EVERSOURCE

July 2021

Affected System Operator (ASO) Studies – Level 3 ASO Projects

July Update

This is Eversource's monthly report to Level 3 customers who have ASO projects undergoing transmission studies that were announced on October 24, 2019. This update includes projects that are in the Level 3 ASO study that commenced on April 6, 2020. With the MA DPU approval of D.P.U. 19-55 and with issuance of the *DG Guidelines For Interconnection*, these monthly reports will be going out on the first business day of each month moving forward while the ASO remains underway. The *DG Guidelines For Interconnection* have been posted to Eversource's ASO website for quick reference.

In summary, the Level 3 ASO Study pool currently consists of 79 projects that have opted in totaling approximately 350MW across MA. Eversource has made tremendous progress conducting and completing in-house one of the largest, complex PSCAD studies in New England. Multiple draft reports have been sent to ISO-NE for their review and comment, broken into batches of results starting in June and most recently on July 17th. Eversource has communicated the upgrades needed via the final results presented to customers at a meeting held on July 27th. These upgrades focus on reconductoring of the 191 line in the SEMA/Cape areas. Prior to submitting the Proposed Plan Applications (PPAs) to ISO-NE for the August agenda, customers will have the opportunity to review their project's PPA to verify its accuracy.

Customers impacted by these Level 3 ASO studies were notified via email of the need for a transmission study and their study level in November 2019, after there was mutual agreement on study levels by project between ISO-NE and Eversource.

These reports are emailed monthly and can be found on the ASO website:
https://www.eversource.com/content/ema-c/about/about-us/doing-business-with-us/builders-contractors/interconnections/massachusetts/affected-system-operator-studies

Throughout the study process, please direct questions to the ASO mailbox at ASOStudyInquiry@Eversource.com so that they may be directed to the appropriate party for response and if applicable added to the ASO Website's FAQ section for others to review.

1. **What is the scope and process for projects in the ASO study?**
ASO transmission studies are required when a DG applicant's project has the potential to impact existing saturation levels at a substation in Eversource's territory that may have implications to Eversource's transmission system or to other transmission companies or bulk power operators. The primary affected parties in Eversource's Massachusetts territories are: ISO-New England, National Grid, Until and various municipal light departments.

Level 0 Studies
From a process perspective, for projects that are not automatically triggering a Level 3 transmission study (projects ≥ 5MW), Eversource's Transmission Planning and Transmission Interconnections teams submit pre-screening forms to ISO-NE for concurrence. ISO-NE reviews the screening technical justification and typically will provide a response on concurrence within 2-3 weeks; Eversource's Transmission team checks in for updates on ISO-NE's decision on a weekly basis. When concurrence is received from ISO-NE, Eversource Transmission submits the Level 0 I.3.9 proposed plan application (PPA) package to the New England Power Pool (NEPOOL) Reliability Committee (RC) for inclusion on the upcoming agenda. Some of these projects may necessitate transfer limit analysis to ensure no degradation of interface limits. If adverse impacts are found, a Level 3 transmission study will be required.

Level 3 Studies
For projects that trigger a Level 3 analysis, a two-step process is implemented. When concurrence is received from ISO-NE on the study level, Eversource Transmission Planning prepares the study scope and assumptions which are also reviewed by ISO-NE. Generally, Level 3 transmission study scopes include thermal and voltage steady state analysis, as well as short circuit and stability analyses. Once the study scope is finalized, the study is performed and the Eversource Transmission Interconnections team attaches the study results to the I.3.9 PPA package to the NEPOOL RC for inclusion on the upcoming agenda.

Once Eversource's Transmission Interconnections team receives the approval letter from ISO-NE, which is usually sent out prior to the next month's RC meeting, Account Executives notify the customer of final project approval.

2. **What are the roles and responsibilities of all parties involved in executing the Level 3 ASO study?**
Eversource Transmission Planning and Transmission Interconnections teams work closely with ISO-NE to ensure ASO studies are performed consistently with ISO-NE tariffs and planning procedures and study parameters agreed upon by ISO-NE and Eversource. Eversource is the electric distribution and transmission company providing ISO-NE with the applicant's project information and transmission analysis results for review and approval. ISO-NE is the bulk power system operator for New England that reviews and concurs or rejects Eversource Transmission Planning teams' proposed transmission study level and results. The NEPOOL Reliability Committee reviews the PPAs at their monthly meetings and provides an advisory recommendation (approve or reject) to ISO-NE on each application. The interconnecting

customer is required to provide inputs to Eversource, such as PSCAD models and project details like mechanical completion date, to complete the I.3.9 PPA package.

3. **What are the standards and jurisdiction of this ASO study?**
   The ASO study is subject to tariffs and agreements under the jurisdiction of the Federal Energy Regulatory Commission. When required, transmission impact studies are governed primarily by ISO-NE tariff Section I.3.9 and ISO-NE Planning Procedures PP5-1 and PP5-3. Some of the reliability standards applicable to these studies, as referenced in PP5-3, are contained in ISO-NE Planning Procedure 3, but others exist as well. For example, elements of NERC's PRC-006-NPCC-1 underfrequency protection criteria and IEEE 1547 are often used to model resources in stability analyses.

   FERC certified The North American Electric Reliability Corporation (NERC) as the Electric Reliability Organization (ERO) in 2006. The ERO is responsible for developing and enforcing reliability standards within the United States. In executing part of its responsibilities, NERC delegates authority to Regional Entities to perform certain functions through delegation agreements. Ensuring the reliability of the bulk power system for New York and the six New England States was delegated from NERC to the Northeast Power Coordinating Council (NPCC). Using the reliability standards developed by these entities, the objective of the ASO studies is to demonstrate that the projects under study have no significant adverse effect on the transmission system.

   Also, the New England Participating Transmission Owners (PTOs), including Eversource's operating companies, executed a Transmission Operating Agreement with ISO-NE in 2005. TOA Section 3.03(b) establishes the obligation for the PTOs to notify ISO-NE when multiple distributed generators may have cumulative impacts affecting the transmission system and consult with ISO-NE in its performance of impact studies.

4. **What are the estimated timelines for completion of the ASO study for Level 3 projects?**
   The Level 3 ASO study commenced on April 6, 2020. After addressing the changes across the steady state and stability cases that were triggered by 177MW of distributed generation (DG) attrition in National Grid's service area, the Eversource Transmission team has been focused on aligning all the customer data to be utilized in the PSCAD studies.

   With the PSCAD study completion, the next step will be to present all final results to ISO-NE for their concurrence and then being able to proceed to ISO-NE's Reliability Committee (RC) meeting. The Cape and SEMA projects are on track for being presented at the August 2021 RC meeting. Eversource held separate Affected Parties and Customer Update meetings on July 27th in advance of attending the August RC. Upon receipt of RC approval, the SEMA/Cape Level 3 study will be completed.

   The Western Massachusetts (WMA) and Greater Boston regions did not require PSCAD studies. Due to these PSCAD study requirements differing, the WMA customers had their projects presented at the ISO-NE RC meeting in January and the Greater Boston customer had their project presented at February 2021 meeting. All five Level 3 WMA projects received approval at the January RC meeting and the 1 Greater Boston project received approval at the February meeting.

ISO-NE requested to add sensitivity cases that will include the FERC interconnection project (QP876) in the SEMA area, which started its System Impact Study in January 2021. Eversource has completed the development of sensitivity cases for the QP876 project and the additional steady state, stability, short circuit and PSCAD analyses. During the PSCAD study process, two customer models were identified as not meeting the ride-through criteria. To date, both customers have provided updated models and the Eversource Transmission team is working to review and verify the criteria has been met. Additionally, ISO-NE has requested additional faults to be tested in PSCAD cases. The following is a milestone schedule that Eversource will provide additional detail on in its subsequent reports and progress updates:

Milestone	Target Completion	Status	Lead
Base Case Model Request to ISO-NE	4/2/2020	Complete	
Base Case Models Provided by ISO-NE	4/6/2020	Complete	
Level 3 Study Commencement	4/6/2020	Complete	
Project Model Validation	5/15/2020	Complete	
Progress Update to Developers & DPU	5/29/2020	Complete	Eversource
Updated Base Case Models Provided by ISO-NE	By 6/30/2020	Complete	ISO-NE
Study Assumption Review 1st Meeting with ISO-NE Management	6/19/2020	Complete	Joint Eversource & ISO-NE
Study Assumption Review 2nd Meeting with ISO-NE Management	7/2/2020	Complete	Joint Eversource & ISO-NE
Study Assumptions Concurrence with ISO-NE	7/2/2020	Complete	Joint Eversource & ISO-NE
Study Base Case Validation	7/10/2020	Complete	Eversource
Project Model Development – Steady State	7/17/2020	Complete	Eversource

Project Model Development – Stability	7/17/2020	Complete	Eversource
Create Steady State Peak Load Pre-Project Case	7/31/2020	Complete	Eversource
Create Steady State Peak Load Post-Project Case	8/7/2020	Complete	Eversource
Create Steady State Shoulder Load Pre-Project Case	8/18/2020	Complete	Eversource
Create Steady State Light Load Pre-Project Case	8/18/2020	Complete	Eversource
Create Steady State Minimum Load Pre-Project Case	8/21/2020	Complete	Eversource
Affected Party Scoping Meeting	8/31/2020	Complete	Eversource
Progress Update to Developers & DPU	9/1/2020 and 9/17/2020	Complete	Eversource
Create Steady State Shoulder Load Post-Project Case	9/4/2020	Complete	Eversource
Create Steady State Light Load Post-Project Case	9/4/2020	Complete	Eversource
Create Steady State Minimum Load Post-Project Case	9/4/2020	Complete	Eversource
PSCAD training	9/14/2020	Complete	Eversource
PSCAD Study Assumption Discussion with ISO-NE	9/16/2020	Complete	Eversource/ISO-NE
PSCAD Study Assumption Follow-up Discussion with ISO-NE	9/18/2020	Complete	Eversource/ISO-NE
Create Steady State Shoulder Load Sensitivity Cases	9/25/2020	Complete	Eversource
Create Steady State Light Load Sensitivity Cases	9/25/2020	Complete	Eversource

Create Steady State Minimum Load Sensitivity Cases	9/25/2020	Complete	Eversource
Complete Stressed Steady State Peak Load Cases	9/25/2020	Complete	Eversource
Preliminary results to ISO-NE	9/30/2020 – delayed	Pending updates to reflect NGRID WMA attrition	Eversource
Complete Stability Light Load Pre-Project Case	9/30/2020	Complete	Eversource
Complete Stability Peak Load Pre-Project Case	9/30/2020	Complete	Eversource
Receive model files from National Grid	9/28/2020	Complete	Eversource and National Grid
Incorporating NGRID model files in cases	10/5/2020	Complete	Eversource
Update Steady State Shoulder Load Cases	10/12/2020	Complete	Eversource
Update Steady State Light Load Cases	10/12/2020	Complete	Eversource
Update Steady State Minimum Load Cases	10/19/2020	Complete	Eversource
Update Steady State Peak Load Cases	10/26/2020	Complete	Eversource
Update Stability Light Load Pre-Project Case	10/26/2020	Complete	Eversource
Update Stability Peak Load Pre-Project Case	10/26/2020	Complete	Eversource
Additional 2022 EMA Sensitivity Steady State Shoulder Load Cases per ISO-NE request	10/30/2020	Complete	Eversource
Additional 2022 EMA Sensitivity Steady State Light Load Cases per ISO-NE request	10/30/2020	Complete	Eversource
Additional 2022 EMA Sensitivity Steady State Minimum Load Cases per ISO-NE request	10/30/2020	Complete	Eversource
Additional 2022 EMA Sensitivity Steady	10/30/2020	Complete	Eversource

State Peak Load Cases per ISO-NE request			
Complete Stressed Stability Cases	11/6/2020	Complete	Eversource
Additional 2022 EMA Sensitivity Stability Cases per ISO-NE request	11/6/2020	Complete	Eversource
Preliminary WMA Steady State Results to ISO-NE	11/18/2020	Complete	Eversource
Preliminary EMA Steady State Results to ISO-NE	11/23/2020	Complete	Eversource
Short Circuit Pre-Project Case	12/8/2020	Complete	Eversource
Short Circuit Post-Project Case	12/8/2020	Complete	Eversource
Update to Affected Parties and Developers (separate meetings)	12/11/2020	Complete	Eversource
PSCAD Study Scope for SEMA/Cape submitted to ISO-NE	1/18/2021	Complete	Eversource, ISO-NE
Projected PPA approval at ISO-NE RC (WMA)	1/20/2021	Complete	Eversource, WMA Level 3 Customers
Receive QP876 models from ISO-NE	1/31/2021 and 2/18/2021	Complete	ISO-NE
Additional SEMA Steady State Sensitivity Cases for QP876 (requested by ISO-NE)	3/31/2021	Complete	Eversource
Additional SEMA Stability Sensitivity Cases for QP876 (requested by ISO-NE)	3/31/2021	Complete	Eversource
Additional Short Circuit Sensitivity Case for QP876 (requested by ISO-NE)	3/31/2021	Complete	Eversource
PSCAD Study Scope (SEMA and Cape)	1/31/2021	Complete	Eversource

PSCAD Model Validation (SEMA and Cape)	Targeting 3/1/2021 – awaiting updated PSCAD modeling data from customers	Complete	Eversource, SEMA and Cape Level 3 Customers
Projected PPA approval at ISO-NE RC (Greater Boston)	2/16/2021	Complete	Eversource, Greater Boston Level 3 Customer
PSCAD Base Case Development and Testing (SEMA and Cape)	2/15/2021 - 3/20/2021	Complete	Eversource
PSCAD Base Case Development and Testing – Additional Faults (SEMA and Cape)	4/16/2021	Complete	Eversource
PSCAD Base Case Development – Adding FERC Queue Projects	4/16/2021	Complete	Eversource
PSCAD Base Case Development – System Integration Testing	4/16/2021	Complete	Eversource
PSCAD Fault Automation including Reclosing (SEMA and Cape)	4/23/2021	Complete	Eversource
First Round of PSCAD simulation (SEMA and Cape)	5/10/2021	Complete	Eversource
Second Round of PSCAD simulation – Verify All Models Working (SEMA and Cape)	7/15/2021	Complete	Eversource
PSSE-PSCAD Model Benchmarking (SEMA and Cape)	7/15/2021	Complete	Eversource
ISO-NE Review of Steady State Scope	6/30/2021	Complete	Eversource, ISO-NE
ISO-NE Review of Stability Scope and Results	7/15/2021	Complete	Eversource, ISO-NE
ISO-NE Review of PSCAD Study Scope and Results	7/30/2021	Complete	Eversource, ISO-NE

ISO-NE Request of Additional Steady State Analysis	7/30/2021	Complete	Eversource, ISO-NE
Affected Parties Meeting on SEMA/Cape Study Results	7/27/2021	Complete	Eversource
Customer Update Meeting on SEMA/Cape Study Results	7/27/2021	Complete	Eversource
Submit SEMA/Cape PPA Package	8/3/2021	In Progress	Eversource
ISO-NE RC Meeting (SEMA/Cape)	8/17/2021	Scheduled	Eversource, ISO-NE

Any progress updates to Level 3 stakeholders will be in addition to the *DG Guidelines For Interconnection* reporting required by the Department of Public Utilities and the Company will continue to share ad-hoc updates as they become available. Factors that may impact this milestone schedule and associated activities are: base case modeling issues, DER stability model issues, solution development for potential adverse system impacts and/or significant project inverter model changes by customers.

5. **What are the estimated necessary system modifications and associated costs?**
   The Level 3 study in the SEMA/Cape will require system modifications on the 191 line in the form of reconductoring work. Eversource is investigating opportunities to manage this system modification as part of a separate upgrade project outside of the ASO study. There were no system modifications identified in WMA or Greater Boston as part of the ASO Level 3 Study.

6. **What prioritization system has the EDC developed to determine which of the affected DG applications would be eligible to interconnect first if capacity became available?**
   The EDC would prioritize applications to interconnect if the capacity became available in the order of the dates the applications were deemed complete e.g. first come, first served. It is unlikely that Eversource would allow applications to “jump” the queue in front of other projects, simply based on capacity differences, to ensure a fair methodical approach to all projects in the queue.

   Separately, Eversource is continuing to proceed with distribution-level studies, including Group Studies authorized by D.P.U. 17-164, while the Level 3 ASO transmission-level studies are being conducted. This is being done to reduce the distribution-level study wait time and increase value to customers. The Group Study order in D.P.U. 17-164 will allow Eversource to process distribution studies in groupings that will include different customers bundled together. More

information can be found on this Order here:
https://eeaonline.eea.state.ma.us/DPU/Fileroom/dockets/bynumber/17-164

Projects that had ISAs prior to the larger ASO study announcement on Oct. 24, 2019 that required transmission studies continued with their separate transmission studies outside of the five ASO group studies and have been completed. There were 54 post ISA projects in this category and all projects have received ISO-NE RC approval as of June 16, 2020.

7. **Are there any proposed resolutions that the EDC is exploring to enable some affected DG applicants to proceed with the interconnection process prior to completion of the ASO study?**
   Eversource is continuing to proceed with distribution level studies while both post ISA ASO transmission studies and the Level 3 studies are being conducted. This is being done to reduce the distribution-level study wait time and increase value to customers. Eversource is implementing group studies based on the Group Studies order in D.P.U. 17-164.

8. **Are the study results available at this time for Level 3 ASO projects?**
   Yes, the final SEMA/Cape Level 3 study results were shared with customers on July 27th (and Eversource also provided a copy of the presentation to customers for reference). There were no transmission upgrades identified for the WMA and Greater Boston customers.

Regarding *DG Guidelines For Interconnection* item E (10), applicants should continue directing questions and correspondence to ASOStudyInquiry@eversource.com so that they can be directed in a timely manner to the appropriate party for a response. The Company also utilizes the questions that come in to the ASO mailbox to update its FAQs list on the ASO website.