 MW assumptions
- Minimum Operating Reserve of 200 MW is the minimum Operating Reserve requirement for transmission system security
- RTEG resources are removed in forecast period
- ICR Values for 2021-2022 (FCA #12) are currently under development and shown as “To Be Determined (TBD)”

Questions

