Eversource 2025 Transitional ASO Study Customer Kickoff Meeting

SEMA/Cape, Western Massachusetts & Greater Boston Areas

July 11, 2024

Agenda

- Introduction
- Updates on the Level Determination from ISO-NE
- Level 0/3 projects technical data requirement
- Study timeline of the Transitional ASO study
- Overview of ASO areas
- Process and next steps
- Q&A

Updates on the Level Determination from ISO-NE

1. Level Determination timeframes

- Starting October 12, 2024, ISO-NE will no longer make Level 0/Level III determinations
- The next opportunity for such determinations will commence when the subsequent Cluster Request Window opens in October 2025.

2. Level Determination methodology

- If the aggregation at the station under review plus the electrically close stations is <20 MW, and the newly proposed addition of individually <5 MW DERs at that station plus those at electrically close stations is <20 MW, then the projects will be determined to be Level 0
- If the aggregation at the station under review plus the electrically close stations is 20 MW or greater, and the newly proposed addition of individually <5 MW DERs at that station plus those at electrically close stations is <20 MW, then the projects will be determined to be Level 0
- If the aggregation at the station under review plus the electrically close stations is <20MW, and the newly proposed addition of individually <5 MW DERs is >20 MW, then the projects will require Level III analysis

ASO Overview – Study Types

- Level 0 - No Studies
  - Collection and validation of PSCAD models for each project will be required for all projects
  - Generation Notification Form need to be approved by October 2025.
- Level 3 studies
  - Collection and validation of PSCAD models for each project will be required for all projects
  - Conduct thermal and voltage steady state, short circuit, stability analysis, PSCAD analysis will be required
  - Technical data will be requested from projects and is required to start studies
  - Stand alone BESS projects exceeding 5MW must have distribution studies completed before starting transmission studies.
  - Studies need to be completed by October 2025 and get I.3.9 PPA approval within 90 days.

Level 0/3 projects technical data requirement

- Data required to support Level 0 PPA approval
  - Fully functioning PSCAD model that meets the PSCAD model requirements
  - Inverter model information (e.g., BESS description if applicable, frequency and voltage relay trip settings)
  - Stamped one-line diagram including inverters
  - Project market information (e.g., In-service date, whether in ISO-NE market per OP-14 generator definition)
- Data required for Level 3 study (**in addition to all of above**)
  - Detailed project technical data including the collector system and step-up transformer information.
  - Project specific stability model in PSS/E standard library format (for projects ≥5MW projects and single or multiple projects of the same developer sharing the same POI). Benchmarking report and Volt-Var feature enabled.
- **Please read and follow the Technical Data Request Requirements.**

Study Level Spreadsheet

Current Phase

The 2023 Level 0 ASO studies in Western Massachusetts and Greater Boston have been completed. The projects included in these Level 0 studies have received Proposed Plan Application (PPA) Approvals from ISO-NE in 2023.

The 2023 Level 3 ASO studies are underway. The projects currently in the Level 3 ASO studies are expected to receive Section I.3.9 PPA approval from ISO-NE by October 30, 2024, provided no unforeseen delays that are beyond Eversource's control. As **ISO-NE's presentation** to the NEPOOL Transmission Committee on December 21, 2023 states "As long as the ASO studies are within 90 days of achieving I.3.9 approval (and all modeling information is provided) by the beginning of the Transitional Cluster Study (i.e. by August 1, 2024), the ASO studies can complete."

View the list of ASO projects to be approved by October 30, 2024 (PDF)

Initial Determination Requests

When an ASO Impact Screen results in the potential need for a DG project to undergo an ASO study, Eversource will submit the project's data to ISO-New England (ISO-NE) with a request for determination on being included in an ASO study. Eversource will post those projects in this section along with any response it receives from ISO-NE. All files are PDF format.

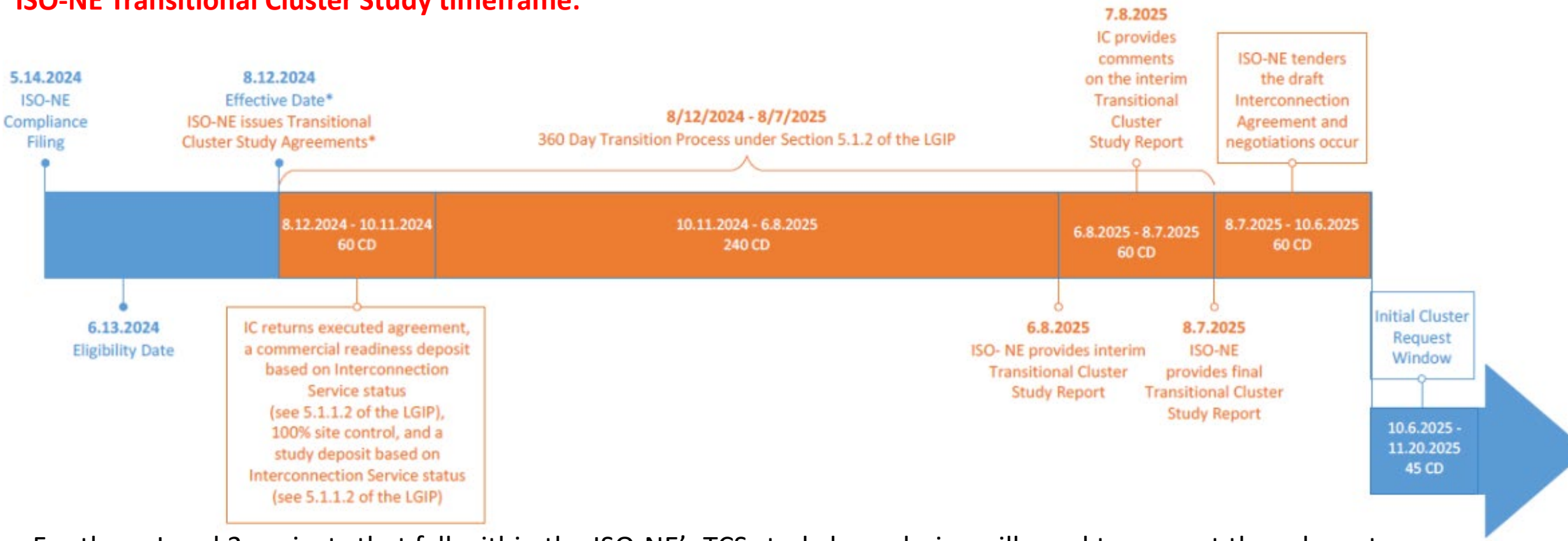
- **Initial Eastern Massachusetts determinations**
- **Initial Western Massachusetts determinations**

- Eversource's ASO Study Website

- Eastern MA study level determinations
- Western MA study level determinations

Study timeline of the Transitional ASO cluster study

ISO-NE Transitional Cluster Study timeframe:



For those Level 3 projects that fall within the ISO-NE's TCS study boundaries will need to respect the relevant FERC QP projects and the system upgrades in the area and need to complete the study by October 2025 and get PPA approval within 90 days after ISO-NE's Transitional Cluster Study completion.

ASO Overview – SEMA/Cape, GB and WMA

- Total 68 projects in the project queue, 19 projects in SEMA/Cape, 6 projects in GB and 43 projects in WMA
- 333MW DER projects in total
- 29 substations impacted
- Awaiting PPA level determination from ISO-NE

Process and Next Steps

- ASO Study Schedule for Phase 1: Study Kickoff and Technical Data Collection

TASK	RESPONSIBLE ENTITY	DUE DATE	COMPLETION DATE
Phase 1: Study Kickoff and Technical Data Collection			
Study Kickoff Call	ES	7/11/24	7/11/24
Powerclerk opt in/out emails sent to customers	ES	7/11/24	7/11/24
Customers to opt in/out in **5 business days (BD)** **upon receipt of powerclerk email to opt in/out.** Customer **payment period starts ($7500 for model validation)** Project technical data and **model submission period starts** No response will be considered as an opt-out.	Customers	7/18/24	7/18/24
Release the level determination from ISO-NE and collect additional costs if Level 3 is identified	ES	7/29/24*	7/29/24*
Deadline for payment period is **10 business days (BD)** after opt-in period Project **technical data** and **model** submission **deadline**	Customers	7/29/24	7/29/24
ES to provide model review feedback on the PSCAD/PSSE models	ES	8/12/24	8/12/24
Technical Data Deficiency Cure Period for Level 3 projects	Customers	9/26/24	9/26/24
Model Acceptance/Rejection notice	ES	9/30/24	10/4/24

* The date is subject to change based on when we receive the level determination from ISO-NE. We will contact the customers as soon as we have the updates.

Next Steps

- Review technical data requirements sheet on the ASO website for modeling requirements (EVERSOURCE MODEL AND TECHNICAL DATA REQUEST LIST FOR AFFECTED SYSTEM OPERATOR (ASO) TRANSMISSION STUDIES), in preparation for uploading

- Look for an email from the PowerClerk portal requesting that you opt in or out of the study, make payment and submit technical data and models
  - No response will indicate an “opt out”
- Stay up to date with study schedule via biweekly reports, monthly reports and ad-hoc updates

OPEN Q&A

Thank You!

APPENDICES

Example Data Package – Level 0 ASO

- One Line Diagram/Design
  - A stamped one-line diagram
- Additional_Attach
  - ESS_Questionnaire.xlsx if applicable
- Additional_Attach
  - PSCAD model supplier checklist
- Inverter Specification
  - Manufacturer datasheet(s) for inverter(s)
- PSCAD_Model
  - A ZIP file of site-specific PSCAD model & documentation

Note: These requirements reflect the ASO study only and are not intended to capture distribution impact study requirements or others

Example Data Package – Level 0 ASO

- One Line Diagram/Design
  - A stamped one-line diagram including:
    - Project total size (kW-AC and kWh if applicable)
    - GSU information (impedance, X/R, kVA, voltages, grounding)
    - Inverter information (make, model, version, quantity, rated kW & kVA)
    - Presence of 32 or 32R directional power relay if applicable
    - Inverter trip settings for frequency and voltage
    - Inverter ride-through settings for frequency and voltage

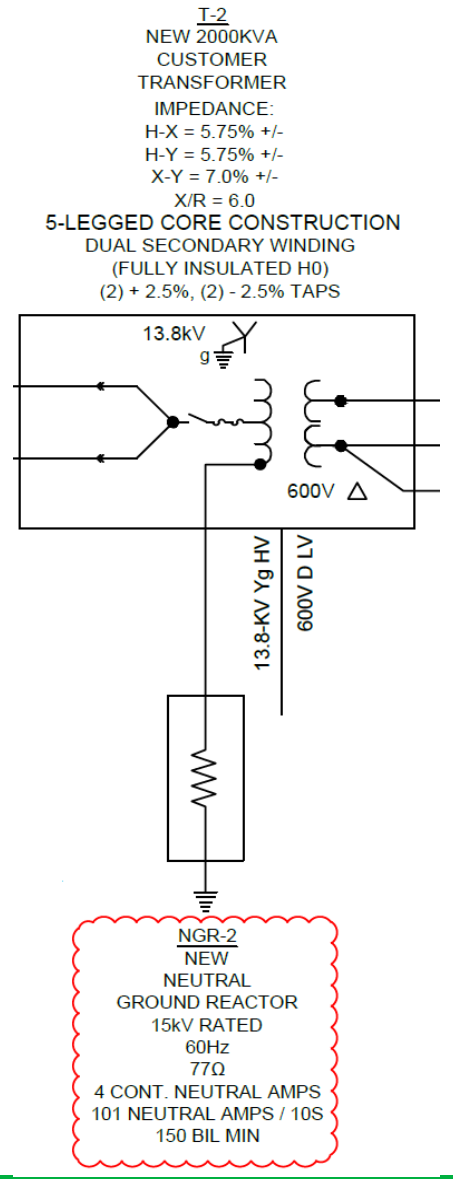
Example Data Package – Level 0 ASO

- One Line Diagram/Design
  - A stamped one-line diagram including:
    - Project total size (kW-AC and kWh if applicable)

SYSTEM SIZE = 11,062.48 kW DC
4,999.00 kW AC NOM.
4,999.00 kW AC MAX.
3,740 kW / 11,220 kWH DC-COUPLED BESS

Example Data Package – Level 0 & Level 3 ASO

- One Line Diagram/Design
  - A stamped one-line diagram including:
    - GSU information
      - Rated kVA
      - Impedance %Z
      - X/R Ratio
      - Rated winding voltages
      - Taps (typical is +/-2 steps, each at 2.5%)
      - Winding configuration (ie. YNd1)
      - Grounding (ie. NGR: 77 ohm, X/R=4)



Example Data Package – Level 0 & Level 3 ASO

- One Line Diagram/Design
  - A stamped one-line diagram including:
    - Inverter information (make, model, version, quantity, rated kW & kVA)

PV INVERTER 1
EPC CAB1000/PV-3.2
1200-kW NOM
1200-kVA MAX
(FACTORY DERATED TO
999.8 kW MAX

Example Data Package – Level 0 ASO

- One Line Diagram/Design
  - A stamped one-line diagram including:
    - Inverter trip settings for frequency and voltage

Inverter Protective Settings ISO-NE SRD Tables I & II				
INTERNAL PROTECTIVE FUNCTIONS	TRIP OUTPUT	VOLTAGE SETTING PU	SETTING	CLEARING TIME (sec)
27-1 - UNDERVOLTAGE	X	0.50	300 V	1.1
27-2 - UNDERVOLTAGE	X	0.88	528 V	2
59-1 - OVERVOLTAGE	X	1.10	660 V	2
59-2 - OVERVOLTAGE	X	1.20	720 V	0.16
81U-1 - UNDERFREQUENCY	X		56.5 Hz	0.16
81U-2 - UNDERFREQUENCY	X		58.5 Hz	300
81O-1 - OVERFREQUENCY	X		61.2 Hz	300
81O-2 - OVERFREQUENCY	X		62 Hz	0.16
PRIMARY VOLTAGE (L-L)	0.6	kV	600	V

Example Data Package – Level 0 ASO

- One Line Diagram/Design
  - A stamped one-line diagram including:
    - Inverter ride-through settings for frequency and voltage

Inverter Voltage Ride-Through Settings ISO-NE SRD Table III					
OPERATING MODE / RESPONSE	VOLTAGE SETTING PU RANGE	SETTING (MIN.)	SETTING (MAX.)	MIN. RIDE-THROUGH TIME (sec)	MAX. RESPONSE TIME (sec)
CEASE TO ENERGIZE	V > 1.2	N/A	720.1 V	N/A	0.16
PERMISSIVE OPERATION	1.175 < V ≤ 1.20	705 V	720 V	0.2	N/A
PERMISSIVE OPERATION	1.15 < V ≤ 1.175	690 V	705 V	0.5	N/A
PERMISSIVE OPERATION	1.10 < V ≤ 1.15	660 V	690 V	1	N/A
CONTINUOUS OPERATION	0.88 ≤ V ≤ 1.10	528 V	660 V	INFINITE	N/A
MANDATORY OPERATION	0.65 ≤ V < 0.88	390 V	528 V	Linear slope of 8.7 s/ 1p.u. voltage starting at 3 s @ 0.65 p.u.: *Tvrt* = 3 s + 8.7 s/1 p.u. (V-0.65 p.u.)	N/A
PERMISSIVE OPERATION *a,b	0.45 ≤ V < 0.65	270 V	390 V	0.32	N/A
PERMISSIVE OPERATION *b	0.30 ≤ V < 0.45	180 V	270 V	0.16	N/A
CEASE TO ENERGIZE	V < 0.3	179.9 V	N/A	N/A	0.16
Footnote a	In the Permissive Operation region above 0.5 p.u., inverters shall ride-through in Mandatory Operation mode				
Footnote b	In the Permissive Operation region below 0.5 p.u., inverters shall ride-through in Mandatory Cessation mode with a maximum response time of 0.083 seconds.				

Inverter Frequency Ride-Through Settings ISO-NE SRD Table IV		
OPERATING MODE / RESPONSE	FREQUENCY RANGE (Hz)	MIN. RIDE-THROUGH TIME (sec)
N/A	f > 62.0	N/A
MANDATORY OPERATION	61.2 < f ≤ 61.8	299
CONTINUOUS OPERATION	58.8 ≤ f ≤ 61.2	Infinite
MANDATORY OPERATION	57.0 ≤ f < 58.8	299
N/A	f < 57.0	N/A

Example Data Package – Level 0 ASO

- Additional_Attach
  - ESS_Questionnaire.xlsx if applicable

Energy Storage System Project Design Information Requirement		
Application ID #		
Customer Name		
ESS Location	Street Address	
	City/Town	
	Zip Code	

1	**Design Documentation**			
	Please provide both a one-line diagram and a site plan as a separate attachment to this questionnaire			
2	**System Configuration**			
	Is the ESS design Behind-the-Meter or Independent Power Producer?			
			For Behind-the-Meter, will the site export or be non-export?	
	Is the ESS electrically connected with DG or other generation?			
			DG Type (select from dropdown list)	
			AC or DC coupled?	
	Will the site be limiting export? If so, identify relay information:			

Example Data Package – Level 0 ASO

- Additional_Attach
  - PSCAD model supplier checklist

Appendix E: PSCAD Model Checklist

This document is a model requirements checklist which must be completed by the supplier of the model and submitted alongside each PSCAD model. Model suppliers must review every item in the checklist and indicate compliance for each item. If the supplied model does not meet any of the requirements an explanation of the deficiency must be provided in the comments column.

Model Submission Summary (to be completed by model supplier)	
Submission date:	
Project Name:	
Primary contact information for model related questions:	
Secondary contact information for model related questions:	
Manufacturer:	
Equipment type: (eg. PV or BESS)	
Equipment version:	
Documentation file(s):	
Model Files supplied:	

Example Data Package – Level 0 ASO

- Inverter Specification
  - Manufacturer datasheet(s) for inverter(s)

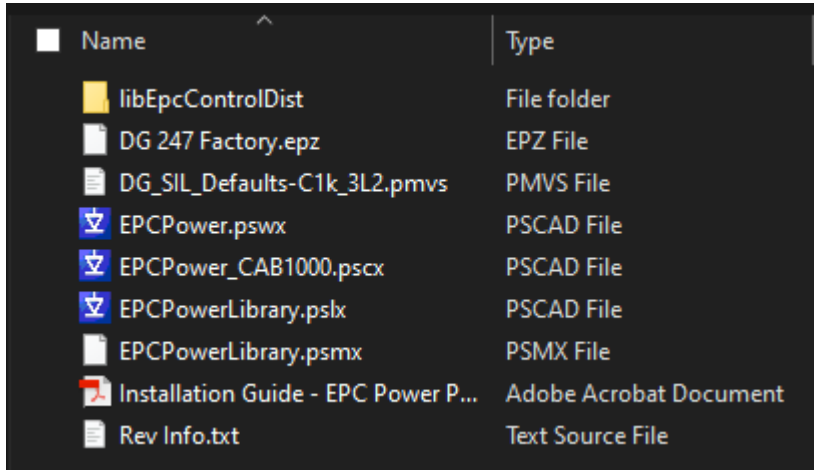
CAB1000/AC - 3L.2
Bidirectional Energy Storage & Microgrid PCS

DG

MODEL	50-100181	CAB1000/AC-3L.2				
AC	AC configuration | max. cables per phase **(1)**	3-wire (3P3W) | 6 x 600 kcmil or 6 x 300 mm²				
	Nominal AC voltage (+/- 10%) **(2)**	480 VRMS	600 VRMS	630 VRMS	660 VRMS	690 VRMS
	Nominal AC current (export/import)	1255 ARMS				
	AC export/import capacity @ 40°C **(3)**	1043 kW	1304 kW	1369 kW	1435 kW	1500 kW
	Export power overload capacity @ 40°C, starting from 66% full load.	120 % for 3 sec and 116 % for 5 min				
	Reactive power capacity **(4), (5)**	Power Factor 0,8...1 leading/lagging				
	Allowed grid short ckt. current ratios	Current mode: >4 | Voltage mode: all				
	Max. fault current allowed from AC source	100 kA (AC RMS) throated version | 180 kA (AC RMS) non-throated version				
	Nominal frequency range	50 / 60 Hz (configurable)				
	Harmonic distortion	UL1741 / IEEE 1547, <2% TDDi at rated power per IEEE 519 <3% according to VDE-AR-N 4110/4120				
	Efficiency (@ 690 VAC): Peak | CEC | Euro	98.8% | 98,4% | 98,5%				
DC	DC voltage range, maximum **(6)**	720 - 1500 VDC	900 - 1500 VDC	945 - 1500 VDC	990 - 1500 VDC	1035 - 1500 VDC
	DC voltage range, at nominal power **(6)**	761 - 1200 VDC	951 - 1500 VDC	999 - 1500 VDC	1046 - 1500 VDC	1094 - 1500 VDC
	Recommended minimum battery voltage	1,65 x nominal AC voltage				

Example Data Package – Level 0 ASO

- PSCAD_Model
  - A ZIP file of site-specific PSCAD model & documentation
    - Model documentation (.pdf) – REQUIRED!
    - Site-specific PSCAD case (.pscx) – REQUIRED!
    - Additional PSCAD model files (.pslx, .pswx, .obj, .lib, .dll) – as applicable
    - OEM inverter configuration files (.txt, .epz, .pmvs, etc.) – as applicable



Example Data Package – Level 3 ASO < 5MW

Same as level 0 with following additions:

- Cond_Type_Details
  - Conductor type and distances in mile between inverters/GSUs (collection system)
  - Conductor type and length of dedicated feeder to POI in miles (generator tie-line)

MEDIUM VOLTAGE CABLE SCHEDULE

TAG	COUNT & SIZE	NEUTRAL	INSULATION	CONDUIT	LENGTH +/- 10'
Ⓐ	(3) 155.4 AAAC	155.4 AAAC	N/A	FREE AIR	40'
Ⓑ	(3) 250kcmil AL	1/3 CONC.	15kV 100% MV-105	4"	50'
Ⓒ	(3) 3/0 AL	1/3 CONC.	15kV 100% MV-105	4"	835'
Ⓓ	(3) 1/0 AL	1/3 CONC.	15kV 100% MV-105	4"	595'

- GSU_Details
  - Saturation data

Example Data Package – Level 3 ASO ≥ 5MW

Same as level 3 < 5MW with following additions:

- Data_Sheet
  - Reactive capability curve or equivalent data

- Stability_Model_List
  - Stability model in PSS/E standard library model format (.dyr) ISO-NE does not accept user-written models
  - The following PSSE v34 standard library renewable energy system models shall be used to represent the transient stability of inverter-based DER's:
    - Renewable Energy Generator/Converter Model: REGC_B
    - Renewable Energy Electrical Model: REEC_D
    - Plant Controller Model:
      - REPC_A for standalone PV, BESS and DC coupled BESS
      - PLNTBU1 + REAX4BU1 for AC coupled BESS and hybrid-projects which include multiple technologies controlled by a single plant controller