

# Eastern Connecticut (ECT) 2029 Needs Assessment Details – Revision 1



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*Revision to the April 25, 2019 Presentation*

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# Purpose

- Present the changes between the Eastern Connecticut (ECT) 2027 Needs Assessment and the ECT 2029 Needs Assessment



# Overview

- Background
- 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 ECT 2027 Solutions Study 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 being used in the ECT 2027 Solutions Study was too high
- The plan discussed at the March PAC Meeting<sup>1</sup> was to:
  - utilize the draft 2019 forecasts to update the models,<sup>2</sup>
  - discuss the changes in scope compared to the May 29, 2018 Needs Assessment,<sup>3</sup>
  - update the Needs Assessment to reflect the changes, and
  - include the updates in the study files and post them

1 [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)

2 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.

3 [https://smd.iso-ne.com/operations-services/ceii/pac/2018/05/final\\_ceii\\_ect\\_2027\\_na.pdf](https://smd.iso-ne.com/operations-services/ceii/pac/2018/05/final_ceii_ect_2027_na.pdf)



# Changes Between the 2027 and 2029 Study Years

Category	ECT 2027 Needs Assessment	ECT 2029 Needs Assessment
CELT	2017	Draft 2019
RSP Project List and Asset Condition List	As of June 2017	As of March 2018 <sup>1</sup>
Local System Plan (LSP) Projects	2016 TOPAC	2017 TOPAC <sup>2</sup>
Transmission Planning Base Case Library Used	2017	2018
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 area that have been added to the RSP Project List and Asset Condition List since March 2018 up to the March 2019 update have been added to the cases.

<sup>2</sup> Transmission owners' LSPs from the 2018 TOPAC were reviewed and no projects relevant to the study area were found.

<sup>3</sup> Generators relevant to the study area have been added to the cases.



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

- 108-4 Line Reconductoring
  - A revised PPA for the project was presented at the December 18, 2018 RC meeting
  - The revised ratings have been included in the 2029 cases
- QP 724 received a Capacity Supply Obligation (CSO) and has been added to the 2029 cases:
  - Killingly Energy Center – 631.96 MW (on 3271 line)
- Two solar projects in the study area have received CSO's and have been added to the 2029 cases:
  - Fusion – 7.44 MW (served from Tunnel substation)
  - Pawcatuck – 9.00 MW (served from Shunock substation)



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

- Eversource has provided updated ratings (PP-7 reviews) for three lines which have been included in the cases

Line	Existing			New			Delta (MW)		
	Normal	LTE	STE	Normal	LTE	STE	Normal	LTE	STE
1465	219	284	306	217	278	302	-2	-6	-4
1280-1	297	382	434	293	340	432	-4	-42	-2
1607-1	297	382	434	293	378	432	-4	-4	-2



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

- The ECT 2029 Needs Assessment will consider multiple scenarios to capture stakeholder feedback on the subject of QP 624 (Vineyard Wind) and the New England Clean Energy Connect (NECEC) project
- Vineyard Wind is an 800 MW off shore wind project interconnected to SEMA and NECEC is a 1,090 MW project that interconnects to the Larrabee Road substation in Maine and were selected as the part of state sponsored RFPs
  - Vineyard Wind and NECEC do not have a MA DPU approved contract however the ISO recognizes that these projects may be approved prior to or soon after the completion of this Needs Assessment
- In summary, two sets of cases were created:
  - Scenario 1 – A set of base cases with Vineyard Wind (dispatched at 160 MW<sup>1,2</sup>)
  - Scenario 2 – A set of base cases with Vineyard Wind (dispatched at 160 MW<sup>1,2</sup>) and NECEC (dispatched at 1,090 MW)

<sup>1</sup> Assumes the proponent of Vineyard Wind informs the ISO, in writing, of its selection or its assumption of financially binding obligations per Section 4.1(f) of Attachment K

<sup>2</sup> Vineyard Wind is a 800 MW off-shore wind project. Based on the Transmission Planning Guide, Vineyard Wind will be dispatched at 20% of its output, which is 160 MW.





# 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</sup>	2029 Summer Peak (MW) <sup>1</sup>
New England	A – PV generation (nameplate) in New England	4,712	6,652
	B – 5.5% Reduction in Distribution Losses	+259	+366
	C – Unavailable PV generation $(A+B) \times (100\% - 26\%)$	-3,679	-5,193
	<b>PV generation Modeled in Case as Negative Loads (A+B)-C</b>	<b>1,292</b>	<b>1,825</b>

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



# 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 (Draft value for 2029)	34,043	32,468
Non-CELT Manufacturing load in New England	320	318
Available FCA 11 Passive DR (modeled as negative load)	-2,826	N/A
Available FCA 11 Active DR (modeled as negative load)	-373	N/A
Available FCA 12 ADCR <sup>1</sup> (modeled as negative load)	N/A	-478
Available 2017 CELT EE Forecast for study year (modeled as negative load)	-1,715	N/A
Available draft 2019 CELT EE Forecast <sup>2</sup> for study year (modeled as negative load)	N/A	-5,284
Available 2017 CELT PV Forecast for study year (modeled as negative load)	-1,292	N/A
Available draft 2019 CELT PV Forecast for study year (modeled as negative load)	N/A	-1,825
<b>Net load modeled in New England (Excludes Station Service)</b>	<b>28,157</b>	<b>25,199</b>

<sup>1</sup> The 2018 CELT Active DR is based on the Active Demand Capacity Resource (ADCR) in Tab 5.2 of the 2018 CELT report for the 2021-2022 commitment period.

<sup>2</sup> Starting with 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.

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

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

Type of Group	Group of Generators	Max MW Unavailable Peak Load (2027)	Max MW Unavailable Peak Load (2029)
Study Area (Largest Generator – Montville – 407 MW)	ECT Generators	473	466
Study Area + Adjacent Area	ECT + Rest of CT Generators	1,363	1,288
	ECT + RI Generators	641	467
Receiving End of System Stress	Eastern New England	1,554	1,276
	Western New England	1,424	1,394

# 2029 Dispatches

- Two generation unavailability dispatches for Stress A and two generation unavailability dispatches for Stress B will be evaluated for the ECT 2029 Needs Assessment
- The 2029 dispatches are the same as the 2027 dispatches with the exception of the following:
  - Dispatch 3A – SECREC is replaced by Lisbon in the study area
  - Dispatch 4B – Lisbon is replaced by Tunnel 10 in the study area
- The dispatches are the same for Scenario 1 and Scenario 2

90/10			
1A	2B	3A	4B
Montville 6	Plainfield	Montville 5	Montville 6
Norwich	Tunnel 10	Lisbon	Tunnel 10
SECREC	Lisbon	Millstone 2	Johnston
Montville 10	Montville 11	Milford 1	NEA Bellingham
Towantic	Franklin/Manchester 9	West Springfield 3	Milford, MA
Devon 11	Johnston		Potter 2
Devon 13	NEA Bellingham		Kendall
West Springfield 3	Milford, MA		Dighton
	Potter 2		Medway Peaker 1
	Kendall		Dartmouth A, B
	Dighton		Wheelabrator
	Medway Peaker 1		MBTA
	Dartmouth A, B		MMWEC
<b>Legend</b>			
	Generators Unavailable in Study Area		
	Generators Unavailable in Adjacent Areas		
	Generators Unavailable in Receiving End		

A 20 MW threshold for units unavailable in the receiving end was used

# 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 ECT 2029 Needs Assessment
- The reserves are the same for Scenario 1 and Scenario 2

Dispatch	Adjacent Area	Stress	Receiving End (MW)	Priority 1 Reserves		Priority 2 Reserves		Priority 3 Reserves	Total
				Weekly Hydro Receiving End (MW)	Weekly Hydro Sending End (MW)	Pumped Hydro WMA (MW)	Non-Renewable Generators Receiving End (MW)	Non-Renewable Generators Sending End (MW)	
1A	Rest of CT	E/W	Western	174	0	918	109	0	1,200
2B	RI	W/E	Eastern	499	0	0	670	31	1,200
3A	Rest of CT	E/W	Western	174	0	918	109	0	1,200
4B	RI	W/E	Eastern	499	0	0	670	31	1,200

# 2029 Interface Levels

The table below shows the interface limits and the interface levels for Scenario 1 and Scenario 2 for the ECT 2029 Needs Assessment

Interface Name	Limit (MW)	Scenario 1 90/10 Range (MW)	Scenario 2 90/10 Range (MW)
East-West	3,500	-2,969 to -2,331	-2,343 to -1,946
West-East	3,000	2,338 to 2,987	1,959 to 2,349
SEMA/RI Import	1,280	-634 to 153	-634 to 145
SEMA/RI Export	3,400	-148 to 640	-142 to 640
CT Import	3,400	-1,307 to -814	-2,192 to -17
CT Export	No limit has been established	814 to 1,307	17 to 2,192

# 2029 Summary – Scenario 1

- The table below shows the summary of peak load dispatches, MWs unavailable and transfer levels for Scenario 1 for the ECT 2029 Needs Assessment
- The 2029 Summary for Scenario 2 is found in the Appendix

Dispatch	Load Level	Adjacent Area	MW Unavailable in Study Area and Adjacent Area (Maximum MW <sup>2</sup> )			MW Unavailable in Receiving End (Maximum MW <sup>2</sup> )		External Interfaces Targets <sup>3</sup> (Maximum Transfer Capability in MW)			Additional Interfaces (Maximum Transfer Capability in MW)	
			ECT (466/100)	ECT + Rest of CT (1,288)	ECT + RI (467)	Western (1,394)	Eastern (1,276)	NY-NE (1,400)	NB-NE (700)	Phase II (1,400)	E-W (3,500)	W-E (3,000)
			1A <sup>1</sup>	90/10	Rest of CT	441	1,272	N/A	1,371	N/A	0	700
2B	90/10	RI	76	N/A	254	N/A	1,269	1,400	0	950	N/A	2,987
3A	90/10	Rest of CT	99	1,276	N/A	1,375	N/A	0	700	1,400	-2,331	N/A
4B <sup>1</sup>	90/10	RI	424	N/A	446	N/A	1,252	1,400	0	950	N/A	2,960

<sup>1</sup> For dispatches with Montville 6 OOS, the MW unavailable threshold calculation includes the Montville 6 EFORD value

<sup>2</sup> Maximum MW is the Maximum unavailable MW of non-renewable generators based on probabilistic methods

<sup>3</sup> Actual interface transfers may vary slightly from the targets due to power flow mismatches



# Schedule/Next Steps

- Please submit comments on the materials in this presentation to [pacmatters@iso-ne.com](mailto:pacmatters@iso-ne.com) by Sunday, May 12<sup>th</sup>
- Proponents of state sponsored RFPs shall notify the ISO in writing via [pacmatters@iso-ne.com](mailto:pacmatters@iso-ne.com) by Sunday, May 12<sup>th</sup>
- Post 2029 Needs Assessment intermediate study files – Q2 2019
- Complete the study area 2029 Needs Assessment, present to PAC, and post report – Q3 or Q4 2019



# Questions



# APPENDIX

# Objectives

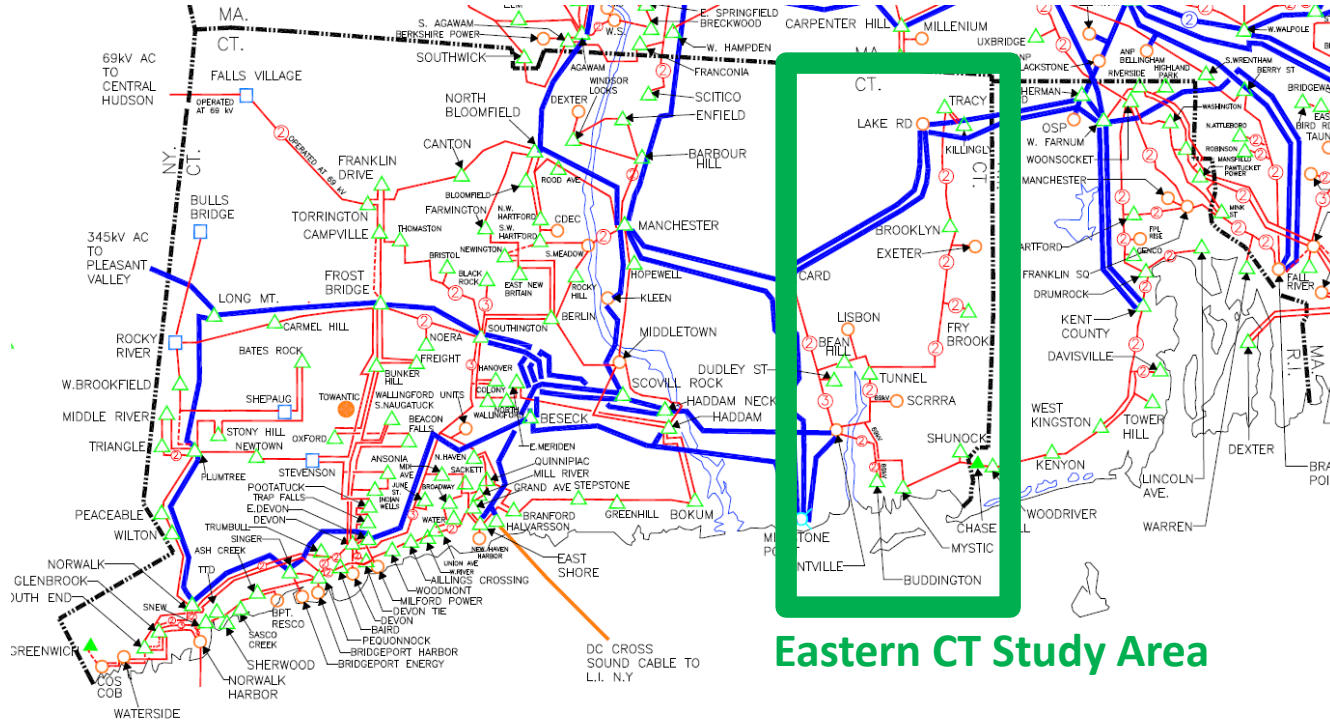
The objective of the ECT Needs Assessment study is to evaluate the reliability performance and identify reliability-based needs in the ECT study area for the year 2029 while considering the following:

- 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>
- Additional scenario analysis with QP 624 (Vineyard Wind) and the New England Clean Energy Connect (NECEC) projects in-service
- Reliability over a range of generation patterns and transfer levels
- Coordination with the proposed Southeastern Massachusetts and Rhode Island (SEMA/RI) projects and the new 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

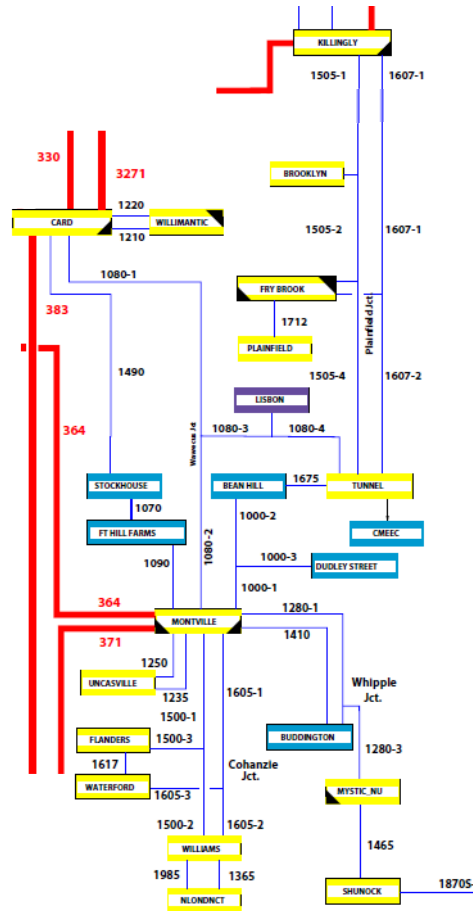
# ECT Geographical Map



Eastern CT Study Area

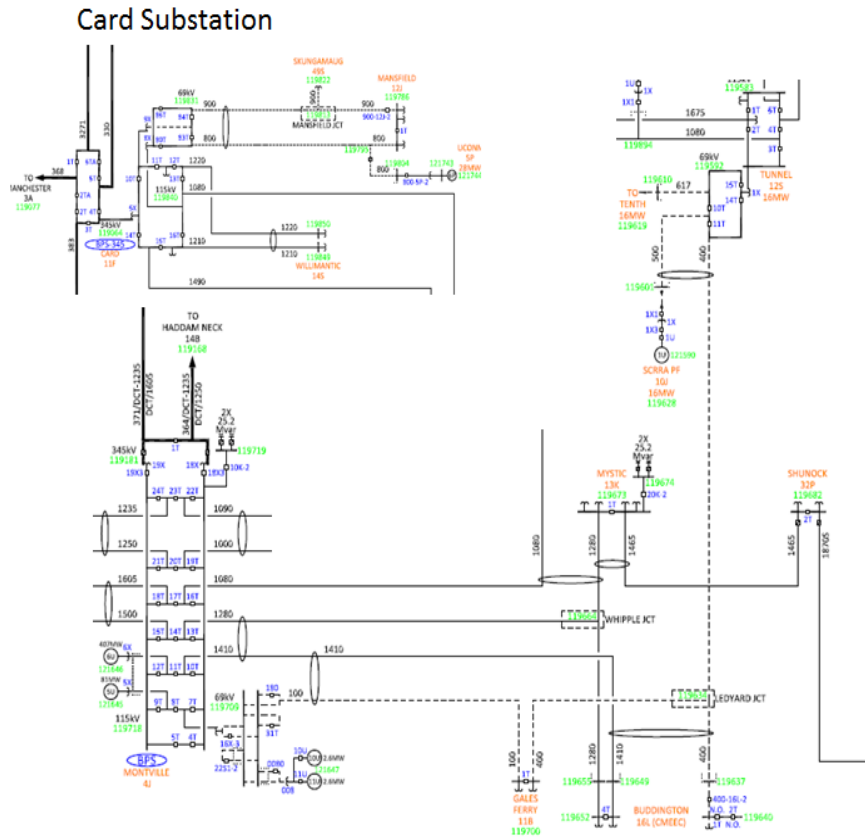
The map is shown for reference only and does not include all of the latest topology changes

# ECT One Line Diagram



The diagram is for illustrative purposes to show the study area. It does not show any future projects in the area. This diagram shows the 115 kV system and above and does not depict the 69 kV system.

# ECT One Line Diagram, cont.



The diagram is for illustrative purposes to show the 69 kV study area. It does not show any future projects in the area.

# Initial Study Files

- The 2029 Needs Assessment cases and files were created from the 2028 Needs Assessment cases and files. The details concerning the creation of the 2028 Needs Assessment are shown below and on the next slide
- The draft initial 2028 Needs Assessment cases and files and the draft Summary Document for 2018 Transmission Planning Base Case Library Review were posted on June 21, 2018 for stakeholder review and comment
- After the stakeholder comment period, the ISO posted:
  - the final initial 2028 Needs Assessment cases and study files, that will be used for the ECT 2029 Needs Assessment,
    - [https://smd.iso-ne.com/operations-services/ceii/pac/2018/07/ceii\\_final\\_na\\_2018\\_tp\\_library\\_basecase.zip](https://smd.iso-ne.com/operations-services/ceii/pac/2018/07/ceii_final_na_2018_tp_library_basecase.zip)
    - Any other changes made to the initial study files since their posting on 7/13/2018 will be included in the intermediate study files
  - the final Summary Document for 2018 Transmission Planning Base Case Library Review, and
    - [https://smd.iso-ne.com/operations-services/ceii/pac/2018/07/ceii\\_summary\\_document\\_for\\_2018\\_transmission\\_planning\\_base\\_case\\_library.zip](https://smd.iso-ne.com/operations-services/ceii/pac/2018/07/ceii_summary_document_for_2018_transmission_planning_base_case_library.zip)
  - the document responding to stakeholder comments
    - [https://www.iso-ne.com/static-assets/documents/2018/07/iso\\_ne\\_response\\_to\\_stakeholder\\_comments\\_on\\_the\\_2018\\_transmission\\_planning\\_base\\_case\\_library\\_review.pdf](https://www.iso-ne.com/static-assets/documents/2018/07/iso_ne_response_to_stakeholder_comments_on_the_2018_transmission_planning_base_case_library_review.pdf)

# Modeling Assumptions

- Transmission Upgrades Included in the Base Cases
  - RSP Project Tracking Sheet – All reliability upgrades in the March 2018 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 March 2018 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 2017 TOPAC, all future LSP projects for which the ISO had modeling data available have been included in the base cases
  - Approved PPAs Tracking Sheet – Transmission projects with an approved PPA as of May 16, 2018 that are not covered under the previously discussed tracking sheets and are not in-service as of May 16, 2018 have been included in the base cases
  - See Appendix E of the Summary Document for 2018 Transmission Planning Base Case Library Review to access all of the tracking sheets
    - [https://smd.iso-ne.com/operations-services/ceii/pac/2018/07/ceii\\_summary\\_document\\_for\\_2018\\_transmission\\_planning\\_base\\_case\\_library.zip](https://smd.iso-ne.com/operations-services/ceii/pac/2018/07/ceii_summary_document_for_2018_transmission_planning_base_case_library.zip)



# Modeling Assumptions, cont.

- Demand Resource Assumptions

- New England Demand Resource Performance Assumptions

Load Level	Active Demand Capacity Resource (ADCR)	Forecasted EE
Summer Peak (90/10)	75%	100%

- **479 MW<sup>1</sup>** - 75% of ADCR that cleared in the Forward Capacity Market through FCA 12 (June 1, 2021 – May 31, 2022)
- **5,284 MW<sup>1</sup>** - 100% of draft 2019 CELT Energy Efficiency (EE) forecast for the year 2029

- Future Generation Assumptions

- All cleared generator additions through FCA 12 will be modeled with the exception of QP 489 (Clear River)<sup>2</sup>
- Pertinent generator additions relevant to the study area from FCA 13 are modeled
  - Vineyard Wind
  - Killingly Energy Center
- All submitted retirement de-list bids through FCA 14 will be excluded from the base cases
- Additional scenario analysis with Vineyard Wind and NECEC in-service

<sup>1</sup> Includes 5.5% distribution losses

<sup>2</sup> Capacity Supply Obligation termination filing:

[https://www.iso-ne.com/static-assets/documents/2018/09/clear\\_river\\_1\\_involuntary\\_res\\_term.pdf](https://www.iso-ne.com/static-assets/documents/2018/09/clear_river_1_involuntary_res_term.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, 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 shall do the following no later than Sunday, May 12:
  - 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

# Set Renewable Generation and Imports

- Renewable generation in New England including the ECT study area 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 and 1,400
Cross Sound Cable HVDC From Long Island to New England (CSC)	0
Phase II HVDC from Quebec to New England (Phase II)	950 and 1,400
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 hydro units
  - Priority 3 – Sending end non-renewable generators
- The reserves will be established following the priority order noted above



# Establish Reserves

- For the reserves the total of 1200 MW of reserves are established as follows
  - Priority 1 Reserves – There are 174 MW on the Western receiving end and 499 MW on the Eastern receiving end of weekly hydro units
  - Priority 2 Reserves – There are 918 MW of pumped hydro units and 109 MW of receiving end non-renewable generators that result in a total of 1027 MW of priority 2 reserves on the Western receiving end. There are 701 MW of receiving end non-renewable generators of non-renewable generators on the Eastern receiving end
  - Priority 3 Reserves – Since priority 1 and priority 2 reserves cover the total 1200 MW reserve requirement for the Western receiving end there is no need to consider any sending non-renewable. For Eastern receiving end 31 MW of non-renewable generators were needed to achieve 1200 MW of reserves

# Minimum Load Assumptions

- One minimum load study was done for all of Connecticut under the Southwest Connecticut (SWCT) study
- Results are discussed in the SWCT Needs Assessment report
  - [https://smd.iso-ne.com/operations-services/ceii/pac/2018/07/final\\_ceii\\_swct\\_2027\\_na.pdf](https://smd.iso-ne.com/operations-services/ceii/pac/2018/07/final_ceii_swct_2027_na.pdf)



# 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 analysis will be performed with representation of the latest generation additions and retirements in the study area



# 2029 Summary – Scenario 2

Dispatch	Load Level	Adjacent Area	MW Unavailable in Study Area and Adjacent Area (Maximum MW <sup>2</sup> )			MW Unavailable in Receiving End (Maximum MW <sup>2</sup> )		External Interfaces Targets <sup>3</sup> (Maximum Transfer Capability in MW)			Additional Interfaces (Maximum Transfer Capability in MW)	
			ECT (466/100)	ECT + Rest of CT (1,288)	ECT + RI (467)	Western (1,394)	Eastern (1,276)	NY-NE (1,400)	NB-NE (700)	Phase II (1,400)	E-W (3,500)	W-E (3,000)
			1A <sup>1</sup>	90/10	Rest of CT	441	1,272	N/A	1,371	N/A	0	700
2B S2	90/10	RI	76	N/A	254	N/A	1,270	1,400	0	950	N/A	1,979
3A	90/10	Rest of CT	99	1,276	N/A	1,375	N/A	0	700	1400	-2331	N/A
4B <sup>1</sup> S2	90/10	RI	424	N/A	446	N/A	1,252	1,400	0	950	N/A	1,959

<sup>1</sup> For dispatches with Montville 6 OOS, the MW unavailable threshold calculation includes the Montville 6 EFORD value

<sup>2</sup> Maximum MW is the Maximum unavailable MW of non-renewable generators based on probabilistic methods

<sup>3</sup> Actual interface transfers may vary slightly from the targets due to power flow mismatches





# Short Circuit Basecase Assumptions

- The short circuit basecase used for the ECT Needs Assessment is based on the expected topology in 2023 compliance steady state base case
  - 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 (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

