UM 2111

Screens, Study Methods, and Modern Configurations Workshop

12-7-2022

Oregon Public Utility Commission

Agenda

Item	Schedule	Time
Welcome – Process Update	9:00	15 min
Utility Questions	9:15	30 min
Screen Comparison Table • Level 2 – discussion	9:45	60 min
Break	10:45	10 min
• Level 2 - continued	10:55	55 min
Next Steps	11:50	10 min
Adjourn	12:00	

Oregon Public Utility Commission

Process Update

- Staff planning on opening a rule-making first-second quarter of 2023.
- Memo to open rulemaking(s) will address areas of
  - Consensus items
  - Competing proposals
- Question: Separate Rulemakings to address workstreams?
  - Incorporating updated standards: IEEE 1547-2018
  - Screens, Study Methods, and Modern Configurations
- Rulemaking to look at both SGIP and NEM rules
  - Oregon SGIP OAR 860-082
  - Oregon NEM OAR 860-039
- Rulemaking will be used to determine appropriate place for issue elements (e.g. See IREC Decision Matrix items)
  - Rules
  - Commission Order (Guidelines)
  - Utility Interconnection handbooks
- Currently scheduled workshops to be used for Rulemaking

Oregon Public Utility Commission

Process Update

- Current Schedule
- Discussion of IEEE 1547-2018 mostly complete
  - IREC Decision matrix
  - Dialogue on Dec 20 for questions raised
- More workshops necessary for Screens workstream – potentially four
- Staff proposal would repurpose scheduled workshops to continue Screens discussion.

Description	Event Date	Worktream	Repurposed
Workshop 4	December 7, 2022	Workstream 1	
Workshop 5	December 20, 2022	Workstream 2	WS 1
Workshop 5	January 17, 2023	Workstream 1	
Workshop 6	January 31, 2023	Workstream 2	WS 1
Workshop 6	February 15, 2023	Workstream 1	
Workshop 7	February 28, 2023	Workstream 2	Rule Making
Workshop 7	March 15, 2023	Workstream 1	
Workshop 8	March 28, 2023	Workstream 2	
Workstream 1: Screens, Study Methods, and Modern Configurations			
Workstream 2: Incorporating Updated Standards			

Oregon Public Utility Commission

Questions for Utilities

On page 7 there is discussion of current DERs achieving less than two second delays. Please provide some more information on these customers? Are they implementing non-export or limited export with relays set to less than a 2 second delay? If so can you provide the following for each utility:

- How many DERs in your Oregon service territory implement non-export using a 32R relay set to less than a 2 second delay?
- How many DERs in your Oregon service territory implement limited export using a 32 relay set to less than a 2 second delay?
- For each DER identified above, please list the:
  - Host load,
  - DER nameplate rating,
  - DER export capacity,
  - How long the DER has operated using the relay to implement non-export or limited export, and,
  - How many times the relay has operated.

- Additional questions for PGE based on Level 1 Screen waiver request (Dec 27 Consent Agenda)
  - Report out on program
    - Reasons for failure
    - Reasons interconnection allowed at Company's discretion

Oregon Public Utility Commission

Screen Comparisons

- Level 2

Oregon Public Utility Commission

Break

Oregon Public Utility Commission

Next Steps

- Continue with Screens discussion in IEEE-1547 workstream
- Staff to post meeting summary notes, and potential questions directly
- Continued collaboration amongst parties
- Open rulemaking in first/second quarter 2023

Oregon Public Utility Commission

Save the Date(s)

Workshop 4: Screens, Study Methods, and Modern Configurations

- Date: January 17
- Time: 9:00 AM – 12:00 PM
- Location: Zoom
  - **Link to Meeting**
  - Dial-In: 1-551 285 1373
  - Meeting ID: 161 631 5107
  - Passcode: 6623001161

Workshop 3: Incorporating Updated Standards (Repurposed for Screens)

- Date: December 20
- Time: 9:00 AM – 12:00 PM
- Location: Zoom
  - **Link to Meeting**
  - Dial-In: 1-551 285 1373
  - Meeting ID: 161 631 5107
  - Passcode: 6623001161

Oregon Public Utility Commission

Discussion Documents

- Attachment B – Standardized Screen Results
- Oregon Level 1 Screens Comparison
- Oregon Level 2 Screens Comparison

Oregon Public Utility Commission

Attachment B
BATRIES Project Standardized Screen Results

Standardized 100% minimum load result

Where 12 months of line section minimum load data (including onsite load but not station service load served by the proposed DER) are available, can be calculated, can be estimated from existing data, or determined from a power flow model, the aggregate Export Capacity on the line section is less than 100% of the minimum load for all line sections bounded by automatic sectionalizing devices upstream of the proposed DER. If minimum load data is not available, or cannot be calculated, estimated or determined, the Distribution Provider shall include the reason(s) that it is unable to calculate, estimate or determine minimum load in its Supplemental Review results notification.

Export Capacity of DER Application		kW
Export Capacity of DER Active on Feeder		kW
Export Capacity of DER ahead in Queue		kW
Relevant time period	__ am/pm to __ am/pm	
Minimum Load		kW
Aggregate Export Capacity, including proposed DER		kW
DER as % of Load		%
Passes Screen	No	

Standardized 15% screen result

For interconnection of a proposed DER to a radial distribution circuit, the aggregated Export Capacity, including the proposed DER, on the circuit shall not exceed 15% of the line section annual peak load as most recently measured. A line section is that portion of a Distribution Provider's electric system connected to a customer bounded by automatic sectionalizing devices or the end of the distribution line.

Export Capacity of DER Application		kW
Export Capacity of Active DER on Feeder		kW
Export Capacity of DER ahead in Queue		kW
15% of Peak Load		kW
Aggregate Export Capacity, including proposed DER		kW
Export Capacity of DER, as % of Load		%
Passes Screen	No	

Standardized shared transformer screen result

If the proposed DER is to be interconnected on single-phase shared secondary, the aggregate Export Capacity on the shared secondary, including the proposed DER, shall not exceed 20 kW or 65% of the transformer Nameplate Rating.

Export Capacity of DER Application		kW
Export Capacity of DER Active on Feeder		kW
Export Capacity of DER ahead in Queue		kW
Export Capacity of Aggregate DER on Shared Secondary:		kW
Transformer Nameplate Rating:		kW
Export Capacity of Aggregate DER, as a % of Transformer Nameplate Rating:		%
Passes Screen	No	

Standardized protection screen result

The fault current of the proposed DER, in aggregate with the fault current of other DERs on the distribution circuit, shall not cause any distribution protective devices and equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or Interconnection Customer equipment on the system to exceed 87.5% of the short circuit interrupting capability; nor shall the interconnection be proposed for a circuit that already exceeds 87.5% of the short circuit interrupting capability.

Nameplate Rating of DER Application		kW
Nameplate Rating of DER Active on Feeder		kW
Nameplate Rating of DER ahead in Queue		kW
Lowest short circuit interrupting rating of equipment in-line with DER:		Amps
Aggregate DER fault current contribution:		Amps
Distribution Circuit Maximum Fault Current nearest the PCC:		Amps
Total available short circuit current		Amps
% of short circuit interrupting rating:		%
Passes Screen	No	

IREC has not developed a template for standardized results of the other screens. However, IREC reviewed the each screen in SGIP developed a description of data that utilities should be required to provide when a Project fails that screen. This information is provided in the following table.

SGIP Screen		Description	Data to provide
2.2.5 Initial Review	2.2.1.2	15% of annual section peak load (or 100% min load)	Load (peak or min), aggregate generation (or Export Capacity), and percentage of load. For interconnection rules that integrate time-based load data into the screening process, provide the minimum load time window.
	2.2.1.3	Spot network (5% of network peak load or 50 kW)	Peak load, aggregate generation on network, and percentage of load.
	2.2.1.4	10% of maximum fault current	Aggregate generation fault current on circuit, distribution circuit max fault current, percentage of max fault current, assumptions for customer's DER (e.g., fault current = 1.2x inverter Nameplate Rating).
	2.2.1.5	87.5% of short circuit interrupting capability	Short circuit interrupting rating at limiting (lowest rated) equipment in-line with DER, aggregate DER fault current contribution, distribution circuit max fault current nearest PCC, total short circuit current, percentage of short circuit interrupting rating.
	2.2.1.6	Line configuration	Distribution line type, interconnection (customer service) type.
	2.2.1.7	Shared secondary transformer 20 kW	Aggregate DER rating (or export) on shared secondary, for screens that use 65% of transformer rating instead of 20 kW provide transformer rating and percentage of rating.
	2.2.1.8	Single-phase imbalance	Transformer rating, imbalance as percentage of rating.
	2.2.1.9	10 MVA transient stability	Aggregate generation, whether there are known transient stability limitations.
2.2.27 Supplemental	2.4.4.1	100% minimum load	Min load, aggregate generation (or export), percentage of load, time period under consideration (e.g., hours of the day based on fixed vs. tracking PV).
	2.4.4.2	Voltage and power quality	This list is not exhaustive and would be dependent on the applied criteria. E.g., if non-bidirectional regulators experiencing reverse flow: maximum reverse power at regulator; If overvoltage is flagged at minimum load: maximum reverse power with customer's DER, maximum reverse power before triggering voltage limit violation.
	2.4.4.3	Safety and Reliability	This list is not exhaustive and would be dependent on the applied criteria. E.g., conductor loading: limiting conductor ampacity, total current, loading as a percentage of ampacity.
	Covering all screens		kW of existing DER in-line section and DER ahead in queue.

Attachment B
BATRIES Project Standardized Screen Results

1556774.1

	OAR 860-082-0045 SGIP	2019 IREC Model Rules, as modified by the 2022 Energy Storage Interconnection Toolkit	OAR 860-039-0030 NEM
	Tier 1 Interconnection Review	**Level 1**	**Level 1 Net Metering Interconnection Review**
Application		IIIA.1. Application: An Applicant must submit a Level 1 Application, pursuant to Section I.C.1, using the standard form provided in Attachment 3 to these Interconnection Procedures, which may be sent electronically to a recipient designated by the Utility. An Applicant executes the standard Interconnection Agreement for Level 1 by submitting a Level 1 Application. A Utility may elect to charge a standard Application fee of up to $100 for Level 1 review.	*The rules allow a customer to sign an interconnection agreement at the same time as submitting an application. Consider requiring all OR NEM & OR SGIP Level 1 applications to include a signed interconnection agreement.*
Eligibility/Size	(1) A public utility must use the Tier 1 review procedures for an application to interconnect a small generator facility that meets the following requirements: (a) The small generator facility must use lab-tested, inverter-based interconnection equipment; (b) The small generator facility must have a nameplate capacity of 25 kilowatts or less; and	III.A.2.a. Facility Size: The Generating Facility has an Export Capacity not greater than 25 kW, a Nameplate Rating not greater than 50 kW and uses a UL 1741 Certified inverter. *FERC SGIP, OR SGIP, and IREC Model allow interconnections to network systems, while OR NEM does not. Consider standardizing to allow any projects on a network to use OR NEM & OR SGRIP Level 1 & Level 2.*	(1) A net metering facility meeting the following criteria is eligible for Level 1 interconnection review: (a) The facility is inverter-based; and (b) The facility has a capacity of 25 kilowatts or less. (2)(b) A net metering facility's point of common coupling will not be on a transmission line, a spot network, or an area network.

	(c) The small generator facility must not be interconnected to a transmission line.		
Fault Current Screen	*Not included*	*Not included. Consider stanadarizing no fault current screen for OR NEM Level 1 projects.*	(2)(a) The aggregate generation capacity on the distribution circuit to which the net metering facility will interconnect, including the capacity of the net metering facility, will not contribute more than 10 percent to the distribution circuit's maximum fault current at the point on the high voltage (primary) level that is nearest the proposed point of common coupling.
Penetration Screen	(2)(b) For interconnection of a small generator facility to a radial distribution circuit, the aggregated nameplate capacity on the circuit must not exceed 15 percent of the line section annual peak load as most recently measured at the substation or calculated for the line section.	*Since the 2019 IREC Model Rules were published, leading states have switched to using 100% of daytime minimum load, i.e., IL, or a hosting capacity analysis, i.e., CA, instead of 15% of peak load.* *As noted in IREC's July 15 presentation, IREC supports, where the data is available, switching to a 100% of min load threshold. However, the threshold for the Level 1 and Level 2 Penetration Screens would look different than the detailed calculations found in the Supplemental Review Penetration Screen. The Level 1 and Level 2 Penetration Screens are typically designed to fail more projects than the Supplemental Review Penetration Screen. Considering Oregon's current use of substation minimum load data to establish generation limited feeders, IREC requests that the work group have a discussion before designing new Level 1 and Level 2 penetration screens.*	(2)(c) If a net metering facility is to be connected to a radial distribution circuit, the aggregate generation capacity connected to the circuit, including that of the net metering facility, will not exceed 10 percent (15 percent for solar electric generation) of the circuit's total annual peak load, as most recently measured at the substation.

Network Screen	(2)(c) For interconnection of a small generator facility to the load side of spot network protectors, the aggregated nameplate capacity on the load side of the spot network protectors must not exceed five percent of a spot network's maximum load or 50 kilowatts, whichever is less.	IIIA.2.e. For interconnection of a Generating Facility within a Spot Network or Area Network, the aggregate Nameplate Rating including the Generating Facility's Nameplate Rating may not exceed 50 percent of the Spot Network or Area Network's anticipated minimum load. If solar energy Generating Facilities are used exclusively, only the anticipated daytime minimum load shall be considered. The Utility may select any of the following methods to determine anticipated minimum load: i. the Spot Network or Area Network's measured minimum load in the previous year, if available; ii. five percent of the Spot Network or Area Network's maximum load in the previous year; iii. the Applicant's good faith estimate, if provided; or iv. the Utility's good faith estimate if provided in writing to the Applicant along with the reasons why the Utility considered the other methods to estimate minimum load inadequate.	*Note: FERC SGIP, OR SGIP, and IREC Model allow interconnections to network systems, while OR NEM does not.*

Single-Phase Shared Secondary Screen	(2)(d) For interconnection of a small generator facility to a single-phase shared secondary line, the aggregated nameplate capacity on the line must not exceed 20 kilowatts.	III.A.2.c. If the Generating Facility is to be interconnected on a single-phase shared secondary, then the aggregate Export Capacity on the shared secondary, including the Generating Facility's Export Capacity, will not exceed 65 percent of the transformer nameplate power rating. *Consider using the 65% threshold instead of 20 kW. Consider using Export Capacity instead of Nameplate Rating.*	(2)(d) If a net metering facility is to be connected to a single-phase shared secondary, the aggregate generation capacity connected to the shared secondary, including the net metering facility, will not exceed 20 kilovolt-amps.
Service Imbalance Screen	(2)(e) For interconnection of a single-phase small generator facility to the center tap neutral of a 240-volt service line, the addition of the small generator facility must not create a current imbalance between the two sides of the 240-volt service line of more than 20 percent of the nameplate rating of the service transformer.	III.A.2.d. If the Generating Facility is single-phase and is to be interconnected on a transformer center tap neutral of a 240-volt service, its addition will not create an imbalance between the two sides of the 240-volt service of more than 20 percent of the nameplate rating of the service transformer.	(2)(e) If a single-phase net metering facility is to be connected to a transformer center tap neutral of a 240 volt service, the addition of the net metering facility will not create a current imbalance between the two sides of the 240 volt service of more than 20 percent of nameplate rating of the service transformer.

Approval Timeline	(3) In addition to the timelines and requirements in OAR 860-082-0025, the public utility must provide written notice to the applicant stating whether the small generator facility meets the Tier 1 approval criteria no later than 15 business days from the date a Tier 1 interconnection application is deemed complete.	III.A.3. Time to process screens: Within seven (7) Business Days after the Utility notifies the Applicant that the Application is complete, the Utility shall notify the Applicant whether the Generating Facility meets all of the applicable Level 1 screens. *Consider standardizing the timeline for projects at 7 business days for OR NEM & OR SGIP Level 1 applications.*	(3) Within 10 business days after the public utility notifies a Level 1 applicant that the application is complete, the public utility must notify the applicant that: (a) The net metering facility meets all applicable criteria and the interconnection will be approved upon installation of any required meter upgrade, completion of any required inspection of the facility, and execution of an interconnection agreement; or (b) The net metering facility has failed to meet one or more of the applicable criteria and the interconnection application is denied.
Deemed Approval	*Not included.* *Consider standardizing deemed approval for OR SGIP Level 1.*	III.A.5. Approval: If the proposed interconnection passes the screens, the Application shall be approved, and the Utility will provide the Applicant an executable Interconnection Agreement within the following timeframes. a. If the proposed interconnection requires no construction of facilities by the Utility on its own system, the Utility shall provide the Applicant with a copy of the Level 1 Application form, signed by the Utility, forming the Level 1 Interconnection Agreement, at the time the screen results are provided. If the Utility does not notify an Applicant whether an Application is approved or denied	(4) If a public utility does not notify a Level 1 applicant in writing or by electronic mail whether the interconnection is approved or denied within 20 business days after the receipt of an application, the interconnection will be deemed approved. Interconnections approved under this section remain subject to section 7 below.

		in writing within twenty (20) Business Days after notification of the Level 1 review results, the Interconnection Agreement signed by the Applicant as part of the Level 1 Application shall be deemed effective.	
Inspection Timelines		III.A.7. Within ten (10) Business Days of receiving the notice of the anticipated start date of the Generating Facility, the Utility may conduct an inspection of the Generating Facility at a time mutually agreeable to the Parties. If the Generating Facility passes the inspection, the Utility shall provide written notice of the passage within three (3) Business Days. If a Generating Facility initially fails a Utility inspection, the Utility shall offer to redo the inspection at the Applicant's expense at a time mutually agreeable to the Parties. If the Utility determines that the Generating Facility fails the inspection, the Utility must provide the Applicant with a written explanation detailing the reasons for the failure and any standards violated. If the Utility determines no inspection is necessary, it shall notify the Applicant within three (3) Business Days of receiving the notice of the anticipated start date.	*Do the rules include a requirement for utility to schedule the inspection on a specific timeline?*

	(5) If a small generator facility is not approved under the Tier 1 interconnection review procedure, then the applicant may submit a new application under the Tier 2, Tier 3, or Tier 4 review procedures. At the applicant's request, the public utility must provide a written explanation of the reasons for denial within five business days of the request. *Consider providing written information on any screen failure to all projects. See recommendations from the Energy Storage Interconnection Toolkit.*	III.A.4. Screens failure: Despite the failure of one or more screens, the Utility, at its sole option, may approve the interconnection provided such approval is consistent with safety and reliability. If the Utility cannot determine that the Generating Facility may nevertheless be interconnected consistent with safety, reliability, and power quality standards, the Utility shall provide the Applicant with specific information on the reason(s) for failure in writing. In addition, the Utility shall allow the Applicant to select one of the following, at the Applicant's option: a. Undergo Supplemental Review in accordance with Section III.D; or b. Continue evaluating the Application under Level 4, Section III.F. The Applicant must notify the Utility of its selection within ten (10) Business Days or the Application will be deemed withdrawn.	(8) If an application for Level 1 interconnection review is denied because it does not meet one or more of the applicable requirements in this section, an applicant may resubmit the application under the Level 2 or Level 3 interconnection review procedure, as appropriate. *Consider providing written information on any screen failure to all projects. See recommendations from the Energy Storage Interconnection Toolkit.*

<table>
<tr><td></td><td>OAR 860-082-0050 SGIP</td><td>2019 IREC Model Rules, as modified by the 2022 Toolkit</td><td>OAR 860-039-0035 NEM</td></tr>
<tr><td></td><td>Tier 2 Interconnection Review</td><td>Level 2</td><td>Level 2 Net Metering Interconnection Review</td></tr>
<tr><td rowspan="2">Fast Track Eligibility</td><td>(1)(b) The small generator facility must have a nameplate capacity of two megawatts or less;</td><td>III.B.2.a. Facility Size: Generating Facility’s Export Capacity does not exceed the limits identified in the table below, which vary according to the voltage of the line at the proposed Point of Interconnection. Generating Facilities located within 2.5 miles of a substation and on a main distribution line with minimum 600-amp capacity are eligible for Level 2 interconnection under higher thresholds.
<table>
<tr><th>Line Capacity</th><th colspan="2">Level 2 Eligibility</th></tr>
<tr><th></th><th>Regardless of location</th><th>On ≥ 600 amp line and ≤ 2.5 miles from substation</th></tr>
<tr><td>≤ 4 kV</td><td>< 1 MW</td><td>< 2 MW</td></tr>
<tr><td>5 kV – 14 kV</td><td>< 2 MW</td><td>< 3 MW</td></tr>
<tr><td>15 kV – 30 kV</td><td>< 3 MW</td><td>< 4 MW</td></tr>
<tr><td>31 kV – 60 kV</td><td>≤ 4 MW</td><td>≤ 5 MW</td></tr>
</table></td><td>(1)(a) The facility has a capacity of two megawatts or less; and</td></tr>
<tr><td>(1)(d) The small generator facility must not be interconnected to a transmission line</td><td>III.B.2.i. The Generating Facility’s Point of Common Coupling will not be on a transmission line.</td><td>(2)(i) A net metering facility's point of common coupling will not be on a transmission line.</td></tr>
</table>

Penetration Screen	(2)(a) For interconnection of a small generator facility to a radial distribution circuit, the aggregated nameplate capacity on the circuit must not exceed 15 percent of the line section annual peak load as most recently measured at the substation or calculated for the line section	*Since the 2019 IREC Model Rules were published, leading states have switched to using 100% of daytime minimum load, i.e., IL, or a hosting capacity analysis, i.e., CA, instead of 15% of peak load.* *As noted in IREC's July 15 presentation, IREC supports, where the data is available, switching to a 100% of min load threshold. However, the threshold for the Level 1 and Level 2 Penetration Screens would look different than the detailed calculations found in the Supplemental Review Penetration Screen. The Level 1 and Level 2 Penetration Screens are typically designed to fail more projects than the Supplemental Review Penetration Screen. Considering Oregon's current use of substation minimum load data to establish generation limited feeders, IREC requests that the work group have a discussion before designing new Level 1 and Level 2 penetration screens.*	(2)(d) If a net metering facility is to be connected to a radial distribution circuit, the aggregate generation capacity connected to the electric distribution system by non-public utility sources, including the net metering facility, will not exceed 10 percent (or 15 percent for solar electric generation) of the total circuit annual peak load. For the purposes of this subsection, annual peak load will be based on measurements taken over the 12 months previous to the submittal of the application, measured for the circuit at the substation nearest to the net metering facility.

Network Screen	(2)(b) For interconnection of a small generator facility to the load side of spot network protectors, the aggregated nameplate capacity on the load side of the spot network protectors must not exceed the lesser of five percent of a spot network's maximum load or 50 kilowatts. *Note: Only projects on "a spot network distribution circuit limited to serving one customer" are eligible. (1)(c).* *Consider standardizing to allow any projects on a network to use OR NEM or OR SGIP Level 1 and Level 2.*	III.B.2.j. For interconnection of a Generating Facility within a Spot Network or Area Network, the Generating Facility must be inverter-based and use a minimum import relay or other protective scheme that will ensure that power imported from the Utility to the network will, during normal Utility operations, remain above one percent of the network's maximum load over the past year or will remain above a point reasonably set by the Utility in good faith. At the Utility's discretion, the requirement for minimum import relays or other protective schemes may be waived. *Note: Any project on a network eligible in 2019 IREC Model, FERC SGIP, and Oregon NEM.*	(2)(j) If a net metering facility's proposed point of common coupling is on a spot or area network, the interconnection will meet the following additional requirements: (A) For a net metering facility that will be connected to a spot network circuit, the aggregate generation capacity connected to that spot network from the net metering facilities, and any generating facilities, will not exceed five percent of the spot network's maximum load; (B) For a net metering facility that utilizes inverter-based protective functions, which will be connected to an area network, the net metering facility, combined with any other generating facilities on the load side of network protective devices, will not exceed 10 percent of the minimum annual load on the network, or 500 kilowatts, whichever is less. For the purposes of this paragraph, the percent of minimum load for solar electric generation net metering facility will be calculated based on the minimum load occurring during an off-peak daylight period; and (C) For a net metering facility that will be connected to a spot or an area network that does not utilize inverter-based protective functions, or for an inverter-based net metering facility that does not meet the requirements of paragraphs (A) or (B) of this subsection, the net metering facility will utilize low forward power relays or other protection devices that ensure no export of power from the net metering facility, including inadvertent export (under fault conditions) that could adversely affect protective devices on the network.

Fault Current Screen	(2)(c) The aggregated nameplate capacity must not contribute more than 10 percent to the distribution circuit's maximum fault current at the point on the primary voltage distribution line nearest the point of interconnection.	III.B.2.c. The Generating Facility, aggregated with other generation on the distribution circuit, will not contribute more than 10 percent to the distribution circuit's maximum Fault Current at the point on the high-voltage (primary) level nearest the proposed Point of Common Coupling.	(2)(c) The aggregate generation capacity connected to the distribution circuit, including the net metering facility, will not contribute more than 10 percent to the distribution circuit's maximum fault current at the point on the high voltage (primary) level nearest the proposed point of common coupling.
Short-Circuit Interrupting Capability Screen	(2)(d) The aggregated nameplate capacity on the distribution circuit must not cause any distribution protective devices and equipment (including substation breakers, fuse cutouts, and line reclosers) or other public utility equipment on the transmission or distribution system to be exposed to fault currents exceeding 90 percent of the short circuit interrupting capability. The small generator facility's point of interconnection must not be located on a circuit that already exceeds 90 percent of the short circuit interrupting capability.	III.B.2.d. The Generating Facility, aggregated with other generation on the distribution circuit, will not cause any distribution protective devices and equipment (including but not limited to substation breakers, fuse cutouts, and line reclosers), or Utility customer equipment on the system, to exceed 90 percent of the short circuit interrupting capability; nor is the interconnection proposed for a circuit that already exceeds 90 percent of the short circuit interrupting capability.	(2)(a) The aggregate generation capacity on the distribution circuit to which the net metering facility will interconnect, including the capacity of the net metering facility, will not cause any distribution protective equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or customer equipment on the electric distribution system, to exceed 90 percent of the short circuit interrupting capability of the equipment. In addition, a net metering facility will not be connected to a circuit that already exceeds 90 percent of the short circuit interrupting capability, prior to interconnection of the facility.

Transient Stability Screen	(2)(e) The aggregated nameplate capacity on the distribution side of a substation transformer feeding the circuit where the small generator facility proposes to interconnect must not exceed 10 megawatts in an area where there are known or posted transient stability limitations to generating units located in the general electrical vicinity (for example, three or four distribution busses from the point of interconnection).	III.B.2.h. The Generating Facility's Nameplate Rating, in aggregate with other generation interconnected to the distribution low-voltage side of the substation transformer feeding the distribution circuit where the Generating Facility proposes to interconnect, will not exceed 10 MW in an area where there are known or posted transient stability limitations to generating units located in the general electrical vicinity (e.g., three or four transmission voltage level busses from the Point of Common Coupling), or the proposed Generating Facility shall not have interdependencies, known to the Utility, with earlier-queued Interconnection Requests, that would necessitate further study.	(2)(b) If there are posted transient stability limits to generating units located in the general electrical vicinity of the proposed point of common coupling, including, but not limited to within three or four transmission voltage level busses, the aggregate generation capacity, including the net metering facility, connected to the distribution low voltage side of the substation transformer feeding the distribution circuit containing the point of common coupling will not exceed 10 megawatts.

<table>
<tr>
<td>Line Configuration Screen</td>
<td>(2)(f) If the small generator facility interconnection is to a primary line on the distribution system, then the interconnection must meet the following criteria:

(A) If the small generator facility is three-phase or single-phase and will be connected to a three-phase, three-wire primary line, then the small generator facility must be connected phase-to-phase.

(B) If the small generator facility is three-phase or single-phase and will be connected to a three-phase, four-wire primary line, then the small generator facility must be connected line-to-neutral and effectively grounded.</td>
<td>The latest national model for this screen is found in the Toolkit and Guidance for the Interconnection of Energy Storage and Solar-Plus-Storage at pp. 132-135, as shown below:

Using the table below, determine the type of interconnection to a primary distribution line. This screen includes a review of the type of electrical service provided to the Project, including line configuration and the transformer connection to limit the potential for creating over-voltages on the Interconnecting Utility's electric power system due to a loss of ground during the operating time of any anti-islanding function.

<table>
<tr><th>Primary Distribution Line Type</th><th>Type of Interconnection to Primary Distribution Line</th><th>Result/Criteria</th></tr>
<tr><td>Three-phase, three-wire</td><td>If ungrounded on primary or any type on secondary</td><td>Pass screen</td></tr>
<tr><td>Three-phase, four-wire</td><td>Single-phase line-to-neutral</td><td>Pass screen</td></tr>
<tr><td>Three-phase, four-wire or mixed three-wire and</td><td>All others</td><td>Pass screen for inverter-based generation if the aggregate Nameplate Rating, including the Nameplate Rating of the proposed Project, is
• ≤ 100% feeder or line section minimum load,</td></tr>
</table>
</td>
<td>(2)(e) If a net metering facility is to be connected to three-phase, three wire primary public utility distribution lines, a three-phase or single-phase generator will be connected phase-to-phase.

(2)(f) If a net metering facility is to be connected to three-phase, four wire primary public utility distribution lines, a three-phase or single-phase generator will be connected line-to-neutral and will be effectively grounded.</td>
</tr>
</table>

		four-wire		or • if minimum load data is not available: ≤ 30% feeder or line section peak load. Pass screen for rotating generation if the aggregate Nameplate Rating, including the Nameplate Rating of the proposed Project, is: • ≤ 33% of feeder or line section minimum load, or • if minimum load data isn't available: ≤ 10% of feeder or line section peak load.	
Single-Phase Shared 2ndry	(2)(g) For interconnection of a small generator facility to a single-phase shared service line on the transmission or distribution system, the aggregated nameplate capacity on the shared secondary line must not exceed 20 kilowatts.			III.B.2.f. If the Generating Facility is to be interconnected on a single-phase shared secondary, then the aggregate Export Capacity on the shared secondary, including the Generating Facility's Export Capacity, will not exceed 65 percent of the transformer nameplate power rating. *Consider using the 65% threshold instead of 20 kW. Consider using Export Capacity instead of Nameplate Rating..*	(2)(g) If a net metering facility is to be connected to a single-phase shared secondary, the aggregate generation capacity on the shared secondary, including the net metering facility, will not exceed 20 kilovolt-amps.

Service Imbalance Screen	(2)(h) For interconnection of a single-phase small generator facility to the center tap neutral of a 240-volt service line, the addition of the small generator facility must not create a current imbalance between the two sides of the 240-volt service line of more than 20 percent of the nameplate rating of the service transformer.	III.B.2.g. If the Generating Facility is single-phase and is to be interconnected on a transformer center tap neutral of a 240-volt service, its addition will not create an imbalance between the two sides of the 240-volt service of more than 20 percent of nameplate rating of the service transformer.	(2)(h) If a net metering facility is single-phase and is to be connected to a transformer center tap neutral of a 240 volt service, the addition of the net metering facility will not create a current imbalance between the two sides of the 240 volt service that is greater than 20 percent of the nameplate rating of the service transformer.
	(2)(i) Except as provided in subsection (2)(l), the interconnection of the small generator facility must not require system upgrades or interconnection facilities different from or in addition to the applicant's proposed interconnection equipment.		
	(2)(j) The aggregated nameplate capacity, in combination with exi[s]ting transmission loads, must not cause the transmission system circuit directly connected to the distribution circuit where the small generator facility interconnection is proposed to exceed its design capacity.		

	(2)(k) If the public utility's distribution circuit uses high speed reclosing with less than two seconds of interruption, then the small generator facility must not be a synchronous machine. If the small generator facility is a synchronous machine, then the applicant must submit a Tier 4 application.		

Inadvertent Export Screen		For interconnection of a proposed DER that can introduce Inadvertent Export, where the Nameplate Rating minus the Export Capacity is greater than 250 kW, the following Inadvertent Export screen is required. With a power change equal to the Nameplate Rating minus the Export Capacity, the change in voltage at the point on the medium voltage (primary) level nearest the Point of Interconnection does not exceed 3%. Voltage change will be estimated applying the following formula: $$\frac{(\mathbf{R_{SOURCE}} \times \Delta\mathbf{P}) - (\mathbf{X_{SOURCE}} \times \Delta\mathbf{Q})}{\mathbf{V^2}}$$ Where: $$\Delta\mathbf{P} = (\textbf{DER apparent power Nameplate Rating} - \textbf{Export Capacity}) \times \textbf{PF},$$ $$\Delta\mathbf{Q} = (\textbf{DER apparent power Nameplate Rating} - \textbf{Export Capacity}) \times \sqrt{(\mathbf{1} - \mathbf{PF^2})},$$ $\mathbf{R_{SOURCE}}$ **is the grid resistance,** $\mathbf{X_{SOURCE}}$ **is the** **V is the grid voltage, PF is the power factor**	