Solar Industry Perspectives on JU Monitoring and Control Practices

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Solar Industry Perspective

- The solar industry appreciates the need for monitoring and control of some types of DER systems in order to maintain the safety and reliability of the existing grid and to support the longer-term objectives of REV and its vision for the build-out of the DSP.
- We support the application in general of a 1 MW threshold for determining when monitoring and control are applied but have significant concerns regarding several of the caveats and exceptions enumerated for this rule
- Other elements of the requirements such as the requirement for individual facilities to report production forecasts also raise concerns

Solar Industry Perspective

- Our recommendations are to :
 - Develop clearly specified thresholds for various line voltages on a per-system basis (not aggregate) above which control and/or monitoring is required as is done in California and Massachusetts.
 - Use these voltage-based thresholds to eliminate broadly applicable exceptions, and make any remaining exceptions that apply to unique circuit characteristics as clear and specific as possible
 - 3. Eliminate the general ability to apply retroactive requirements at any time based on broadly construed and uncertain criteria such as "prior and future utility experiences"

Solar Industry Perspective

- Our recommendations are to :
 - Eliminate the requirement for individualized production forecasts from each facility in favor of a centralized approach
 - 5. Clearly differentiate between control and/or monitoring requirements needed for the safe and reliable interconnection of projects and those required for future grid support functions under REV and keep the matrix focused only on the former
 - 6. Expand efforts in partnership with solar developers to identify lower cost equipment options, to expand the use of lower cost communications media, and to move in ways compatible with likely future requirements

Setting Generally Applicable Thresholds for Control and/or Monitoring

<u>Concerns regarding the threshold above which control in the</u> form of SCADA enabled reclosers are required

- "DERs will require standard control above a certain size threshold, although control may be required for DERs below the size threshold. The size threshold for Control is set at 1 MW and above. <u>This criteria may be modified to include PVs</u> <u>below 1MW in the future.</u>"
- The level of control for DER's below the 1 MW threshold will be decided by each utility based on system, locational and other constraints. <u>DERs will be expected to comply with</u> <u>evolving control standards which will be applied</u> <u>retroactively.</u>
- <u>This size threshold will be determined based on prior and</u> <u>future utility experiences</u> so that the safety and reliability of the distribution system is maintained."

Retroactive Application of New Thresholds

Concerns regarding the threshold above which monitoring and/or control is required

- Retroactive application of control requirements based on broad and uncertain criteria pose serious concerns to the solar industry
- This is particularly true given the cost of a SCADA recloser is between \$60,000 and \$85,000 while the SCADA solution on Con Ed's system is up to \$100,000 to \$120,000
- For a sense of scale, the median recloser cost is roughly equal to the value of an entire year's production of a 400 kW system at \$0.14 per kWh not counting monthly data or other communications charges
- The same language appears in the section on monitoring only requirements and would raise similar concerns regarding retroactivity

Setting Generally Applicable Thresholds for Control Based on System Size and Line Voltage

<u>Concerns regarding the threshold above which control in the</u> form of SCADA enabled reclosers are required

 The general use of a 1 MW threshold to distinguish systems that require the control functions of a recloser from those that may require no upgrades or may require monitoring only is inline with practices of other States with high solar penetration including California, Hawaii, and Massachusetts and is supported by the solar industry

California Rule 21

J. METERING, MONITORING AND TELEMETERING 5. TELEMETERING

- If the nameplate rating of the Generating Facility is 1 MW or greater, Telemetering equipment at the Net Generation Output Metering location <u>may be required</u> at Producer's expense.
- If the Generating Facility is Interconnected to a portion of Distribution Provider's Distribution System operating at a voltage below 10 kV, then Telemetering equipment <u>may be required</u> on Generating Facilities 250 kW or greater.
- Distribution Provider shall only require Telemetering to the extent that less intrusive and/or more cost effective options for providing the necessary data in real time are not available.
 Distribution Provider will report to the Commission or designated authority, on a quarterly basis, the rationale for requiring Telemetering equipment in each instance along with the size and location of the facility.

Massachusetts Common Technical Standards Manual (8/1/16) 7.0 PCC <u>Recloser</u> Requirements – Threshold DG Size

7.1 National Grid

For independent power producers and non-independent power producers:

- 5kV: Interconnections greater than or equal to 500kW
 - For sites between 250kW and 500kW, it is the discretion of the company given the unique circumstances of the interconnection as to whether or not a recloser is required.
- 15kV: Interconnections greater than or equal to 1000kW
 - For sites between 500kW and 1000kW, it is the discretion of the company given the unique circumstances of the interconnection as to whether or not a recloser is required.

Massachusetts Common Technical Standards Manual (8/1/16)

7.2 Eversource MA

Eversource may install a recloser at any DG PCC with an aggregate nameplate of 500kW or greater. However Eversource reserves the right to install a recloser for generation facilities when we determine it is necessary.

- 7.3 <u>Unitil</u>
 - DG > 1MW

NOTE: Utilities reserve the right to implement a recloser in any case it is deemed necessary to interconnect a DG facility with the potential to cause an adverse condition.

Massachusetts Technical Standards Review Group, "Common Technical Standards Manual To accompany M.D.P.U. No. 11-75-E", (posted 8/1/16)

Hawaii Rule 14H

3. Design Requirements

f. Supervisory Control:

For generating facilities with an aggregate capacity greater than 1MW, computerized supervisory control <u>shall be required</u> to ensure the safety of working personnel and prompt response to system abnormalities in case of islanding of the generating facility. Supervisory control <u>may be required</u> for generating facilities with an aggregate capacity greater than 250 kW and up to 1 MW, but shall not be required for generating facilities with an aggregate capacity of 250 kW or less.

<u>Concerns regarding the threshold above which control in the</u> form of SCADA enabled reclosers are required

- The California and Massachusetts standards contain limited and well defined cases based on line voltage were the general 1 MW threshold is not used while retaining the flexibility to adapt in unusual or exceptional circumstances.
- While the solar industry values the JU's efforts to delineate in greater detail the extenuating circumstances that may trigger control requirements below the stated threshold, we have substantive questions concerning several points.

<u>Concerns regarding the threshold above which control in the</u> form of SCADA enabled reclosers are required

- Overall, the number and breadth of potential exceptions raises the general question of how often the 1 MW threshold will be the rule and how many cases will trigger one of the extenuating circumstances
- In general, our view is that extenuating circumstances should be the rare exception and those that create broadly applicable categories where the stated threshold(s) is not to be Utility practice for numbers of systems, then those cases should be more fully delineated and debated as part of the rule and not left as broad caveats to the stated threshold(s)

Areas of Particular concerns regarding stated exceptions to the threshold above which control is required

- The level of system impact
- Number of aggregated smaller systems
- Feeder containing multiple large PV systems
- If minimum daytime load is below 1 MW or if it's a standalone generating assets [stet].
- Voltage Threshold (4kV, 13kV, 27kV, etcetera)
- Islanding risk

Areas of Particular Concern in the Stated Threshold Exceptions :

Use of Aggregate vs Individual System Size

<u>Concerns regarding the potential application of threshold</u> <u>requirements to aggregate DG on a line vs individual</u> <u>system size</u>

- Number of aggregated smaller systems
- Feeder containing multiple large PV systems
 - The lack of quantification significantly limits the usefulness of these exceptions.
 - For example, how many is "multiple" and what is "large"
 - The presence of "multiple facilities on a single feeder" is also listed as a potential trigger for monitoring alone
 - These appear to be implying aggregate capacity considerations for control and monitoring that could be of significant concern, particularly for smaller systems

Concerns regarding the potential application of threshold requirements to aggregate DG on a line vs individual system size

JU may require control depending on the following :

• Islanding risk

JU Revised Supplemental Anti-Islanding Protection

Preliminary Assessment: Determine Requirements for Eliminating DTT

Each utility at its discretion may implement more relaxed requirements. However, there may be situations that require deviation from the typical requirements to ensure safety and reliability of the utility system.



Aggregate Thresholds Included in JU Proposal



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Areas of Particular Concern in the Stated Threshold Exceptions :

Use of Categories That are Likely to be Broadly Applicable to a Large Number of Circuits

Concerns regarding the breadth of stated exceptions to the threshold above which control is required

- The level of system impact
 - As currently written the vagueness of this requirement substantively limits its value to developers in knowing what the rules are and when they are likely to trigger control requirements below 1 MW.
 - If retained, which we would not recommend, it would be of significantly greater use if the specific types of system impacts being considered were enumerated (i.e. voltage control, minimum load ratio, etc.)

Concerns regarding the breadth of stated exceptions to the threshold above which control is required

- If minimum daytime load is below 1 MW or if it's a standalone generating assets [stet].
 - The first half of this would appear to be a specific instance of the initial caveat "level of system impact".
 - Given the use of 15% or 25% of peak load as the estimate of minimum load in large parts of the State this is likely to apply to many circuits.
 - A clearer sense of the concern driving this exception would be helpful. Is the concern the ratio of the generator to minimum load, the aggregate DG to minimum load, etc.

Concerns regarding the breadth of stated exceptions to the threshold above which control is required

- If minimum daytime load is below 1 MW or if it's a standalone generating assets [stet].
 - The second half of this would appear to capture virtually all CDG facilities as well as many C&I systems across the State that are located remotely
 - While many of these facilities are over 1 MW, a meaningful number will be smaller and would thus be left uncertain of their requirements for control
 - For example, the first shared solar facility in NYS was a stand-alone 359 kW system

Areas of Particular Concern in the Stated Threshold Exceptions :

Use of Undefined Modifications to Requirements Based on Line Voltage

Concerns regarding unspecified modifications based on voltage of thresholds above which control is required

- Voltage Threshold (4kV, 13kV, 27kV, etcetera)
 - A clear statement of the voltage thresholds and relevant systems sizes such as those given in California and Massachusetts would be preferable
 - Individual Utilities already do this for monitoring and/or control requirements in New York and other States
 - The JU already appear headed in this direction based on their revised supplemental anti-islanding methodology

National Grid (Massachusetts) Requirements 6.0 Remote Control & Monitoring

6.1 National Grid

National Grid requires the installation of an RTU for non-Independent Power Producer DG applications at the following thresholds: 5kV: DG \geq 500kW 15kV: DG \geq 1MW +15kV: DG > 1.8MW

7.0 PCC <u>Recloser</u> Requirements – Threshold DG Size

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 - For sites between 500kW and 1000kW, it is the discretion of the company given the unique circumstances of the interconnection as to whether or not a recloser is required.

National Grid (New York) Requirements nationalgrid

Rationale for Requiring SCADA Remote Terminal Unit ("RTU") at Distributed Generation Facility

National Grid requires an EMS-RTU for status and control of the DG facility for the following conditions:

- 300 kW or greater for DG systems connected to National Grid's Distribution EPS of 5 kV or below.
- 1 MW or greater for DG systems connected to National Grid's Distribution EPS greater than 5 kV but less than 15 kV.
- 1.8 MW or greater for DG systems connected to National Grid's Distribution EPS greater than 15 kV but less than 35 kV.

EMS-RTU installations may also be required for DG applications not covered by the conditions above as determined by National Grid on a case-by-case basis.

JU Revised Supplemental Anti-Islanding Protection



Concerns regarding unspecified modifications based on voltage of thresholds above which control is required

- Voltage Threshold (4kV, 13kV, 27kV, etcetera)
 - A set of thresholds based on the relative voltage of the circuit and system size effectively creates a bound on the level of current injection allowed prior to the need for control.
 - Such a policy would appear to obviate the need for a number of the enumerated caveats as it does in States like California and Massachusetts thus making clearer the that the rules are the majority of cases and deviations from the reported thresholds are the rare exceptions.

Requirement of Individualized Production Forecasts from Each Facility

<u>Concerns regarding the requirement to provide individualized</u> production forecasts for each facility

- "Utilities have the right to require a short term (e.g. week ahead / day ahead / real time) forecast for individual facilities expected output."
- The solar industry questions the efficacy and efficiency of a requirement that each facilities transmit in some uncertain form at some unspecified timing their own individualized production forecasts
- Such forecasts are more appropriately carried out in a centralized manner by the Utilities or other body ensuring consistency by standardizing the data sets, methodology, and meteorological models used for all facilities.

- The NYISO established "a centralized wind forecasting system in 2008 to better utilize and accommodate wind energy by forecasting the availability and timing of wind-powered generation."
- "In June 2016, the NYISO completed a study, Solar Impact on Grid Operations: An Initial Assessment, which lays the groundwork for reliably managing projected growth in solar resources. Among its recommendations is development of forecasting tools to facilitate the reliable integration of solar resources."

Requirements More Applicable to Enabling Grid Support Functions Under REV than the Safe and Reliable Interconnection of Systems

Concerns regarding the application of monitoring requirements to individual components of DER aggregators

- "For aggregated DER systems, visibility of individual DERs monitoring data in the aggregate will be required at the primary feeder level."
- "The JU may also request information from DER aggregators on parameters of individual DERs that form a part of aggregated DER systems."
- Considering the goal of aggregating numerous small systems together is to economically participate in markets they could not individually, the triggers and rationale for imposing individualized monitoring requirements that could be high cost in total should be more thoroughly explored in our view as part of REV and not imposed as part of an interconnection document

ITWG Monitoring & Control – Monitoring only



Figure V-2: Enabling Technologies⁸¹

- REV guidance docs envision small DERs participating in aggregated grid support and distribution level markets on an 'opt-in' basis.
- For DERs below a certain system size dispatch and control should not be required by the utility.
- Additionally, DERs that do not have a significant operational impact (*i.e. load modifiers*) should not be required to provide control capability.

ITWG Monitoring & Control – Monitoring only



Figure V-2: Enabling Technologies⁸¹

- Utilities should leverage existing investment plans for DERMS and/or AMI integration to accept data from monitoring-only DER nodes.
- To the extent possible, cellular and/or power line carrier technologies should be utilized.

Near-term and Future Strategies for Cost Reduction in Monitoring and/or Control

Lowering M&C Cost - Communications

- Requirements for dedicated hard-wired communications (e.g. "leased line") impose significant cost, delays, and headaches.
- Options for improvement:
 - Wireless communication (e.g. cellular)
 - Leverage AMI or DSP network infrastructure
 - Provide utility access to developer's M&C capabilities →
 Enables path to lower cost and greater capabilities



Eliminating redundant monitoring, control, and communications

- DG projects come with existing and growing capabilities to remotely monitor and control projects. These capabilities continue to grow over time.
- Utilities can leverage the developer's DER management platform for greater M&C capabilities and/or lower cost.

Scenario:	Monitoring Only	Basic Monitoring and Control	Advanced Monitoring and Control
M&C Device:	Customer or Utility Meter	Customer or Utility Recloser/equivalent	Customer Inverters
Communications:	Utility access to developer's platform	Utility access to developer's platform	Utility access to developer's platform



Advanced Monitoring and Control – Smart Inverter and Batteries

- The majority of site-level monitoring, control, and protection requirements can be met through inverters
- Utilities will need increased access to inverters and battery systems for advanced grid services
- Smart Inverter and Battery M&C capabilities:
 - Remote Monitoring and Control
 - Battery Energy Dispatch
 - Set power factor or Volt/VAR curve
 - + many others



Utility – DER Provider Communications: Smart Energy Profile 2.0 (SEP 2.0 / IEEE 2030.5)

- CA utilities have been required to implement SEP 2.0 for utility-DER communications.
- It would be beneficial for NY utilities to also implement SEP 2.0.





Conclusions

- The solar industry welcomes the overall direction of the JU matrix in setting generally applicable thresholds for when monitoring and/or control is required
- Our recommendations are to :
 - 1. Develop clearly specified thresholds for various line voltages on a per-system basis (not aggregate) above which control and/or monitoring is required as is done in California and Massachusetts.
 - 2. Use these voltage-based thresholds to eliminate broadly applicable exceptions, and make any remaining exceptions that apply to unique circuit characteristics as clear and specific as possible
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