Lower Maine (ME) 2030 Needs Assessment Scope of Work

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Purpose

- Present the Lower Maine (ME) 2030 Needs Assessment Scope of Work

Overview

- Background
- Objectives
- Study area geographic map and one-line diagram
- Modeling assumptions
- Peak load dispatches and transfer levels
- Minimum load study assumptions and dispatches
- Short circuit study assumptions
- Study methodology
- Schedule/Next steps

Background

- A Needs Assessment for the state of Maine was originally initiated in June 2017
- Due to the study in progress for the New England Clean Energy Connect (NECEC) HVDC Elective Transmission Upgrade (ETU), this assessment was split into Upper and Lower Maine
  - NECEC meets the criteria for inclusion in Needs Assessments, according to Attachment K[1]
  - Upper Maine was able to proceed using a simplified model of NECEC, and without modeling its required upgrades; Needs Assessment was completed in March 2020[2], Solutions Study is in progress
  - Lower Maine could not proceed until NECEC's System Impact Study was completed, and its required system upgrades were known

1 https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_2/oatt/sect_ii.pdf
2 https://smd.iso-ne.com/operations-services/ceii/pac/2020/03/final_ceii_ume_2029_na.pdf

Background, cont.

- On September 10, 2020, the ISO posted a Notice of Initiation of the Lower ME Needs Assessment
  - https://www.iso-ne.com/static-assets/documents/2020/09/2030_lower_maine_needs_assessment_study_initiation_pac_notice.pdf
- The triggers for this Needs Assessment are:
  - Assess compliance with reliability standards and criteria (including those established by the ISO, NERC, and NPCC) consistent with the long term needs of the system
  - Assess the adequacy of the transmission system capability, such as transfer capability, to support local, regional and interregional reliability
  - Examine short circuit performance of the system
  - Address system performance in consideration of de-list bids and cleared demand bids consistent with sections 4.1(c) and 4.1(f) of Attachment K

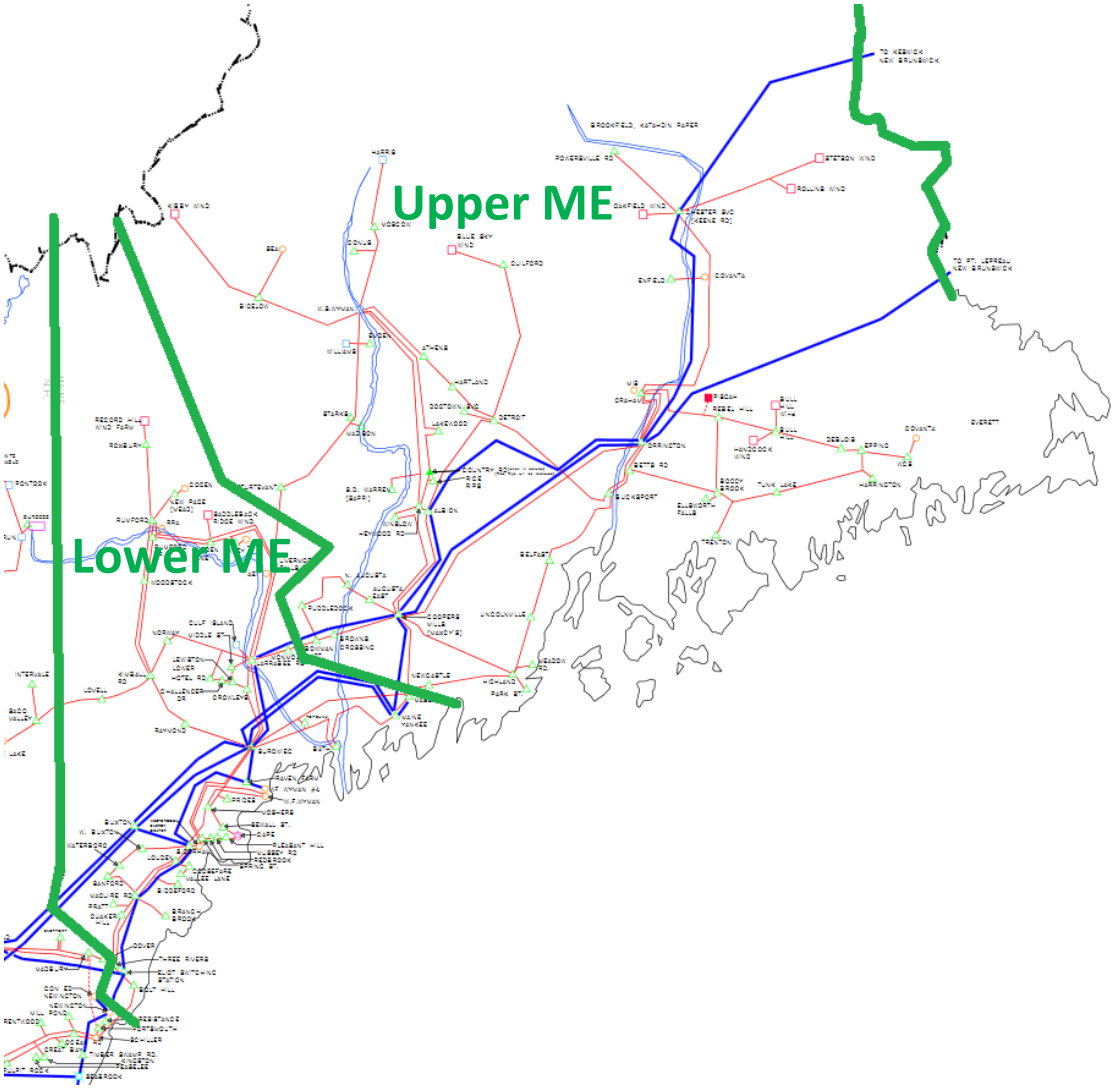
Objectives

- The objective of the Lower Maine (ME) Needs Assessment study is to evaluate the reliability performance and identify reliability-based needs in the Lower ME study area for the year 2030 while considering the following:
  - Future load conditions, updated to reflect the 2020 Capacity, Energy, Loads and Transmission (CELT) forecast[1]
  - Resource changes in the study area, based on FCA 14 results[2]
  - Reliability over a range of generation patterns and transfer levels
  - Coordination with Needs Assessments in the Upper ME and NH study areas
- Study will be consistent with NERC Standard TPL-001-4, "Transmission System Planning Performance Requirements", NPCC Directory # 1, "Design and Operation of the Bulk Power System", and ISO-NE Planning Procedure No. 3 (PP3), "Reliability Standards for the New England Area Pool Transmission Facilities"

1 https://www.iso-ne.com/static-assets/documents/2020/04/2020_celt_report.xlsx

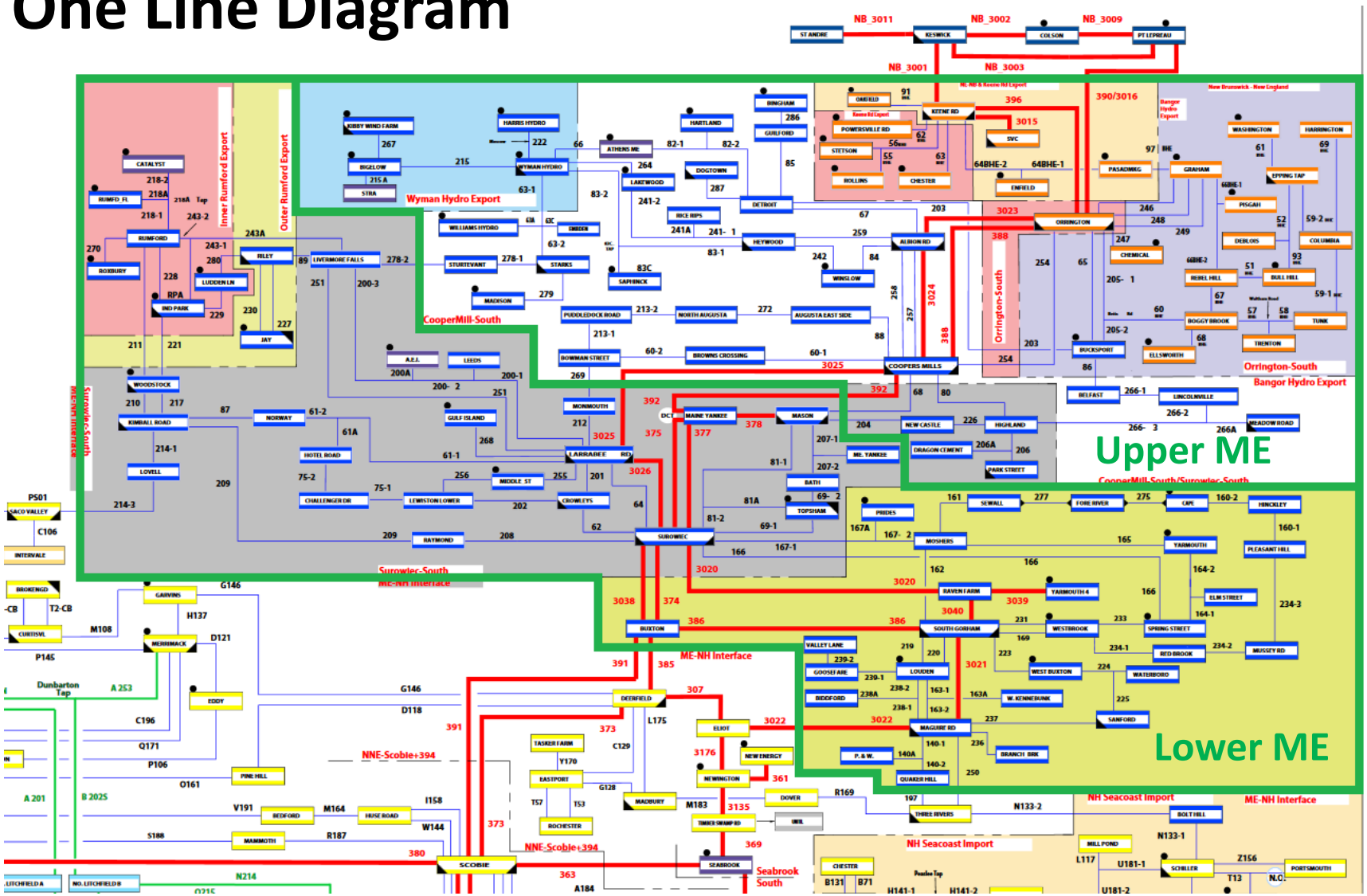
2 All generators with a submitted retirement de-list bid or non-price retirement request through FCA 15 are excluded from the base cases.

Geographical Map



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

One Line Diagram



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

Modeling Assumptions

- Study Horizon and Source of Basecase Models
  - This study will be focused on a study year of 2030 (a ten-year horizon)
  - The initial power flow study cases were issued to the Planning Advisory Committee (PAC) on August 13, 2020 as a part of the 2020 Transmission Planning Base Case Library[1]
- Existing Topology
  - All transmission and generation facilities that are in-service as of June 1, 2020 are included in the base cases, except for retiring resources (see next slide)
- Load Levels
  - The 2020 CELT report[2] is used to determine the forecasted loads for the peak load demand level
    - **34,043 MW** - 90/10 summer peak load (includes T&D losses)
  - A minimum load analysis will be performed at a fixed New England load of 7,680 MW (includes T&D losses)

1 2020 Transmission Planning Base Case Library link: https://smd.iso-ne.com/operations-services/ceii/pac/2020/08/ceii_final_ss_2020_tp_basecase_library.zip

2 2020 CELT Forecast data link: https://www.iso-ne.com/static-assets/documents/2020/04/2020_celt_report.xlsx

Modeling Assumptions, cont.

- Demand Resource Assumptions
  - New England Demand Resource Performance Assumptions

Load Level	Active-Demand Capacity Resources (ADCR)	Forecasted EE[2]
Summer Peak (90/10)	75%	100%

  - 553 MW[1] - 75% of ADCR that cleared in the Forward Capacity Market through FCA 14 (June 1, 2023 – May 31, 2024)
  - 5,749 MW[2] - 100% of 2020 CELT Energy Efficiency (EE) forecast for summer 2030

- Future Generation Assumptions
  - All cleared generator additions through FCA 14 will be modeled
  - All submitted retirement de-list bids or non-price retirement requests through FCA 15 will be excluded from the base cases

1 These values include 5.5% distribution losses.

2 Starting with the 2018 CELT, the EE Forecast includes all years in the 10 year planning horizon and the EE forecast data will be used for Years 1-3 in lieu of the Passive DR from the most recent FCA.

Modeling Assumptions, cont.

- Four generators have been set as out-of-service in the 2030 cases
  - One generator in New Hampshire (NH) fully de-listed for 3rd consecutive FCA[1]
    - Schiller 4 – ~48 MW
  - One generator in NH had a Qualified Capacity value of zero MW for FCA 13 and FCA 14
    - Indeck-Energy Alexandria – ~15 MW
  - Two generators in ME have cleared retirement de-list bids for FCA 14
    - Yarmouth 1 and 2 – ~50 MW each

1 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.

Modeling Assumptions, cont.

- Photovoltaic (PV) Generation Modeled utilizing the 2020 CELT PV Generation Forecast

PV generation Modeled as Negative Load		Study Year
		2030 Summer Peak (MW)[1]
New England	A – PV generation (nameplate) in New England	7,791
	B – 5.5% Reduction in Distribution Losses	+429
	C – Unavailable PV generation (A+B)x(100%-26%)	-6,083
	PV generation Modeled in Case as Negative Loads (A+B)-C	2,137

1 These values exclude explicitly modeled PV generators.

Modeling Assumptions, cont.

- New England New Load Levels (Excludes Transmission Losses)

Category	Summer Peak 2030 90/10 Load (MW)	Minimum Load 2030 (MW)
CELT Forecast	33,251	N/A
Fixed New England load	N/A	7,477[1]
Non-CELT Manufacturing load in New England	319	0
Available CELT 2020 EE Forecast for study year	-5,749	0
Available FCA 14 ADCR	-553	0
Available CELT 2020 PV Forecast for study year (modeled as negative load)	-2,137	0
Net load modeled in New England (Excludes Station Service)	25,131	7,477

1 The minimum load level has been reduced from 7,680 MW to 7,502 MW to account for the removal of transmission losses, and further reduced from 7,502 MW to 7,477 MW due to the treatment of the 25 MW manufacturing load at the SAPPI Westbrook facility, which is assumed to be consuming 0 MW and 0 MVAR under minimum load conditions.

Modeling Assumptions, cont.

- Transmission Upgrades Included in the Base Cases:
  - RSP Project Tracking Sheet - All reliability upgrades in the June 2020 RSP Project List (Table 1a and 1b) that were Proposed, Planned and Under Construction were included in the base cases
  - Asset Condition Tracking Sheet - In general, all Asset Condition projects that are listed in the June 2020 Asset Condition listing that were Planned, Proposed, or Under Construction are included in the base cases
  - Local System Plan (LSP) Projects Tracking Sheet – Using the information from the October 2019 LSP, projects with a PPA approval for which the ISO had modeling data available have been included in the base cases
  - Tracking sheets can be found at:
    - https://smd.iso-ne.com/operations-services/ceii/pac/2020/08/ceii_final_ss_2020_tp_basecase_library.zip

Modeling Assumptions, cont.

- The Needs Assessment will include capacity resources with financially binding contracts and State Sponsored Request for Proposals (RFP)
  - The New England Clean Energy Connect (NECEC) HVDC-based Elective Transmission Upgrade (ETU) project meets the requirements for being included in the Lower ME 2030 Needs Assessment to identify system reliability needs, according to Attachment K of the Open Access Transmission Tariff (OATT)[1]
  - The NECEC project and associated upgrades have been included in the study base cases

1 https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_2/oatt/sect_ii.pdf

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, demonstration of such contracts is accomplished through submittal for ISO review of an order or other similar authorization from the appropriate state regulatory agency, along with a copy of the contract, that together demonstrate the contractual requirements."

- If there are any resources that meet criteria (ii) and (iii) stated above that are not already included in this study, and that the ISO should consider for inclusion in the respective study area Needs Assessments, the proponents shall do the following no later than Friday, October 9th
  - Notify the ISO in writing via pacmatters@iso-ne.com
  - Provide the contract as part of the notification to the ISO

2030 Peak Load External Interface Assumptions

- 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

2030 Peak Load Probability Based Unavailability

- The table below summarizes the maximum unavailable generation that will be considered

Type of Group	Group of Generators	Max MW Unavailable Peak Load (2030)
Study Area (Largest Generator – Yarmouth #4 – 620 MW)	ME Generators	574
Study Area + Adjacent Area	ME+NH Generators	725
Receiving End of System Stress	Eastern New England	1,309

2030 Peak Load Basecase Dispatches

- Dispatches[1] that end in A and B have different stress on NB-NE interface
  - Dispatches with NB-NE=700 MW in A (example Dispatch D1A)
  - Dispatches with NB-NE=0 MW in B (example Dispatch D1B)

D1A	D1B	D2A	D2B	D3A	D3B	D4A	D4B	D5A	D5B	D6A	D6B
Yarmouth #4	Yarmouth #4	Westbrook	Westbrook	MIS	MIS	RPA	RPA	Yarmouth #3	Yarmouth #3	Yarmouth #3	Yarmouth #3
Schiller #6	Schiller #6	Indeck #5	Indeck #6	Verso Cogen #1	Verso Cogen #1	Bucksport G4	Bucksport G4	Ecomaine	Ecomaine	Ecomaine	Ecomaine
Canal G1	Canal G1	Schiller #6	Schiller #6	Athens	Athens	PERC	PERC	Cape #4	Cape #4	Cape #4	Cape #4
		Canal G1	Canal G1	Canal G1	Canal G1	Tamworth	Whitelake Jet	Cape #5	Cape #5	Cape #5	Cape #5
		Dartmouth Power	Dartmouth Power	Dartmouth Power	Dartmouth Power	Canal G1	Canal G1	Livermore	Livermore	Livermore	Livermore
						ANP Blackstone G2	ANP Blackstone G2	Sea Stratton	Sea Stratton	Sea Stratton	Sea Stratton
								Whitelake Jet	Whitelake Jet	Newington G1	Newington G1
								Schiller #6	Schiller #6	Tamworth	Tamworth
								Canal G1	Canal G1	Canal G1	Canal G1
								ANP Blackstone G2	ANP Blackstone G2		

	Generator unavailable in the study area
	Generator unavailable in the adjacent area
	Generator unavailable in the rest of area

1 Additional generation MW output may also be reduced or additional generators may be turned off as needed to ensure that no transfer limit was violated when establishing generation dispatches, reserves and energy balance.

2030 Peak Load Basecase Reserves

- The table below shows the amount of reserves available to be turned on after the first contingency in the N-1-1 analysis

Dispatch	Adjacent Area	Stress	Receiving End	Weekly Hydro in Study Area	Weekly Hydro in Receiving End[1]	Non-Renewable Generators in Receiving End	Non-Renewable Generators in Sending End	Total
D1A	ME	W/E	Eastern New England	168	321	669	41	1,200
D1B	ME	W/E	Eastern New England	168	321	669	41	1,200
D2A	ME	W/E	Eastern New England	168	321	669	41	1,200
D2B	ME	W/E	Eastern New England	168	321	669	41	1,200
D3A	ME	W/E	Eastern New England	168	321	669	41	1,200
D3B	ME	W/E	Eastern New England	168	321	669	41	1,200
D4A	ME	W/E	Eastern New England	168	321	669	41	1,200
D4B	ME	W/E	Eastern New England	168	321	669	41	1,200
D5A	ME	W/E	Eastern New England	168	321	669	41	1,200
D5B	ME	W/E	Eastern New England	168	321	669	41	1,200
D6A	ME	W/E	Eastern New England	168	321	669	41	1,200
D6B	ME	W/E	Eastern New England	168	321	669	41	1,200

1 Weekly Hydro in Receiving End does not include weekly hydro units in the study area.

2030 Interface Levels

- The table below shows the interface limits and the interface levels for the Lower ME 2030 Needs Assessment
- All interface transfers are within their limits, demonstrating that the established reserves are acceptable

Interface Name	Limit (MW)	Actual Interface Flows in Study Cases (MW)
NB-NE	700	0 or 700
Orrington South	1,325	0 to 1,186
Surowiec South	2,200	702 to 1,914
ME-NH	1,900	1,255 to 1,898
NNE Scobie + 394	3,450	2,843 to 3,058
West-East	3,000	1,653 to 1,920
North-South	2,725	2,489 to 2,724

2030 Peak Load Basecase Summary

- The table below shows the summary of peak load dispatches, MWs unavailable and transfer levels

Dispatch	MW Unavailable in Study Area and Adjacent Area (Maximum MW)[1]		MW Unavailable in Receiving End (Max MW[1])	External Interfaces Targets (Maximum Transfer Capability in MW)[2]			Additional Interfaces (Maximum Transfer Capability in MW)					
	ME (574)	ME+NH (725)	Eastern NE (1,309)	NY-NE (1,400)	NB-NE (700)	Phase II (1,400)	Orrington S (1,325)	Surowiec S (2,200)	ME-NH (1,900)	NNE Scobie+394 (3,450)	West-East (3,000)	N-S (2,725)
D1A	620	671	1,262	0	700	950	1,186	1,914	1,890	3,044	1,653	2,717
D1B	620	671	1,262	0	0	950	490	1,239	1,255	2,843	1,884	2,486
D2A	568	619	1,292	0	700	950	1,166	1,888	1,898	3,058	1,727	2,724
D2B	567	618	1,272	0	0	950	470	1,214	1,301	2,892	1,920	2,528
D3A	556	556	1,229	0	700	950	696	1,387	1,896	3,050	1,729	2,724
D3B	556	556	1,229	0	0	950	0	702	1,316	2,924	1,858	2,591
D4A	435	458	1,293	0	700	950	1,007	1,513	1,893	3,058	1,883	2,724
D4B	435	452	1,288	0	0	950	311	833	1,441	3,034	1,911	2,695
D5A	244	313	1,230	0	700	950	1,186	1,836	1,895	3,049	1,984	2,701
D5B	244	313	1,230	0	0	950	490	1,160	1,618	3,034	2,012	2,676
D6A	244	684	1,275	0	700	950	1,186	1,834	1,894	3,061	1,645	2,725
D6B	244	684	1,275	0	0	950	490	1,160	1,620	2,822	1,892	2,475

1 Maximum MW is the maximum unavailable MW of non-renewable generators based on probabilistic methods. The Maximum MW value excludes additional generation that was turned off or reduced to ensure that no transfer limit was violated when establishing generation dispatches, reserves, and energy balance.

2 Actual interface transfers may vary slightly from the targets due to power flow mismatches.

2030 Minimum Load Study Assumptions

- Majority of ME generators out of service
- All major NH and Boston generators out of service
- All NH, ME, VT and Boston shunt reactors online, as well as all dynamic reactive devices
- All pumped hydro generators out of service
- Low transfers across interfaces
- All transmission capacitors out of service

2030 Minimum Load Basecase Dispatches

- Two NB-NE transfer conditions are considered
  - NB-NE= 700 MW
  - NB-NE= 0 MW
- List of dispatched New Hampshire and Maine generators (PMax 20 MW or greater)

Generator	PMax (MW)	NB-NE=0 MW & NB-NE=700 MW
Comerford #3	45.48	ON
Comerford #4	45.48	ON
Moore #3	47.82	ON
Moore #4	47.82	ON
Monty Hydro	28.0	ON
Wyman Hydro	26.52	ON

Short Circuit Study Assumptions

- The short circuit basecase used for the Lower ME Needs Assessment is based on the expected topology in the 2025 steady state base case
  - No significant projects are expected in the 2025-2030 timeframe, and hence the 2025 case was considered acceptable
- The 2025 case includes the impact of all PPA approved generators and ETUs[1] (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 upon 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

[1] The Three Corners Solar project was not included due to insufficient modeling data at this time.

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
- Short circuit analysis will evaluate the circuit breaker short circuit momentary and fault interrupting duties at all substations in the study area

Scope of Work Document and Study Files

- The Lower ME 2029 Needs Assessment scope of work, cases and related study files were posted along with this presentation for stakeholder review and comment
  - https://www.iso-ne.com/system-planning/key-study-areas/maine/

Schedule/Next Steps

- Please submit comments on the materials in this presentation, scope of work, and study files to pacmatters@iso-ne.com by Friday, October 9th
- Project proponents or applicable stakeholders (as specified in Attachment K) shall notify the ISO in writing via pacmatters@iso-ne.com of any projects that are not included in this study, and have been selected in and are contractually bound by a state sponsored RFP or have a financially binding obligation pursuant to a contract, by Friday, October 9th
- Complete the Lower ME 2029 Needs Assessment, present to PAC, and post report – Q1 or Q2 2021

Questions