

# Upper Maine (ME) 2029 Needs Assessment Details

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# Purpose

- Present the scope changes between the Maine (ME) 2027 Needs Assessment and the Upper ME 2029 Needs Assessment



# Overview

- Background
- Study Area
- Changes Between the 2027 and 2029 Study Years
- 2029 Dispatches, Reserves, and Interface Levels
- Schedule/Next Steps
- Appendix



# Background

- In February 2019, the ISO suspended the ME 2027 Needs Assessment process due to changes seen in the draft 2019 CELT forecast data
  - Considering the change in load, EE, and solar PV from the 2017 CELT data to the draft 2019 forecast data, the net load in New England originally considered for the ME 2027 Needs Assessment<sup>1</sup> to identify needs was too high
- The plan discussed at the March 2019 PAC Meeting<sup>2</sup> was to
  - Utilize the draft 2019 forecasts to update the models<sup>3</sup>
  - Discuss the changes in scope compared to the ME 2027 Needs Assessment
  - Update the Needs Assessment to reflect the changes
  - Include the updates in the study files and post them

1 [https://smd.iso-ne.com/operations-services/ceii/pac/2018/03/final\\_ceii\\_2027\\_maine\\_na\\_sow.pdf](https://smd.iso-ne.com/operations-services/ceii/pac/2018/03/final_ceii_2027_maine_na_sow.pdf)

2 [https://www.iso-ne.com/static-assets/documents/2019/03/a6\\_updating\\_needs\\_assessment\\_to\\_reflect\\_latest\\_assumptions.pdf](https://www.iso-ne.com/static-assets/documents/2019/03/a6_updating_needs_assessment_to_reflect_latest_assumptions.pdf)

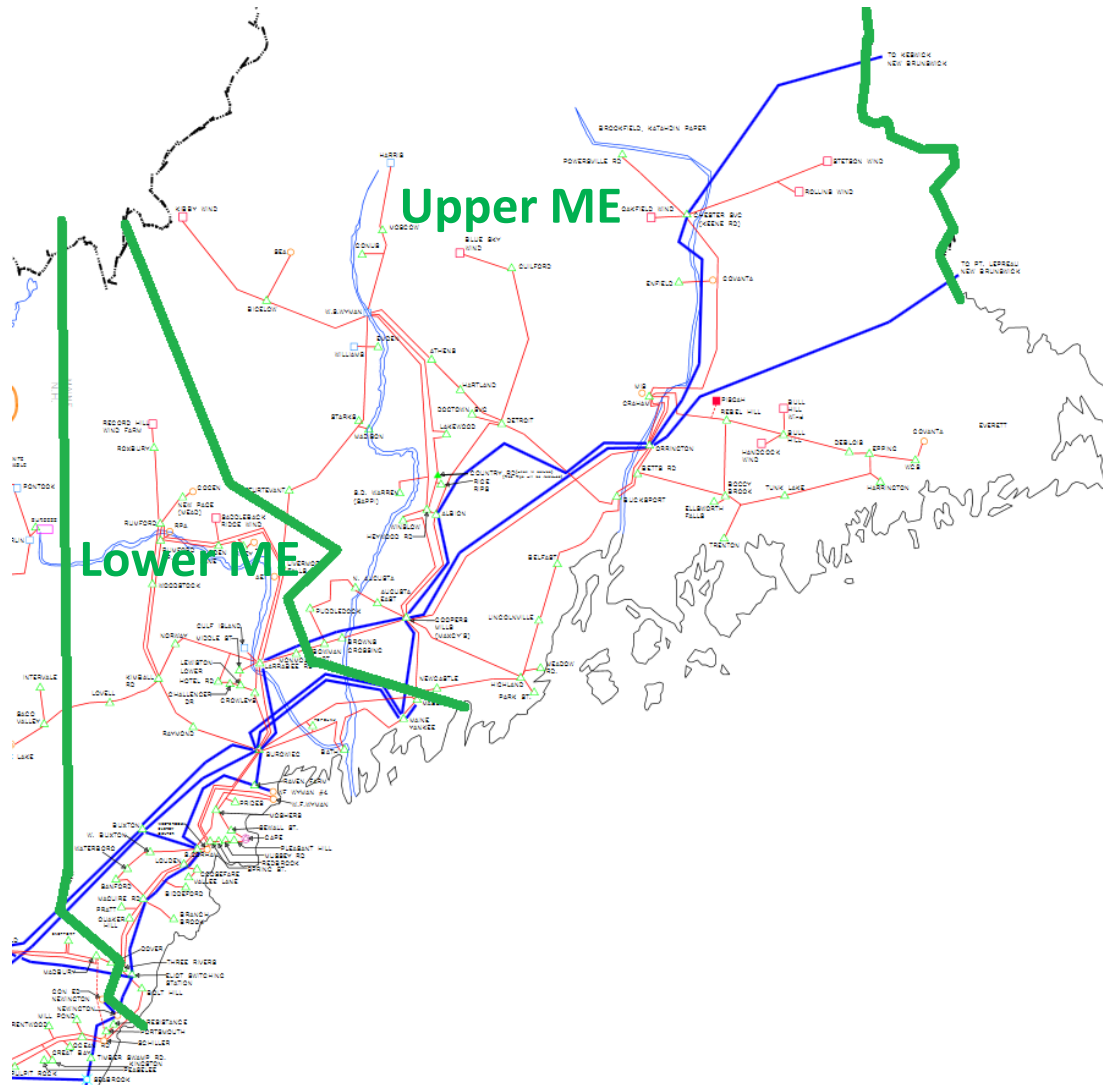
3 When the draft 2019 forecast is specified it means the 2019 draft forecast data is used and applied to the 2018 load distributions that are supplied by the TOs.

# Study Area

- Only the Upper ME region will be considered when identifying reliability needs in the Upper ME 2029 Needs Assessment
- The New England Clean Energy Connect (NECEC) is a large project with the potential to impact system performance in the Lower ME region
  - This project does not have a MA DPU approved contract, however the ISO recognizes that such a contract may be forthcoming for this project
  - The system modifications and upgrades for interconnecting this project have not yet been identified, and so the project cannot be modeled in sufficient detail when evaluating needs in the Lower ME region
  - The NECEC project is not expected to significantly impact the performance of the Upper ME region when evaluating reliability needs
    - Sensitivity cases with less detailed models for the NECEC project can be used in the Upper ME 2029 Needs Assessment to demonstrate this
- The Lower ME region will be evaluated when more information on NECEC is known
- Similar to the ME 2027 Needs Assessment, for the purposes of establishing dispatches and transfers the study area will be the state of ME
  - The regions used to calculate probabilistic maximum generation unavailability values will remain unchanged



# Geographical Map



The map is shown for reference only and does not include all of the latest topology changes



# Changes Between the 2027 and 2029 Study Years

Category	ME 2027 Needs Assessment	Upper ME 2029 Needs Assessment
CELT	2017	Draft 2019
RSP Project List and Asset Condition List	As of June 2017	As of March 2019 <sup>1</sup>
Local System Plan (LSP) Projects	2017 TOPAC	2018 TOPAC <sup>2</sup>
Transmission Planning Base Case Library Used	2017	2017
Cleared Generator Additions	Through FCA 11	Through FCA 13 <sup>3</sup>
Submitted Retirement Delist Bids	Through FCA 12	Through FCA 14
Short Circuit Base Case Used	2022	2023

<sup>1</sup> Projects relevant to the study and adjacent areas that have been added to the RSP Project List and Asset Condition List since June 2017 up to the March 2019 update have been included in the cases.

<sup>2</sup> Transmission owners' LSPs from the 2018 TOPAC were reviewed and relevant projects to the study area have been added to the cases.

<sup>3</sup> Generators relevant to the study and adjacent areas have been added to the cases.





# Changes Between the 2027 and 2029 Study Years, cont.

- Two projects that received Capacity Supply Obligations (CSOs) in FCA 13 have been added to the 2029 cases
  - Killingly Energy Center – ~632 MW (combined cycle on 3271 line in Connecticut (CT))
    - Modeled offline since the project is far from the study area
  - Three Corners Solar – ~123 MW (PV connecting into the Albion Road 115 kV substation in ME)
    - Modeled at ~32 MW (26% of nameplate)
- Four generators have been set as out-of-service in the 2029 cases
  - One generator in New Hampshire (NH) fully de-listed for 2<sup>nd</sup> consecutive FCA\*
    - Schiller 4 – ~48 MW
  - One generator in NH had a Qualified Capacity value of zero MW for FCA 13
    - Indeck-Energy Alexandria – ~15 MW
  - Two generators in ME have submitted retirement de-list bids for FCA 14
    - Yarmouth 1 and 2 – ~50 MW each

\* As described in the Transmission Planning Technical Guide, if a resource has de-listed in the two most recent Forward Capacity Auctions, the ISO will consider the resource unavailable for dispatch when performing a Needs Assessment. If a resource does not operate for 3 calendar years in a row, the resource is deemed to be retired.

# Changes Between the 2027 and 2029 Study Years, cont.

- ME Transmission System Data Update
  - Line impedances and ratings, and 345/115 kV transformer voltage schedules have been updated
  - Addition of a new large industrial load at the Belfast 115 kV station
  - Mill models at peak and minimum load have been updated
    - At min load, the mills were set up with a 0 MW and 0 MVAR demand
    - At peak load, the mills' loads were set up such that loss of the largest generator in each mill results in a power flow into the mill that meets the related mill contract value



# Changes Between the 2027 and 2029 Study Years, cont.

- The Upper ME 2029 Needs Assessment will consider the following sensitivity study scenario
  - Addition of the NECEC and Three Rivers Solar Power projects
    - NECEC
      - Will interconnect to the Larrabee Road 345 kV substation in ME and was selected as part of a state sponsored RFP
      - Will be modeled as a 1,090 MW injection based on the RFP selection
      - Does not have a MA DPU approved contract, however the ISO recognizes that this project may have a contract prior to or soon after the completion of this Needs Assessment
    - Three Rivers Solar Power
      - Will interconnect on 115 kV Line 93 in the Emera ME system and was selected as part of a state sponsored RFP
      - Will be modeled as a 26 MW (26% of 100 MW) injection based on the RFP selection
      - Does not have a ME PUC approved contract, however the ISO recognizes that this project may have a contract prior to or soon after the completion of this Needs Assessment



# Changes Between the 2027 and 2029 Study Years, cont.

- Photovoltaic (PV) Generation Modeled utilizing the draft 2019 CELT PV Generation Forecast

PV Generation Modeled as Negative Load		Study Year	
		2027 Summer Peak (MW) <sup>1,2</sup>	2029 Summer Peak (MW) <sup>1,3</sup>
New England	A – PV generation (nameplate) in New England	4,732	6,652
	B – 5.5% Reduction in Distribution Losses	+260	+366
	C – Unavailable PV generation $(A+B) \times (100\% - 26\%)$	-3,694	-5,193
	<b>PV generation Modeled in Case as Negative Loads (A+B)-C</b>	<b>1,298</b>	<b>1,825</b>

<sup>1</sup> These values exclude explicitly modeled PV generators.

<sup>2</sup> The 2027 Summer Peak value was based on CELT 2017 PV Generation Forecast.

<sup>3</sup> The 2029 Summer Peak value was based on draft CELT 2019 PV Generation Forecast.



# Changes Between the 2027 and 2029 Study Years, cont.

- New England New Load Levels (Excludes Transmission Losses)

Category	Summer Peak 2027 90/10 Load (MW)	Summer Peak 2029 90/10 Load (MW)
CELT Forecast	34,043 <sup>1</sup>	32,465 <sup>2</sup>
Non-CELT Manufacturing load in New England	320	348
New Large Load Supplied at CMP's Belfast Station	0	21
Available Passive DR (modeled as negative load)	-2,826 <sup>3,4</sup>	N/A
Available Active DR (modeled as negative load)	-373 <sup>3,4</sup>	N/A
Available ADCR (modeled as negative load)	N/A	-478 <sup>4,5</sup>
Available EE Forecast for study year (modeled as negative load)	-1,715 <sup>1,4</sup>	-5,284 <sup>2,4</sup>
Available PV Forecast for study year (modeled as negative load)	-1,298 <sup>1</sup>	-1,825 <sup>2</sup>
<b>Net load modeled in New England (Excludes Station Service)</b>	<b>28,151</b>	<b>25,247<sup>6</sup></b>

<sup>1</sup> The 2027 Summer Peak, EE and PV values were based on the CELT 2017 forecast.

<sup>2</sup> The 2029 Summer Peak, EE and PV values were based on the draft CELT 2019 forecast.

<sup>3</sup> The 2027 Passive and Active DR was based on FCA 11.

<sup>4</sup> For available Active DR/ADCR and Passive DR/EE, 75% and 100% of the forecasted values were assumed, respectively.

<sup>5</sup> The 2029 ADCR was based on FCA 12.

<sup>6</sup> The cases used for the Upper ME 2029 Needs Assessment were developed before the 2019 CELT forecast data was finalized. The net load modeled in New England is 25,250 MW when calculated on the final 2019 CELT data, which is only 3 MW greater than the value calculated from the draft CELT forecast data.

# Changes Between the 2027 and 2029 Study Years, cont.

- The table below summarizes the maximum unavailable generation that will be considered in the Upper ME 2029 Needs Assessment

Type of Group	Group of Generators	Max MW Unavailable Peak Load (2027)	Max MW Unavailable Peak Load (2029)
Study Area (Largest Generator – Yarmouth #4 – 620 MW)	ME Generators	620	575
Study Area + Adjacent Area	ME+NH Generators	885	738
Receiving End of System Stress	Eastern New England	1,554	1,276



# 2029 Dispatches

- Dispatches that end in A and B have different transfer levels over the New Brunswick – New England (NB-NE) interface
  - Dispatches with NB-NE = 700 MW end in A (e.g. Dispatch D1A)
  - Dispatches with NB-NE = 0 MW end in B (e.g. Dispatch D1B)



# 2029 Dispatches, cont.

D1A	D1B	D2A	D2B	D3A	D3B	D4A	D4B	D5A	D5B	D6A
Yarmouth #4 (620)	Yarmouth #4	Westbrook	Westbrook	MIS	MIS	RPA	RPA	Yarmouth #3	Yarmouth #3	Cape G5
Schiller #6	Schiller #6	Indeck GT5	Indeck GT6	Sappi Westbrook 9	SEA Stratton	Bucksport G4	Bucksport G4	Ecomaine	Ecomaine	Cape G4
Canal G1	Canal G1	Schiller #6	Schiller #6	Canal G1	Canal G1	PERC	PERC	Cape G5	Cape G5	Livermore
		Canal G1	Canal G1	Dartmouth Power	Dartmouth Power	Tamworth	Whitelake Jet	Cape G4	Cape G4	Athens
						Canal G1	Canal G1	Sappi Somerset G2	Sappi Somerset G2	Newpage G4
						Dartmouth Power	Dartmouth Power	Verso Cogen #1	Verso Cogen #1	Newington
								Verso Jay C	Verso Jay C	Tamworth
								Whitelake Jet	Whitelake Jet	Canal G1
								Schiller #6	Schiller #6	
								Canal G1	Canal G1	
								ANP Blackstone G2	Blackstone G2	

Legend	
	Generators Unavailable in Study Area
	Generators Unavailable in Adjacent Area
	Generators Unavailable in Receiving End



# 2029 Reserves

- The table below shows the amount of reserves available to be turned on after the first contingency in the N-1-1 analysis for the Upper ME 2029 Needs Assessment

Dispatch	NB-NE (MW)	Receiving End	Priority 1 Reserves		Priority 2 Reserves	Priority 3 Reserves	Total (MW)
			Weekly Hydro Study Area (MW)	Weekly Hydro Receiving End (MW) <sup>1</sup>	Non-Renewable and Pumped-Storage Hydro Generators Receiving End (MW)	Generators Sending End (MW) <sup>1</sup>	
D1A	700	Eastern	168	321	711	0	1200
D1B	0	Eastern	168	321	711	0	1200
D2A	700	Eastern	168	321	711	0	1200
D2B	0	Eastern	168	321	711	0	1200
D3A	700	Eastern	168	321	711	0	1200
D3B	0	Eastern	168	321	711	0	1200
D4A	700	Eastern	168	321	711	0	1200
D4B	0	Eastern	168	321	711	0	1200
D5A	700	Eastern	168	321	711	0	1200
D5B	0	Eastern	168	321	711	0	1200
D6A	700	Eastern	168	321	711	0	1200

1 – Does not include weekly hydro units in the Study Area



# 2029 Interface Levels

- The table below shows the interface limits and the interface levels for the Upper ME 2029 Needs Assessment
- All interface transfers are within their limits, demonstrating that the established reserves are acceptable

Interface Name	Limit (MW)	90/10 Range (MW)
NB-NE	700	0 or 700
Orrington South	1,325	-4 to 1,184
ME-NH	1,900	179 to 1,286
NNE Scobie + 394	3,450	1,803 to 2,679
West-East	3,000	1,821 to 2,634
North-South	2,725	1,392 to 2,337

# 2029 Summary

- The table below shows the summary of peak load dispatches, MWs unavailable and transfer levels for the Upper ME 2029 Needs Assessment

Dispatch	MW Unavailable in Study Area and Adjacent Area (Maximum MW <sup>1</sup> )		MW Unavailable in Receiving End (Max MW <sup>1</sup> )	External Interfaces Targets <sup>2</sup> (Maximum Transfer Capability in MW)				Additional Interfaces (Maximum Transfer Capability in MW)				
	ME (575)	ME+NH (738)	Eastern NE (1,276)	NY-NE (1,400)	NB-NE (700)	Phase II (1,400)	Orrington S (1,325)	ME-NH (1,900)	NNE Scobie + 394 (3,450)	West-East (3,000)	N-S (2,725)	
D1A	620	671	1,252	0	700	950	1,184	854	2,416	1,950	2,065	
D1B	620	671	1,252	0	0	950	487	179	1,803	2,618	1,392	
D2A	568	619	1,200	0	700	950	1,164	902	2,466	1,902	2,114	
D2B	567	618	1,199	0	0	950	467	227	1,852	2,571	1,438	
D3A	539	539	1,203	0	700	950	694	943	2,523	1,896	2,203	
D3B	549	549	1,213	0	0	950	-4	245	1,862	2,634	1,457	
D4A	437	458	1,122	0	700	950	1,002	1,038	2,605	1,821	2,278	
D4B	437	454	1,118	0	0	950	305	359	1,989	2,488	1,604	
D5A	311	380	1,216	0	700	950	1,184	1,145	2,679	1,926	2,337	
D5B	311	380	1,216	0	0	950	487	472	2,068	2,590	1,668	
D6A	184	623	1,203	0	700	950	1,184	1,282	2,451	1,890	2,124	

<sup>1</sup> Maximum MW is the Maximum unavailable MW of non-renewable generators based on probabilistic methods

<sup>2</sup> Actual interface transfers may vary slightly from the targets due to power flow mismatches



# 2029 Sensitivity Scenario Case Dispatches

- D7A and D8A cases are used to examine the addition of the NECEC and Three Rivers Solar Power projects sensitivity scenario
  - Based on the D3A and D4A cases
  - For these cases, generators in southern ME, western ME, Bangor, and NH regions were turned off to maintain acceptable ME-NH and North-South interface transfer levels



# 2029 Sensitivity Scenario Case Dispatches, cont.

D7A	D8A
MIS	RPA
Sappi Westbrook 9	Bucksport G4
Yarmouth #3 <sup>1</sup>	PERC
Cape G5 <sup>1</sup>	Yarmouth #3 <sup>1</sup>
Cape G4 <sup>1</sup>	Ecomaine <sup>1</sup>
Merrimack #1 <sup>1</sup>	Cape G5 <sup>1</sup>
Merrimack #2 <sup>1</sup>	Cape G4 <sup>1</sup>
Canal G1	Indeck GT5 <sup>1</sup>
Dartmouth Power	Indeck GT6 <sup>1</sup>
	SEA Stratton <sup>1</sup>
	Tamworth
	Merrimack #1 <sup>1</sup>
	Merrimack #2 <sup>1</sup>
	Canal G1
	Dartmouth Power

Legend	
	Generators Unavailable in Study Area
	Generators Unavailable in Adjacent Area
	Generators Unavailable in Receiving End

<sup>1</sup>These generators in ME and NH were turned off to maintain acceptable ME-NH and N-S interface transfer levels



# 2029 Sensitivity Scenario Case Dispatches, cont.

- The table below shows the summary of peak load dispatches, MWs unavailable and transfer levels for the Upper ME 2029 Needs Assessment sensitivity scenario cases

Dispatch	MW Unavailable in Study Area and Adjacent Area (Maximum MW <sup>1</sup> )		MW Unavailable in Receiving End (Max MW <sup>1</sup> )	External Interfaces Targets <sup>2</sup> (Maximum Transfer Capability in MW)				Additional Interfaces (Maximum Transfer Capability in MW)				
	ME (575)	ME+NH (738)	Eastern NE (1,276)	NY-NE (1,400)	NB-NE (700)	Phase II (1,400)	Orrington S (1,325)	ME-NH (1,900)	NNE Scobie + 394 (3,450)	West-East (3,000)	N-S (2,725)	
D7A	539	539	1,203	0	700	950	720	1,888	3,255	1,407	2,695	
D8A	437	458	1,122	0	700	950	988	1,890	3,255	1,423	2,680	

<sup>1</sup> Maximum MW is the Maximum unavailable MW of non-renewable generators based on probabilistic methods

<sup>2</sup> Actual interface transfers may vary slightly from the targets due to power flow mismatches



# State Sponsored Request For Proposals (RFPs)

- Section 4.1(f) of Attachment K states:
  - “Specifically, the ISO shall incorporate or update information regarding resources in Needs Assessments that have been proposed and (i) have cleared in a Forward Capacity Auction pursuant to Market Rule 1 of the ISO Tariff, (ii) have been selected in, and are contractually bound by, a state-sponsored Request For Proposals, or (iii) have a financially binding obligation pursuant to a contract.”  
*(underlining added)*
  - “With respect to (ii) or (iii) above, the proponent of the market response shall inform the ISO, in writing, of its selection or its assumption of financially binding obligations, respectively.”
- If there are any resources that meet criteria (ii) and (iii) stated above that the ISO should consider for inclusion in the respective study area Needs Assessments, the proponents of the projects shall do the following no later than Monday, July 8<sup>th</sup>
  - Notify the ISO in writing via [pacmatters@iso-ne.com](mailto:pacmatters@iso-ne.com)
  - Provide the contract as part of the notification to the ISO

# Schedule/Next Steps

- Please submit comments on the materials in this presentation to [pacmatters@iso-ne.com](mailto:pacmatters@iso-ne.com) by Monday, July 8<sup>th</sup>
- Proponents of projects that have been selected in and are contractually bound by a state sponsored RFP or have a financially binding obligation pursuant to a contract shall notify the ISO in writing via [pacmatters@iso-ne.com](mailto:pacmatters@iso-ne.com) by Monday, July 8<sup>th</sup>
- Post Upper ME 2029 Needs Assessment intermediate study files – Q3 2019, if needed
- Complete the Upper ME 2029 Needs Assessment, present to PAC, and post report – Q3 or Q4 2019



# Questions



# APPENDIX



# Objectives

The objective of the Upper ME 2029 Needs Assessment study is to evaluate the reliability performance and identify reliability-based needs in the Upper ME region for the year 2029 while considering the following

- Future load conditions updated to reflect the draft 2019 CELT forecasts<sup>1</sup>
- Resource changes in the study area based on FCA 13 results<sup>2</sup>
- Sensitivity scenario analysis to consider the addition of the NECEC and Three Rivers Solar Power projects
- Reliability over a range of generation patterns and transfer levels
- Coordination with the NH 2029 Needs Assessment
- All applicable North American Electric Reliability Corporation (NERC), Northeast Power Coordinating Corporation (NPCC) and ISO New England transmission planning reliability standards

<sup>1</sup> When the draft 2019 forecast is specified it means the 2019 draft forecast data is used and applied to the 2018 load distributions that are supplied by the TOs.

<sup>2</sup> FCA 14 for retirement and permanent de-list bids.

# Initial Study Files

- The Upper ME 2029 Needs Assessment cases and files were created from the NH 2029 Needs Assessment cases and files
- The details concerning the NH 2029 Needs Assessment study files are provided in the NH 2029 Needs Assessment Details May 21, 2019 PAC presentation
  - [https://www.iso-ne.com/static-assets/documents/2019/05/a3\\_new\\_hampshire\\_2029\\_needs\\_assessment\\_details.pdf](https://www.iso-ne.com/static-assets/documents/2019/05/a3_new_hampshire_2029_needs_assessment_details.pdf)

# Set Renewable Generation and Imports

- Renewable generation in New England is dispatched based on historical availability
- The table below specifies the ranges of imports from external areas that are proposed for the Needs Assessment

Inter-area Interface	Dispatch Range (MW)
New Brunswick to New England tie (NB-NE)	0 and 700
New York to New England AC ties (NY-NE)	0
Cross Sound Cable HVDC From Long Island to New England (CSC)	0
Phase II HVDC from Quebec to New England (Phase II)	950
Highgate HVDC From Quebec to New England (Highgate)	200



# Establish Reserves

- In this step, the reserves are established while respecting the interface limits
- The priority order for reserve establishment is as follows:
  - Priority 1 – Study Area and Receiving End weekly hydro units
  - Priority 2 – Receiving End non-renewable generators and pumped-storage hydro units
  - Priority 3 – Sending End generators (excluding any weekly hydro units in the Study Area)
- The reserves will be established following the priority order noted above



# Establish Reserves, cont.

- For the Upper ME 2029 Needs Assessment one stress is considered when establishing reserves (west to east)
  - The proposed generation dispatches in ME and NH, and transfers across the NB-NE interface, result in north to south power flows
  - More power is pulled down the eastern part of the system with Eastern New England as the Receiving End due to establishing unavailable and reserve units in southeastern New England
- For the stress with western New England as the Receiving End, the total of 1200 MW of reserves are established as follows
  - Priority 1 Reserves – There are 489 MW weekly hydro units on the Receiving End
  - Priority 2 Reserves – There are 711 MW non-renewable generators on the Receiving End
  - Priority 3 Reserves – Since priority 1 and priority 2 reserves cover the total 1200 MW reserve requirement, there is no need to consider any Sending End generators in the total reserves established



# Minimum Load Assumptions

- Majority of ME generators OOS
- All major NH and Boston generators OOS
- All NH, ME and Boston reactors online
- All pumped hydro generators OOS
- Low transfers across interfaces
- All transmission capacitors OOS





# Minimum Load Dispatch

- Two dispatches are considered
  - NB-NE= 700 MW
  - NB-NE= 0 MW
- All NH and ME generators connected to 345 kV system OOS



# Study Methodology

- Steady state thermal and voltage analysis will be performed, for N-0 (all-facilities-in), N-1 (all-facilities-in, first contingency), and N-1-1 (facility-out, first contingency) for the described set of generation dispatches and inter-regional stresses
  - Up to 1,200 MW generation re-dispatch will be allowed between the first and second contingency
  - If any needs are identified in the summer peak cases
    - an analysis will be completed to indicate whether the needs are time sensitive or not
    - a critical load level (CLL) analysis will be completed

# Short Circuit Basecase Assumptions

- The short circuit basecase used for the Upper ME Needs Assessment is based on the expected topology in 2023 compliance steady state base case
  - Northern Pass Project (NPT) is included<sup>1</sup>
  - No significant project is expected in the 2023-2029 timeframe, and hence the 2023 case was considered acceptable
- The 2023 case includes the impact of all PPA approved generators and ETUs<sup>2</sup> (including resources without an obligation through the FCM)
  - The resources with an approved PPA that do not have an obligation through the FCM cannot be relied to resolve a reliability need (and are therefore not considered in steady state),
  - However, they do contribute to the available short circuit current as they may be in service as part of the energy dispatch of the system.
- All generators in the short circuit model will be considered online for this study, with consideration of the latest generation additions and retirements in the study and adjacent areas

<sup>1</sup> The NPT project has an approved Proposed Plan Application.

<sup>2</sup> The NECEC, Three Corners Solar and Three Rivers Solar Power projects were not included due to insufficient modeling info at this time.

