



**DATE:** April 28, 2017

**TO:** Jason Pause, Electric Distribution Systems,  
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Department of Public Service  
3 Empire State Plaza, Albany, NY 12223

**FROM:** Joint Utilities of New York – Interconnection Technical Working Group

**RE:** 03/29/17 ITWG Meeting Follow-Ups – DG Penetration Analysis

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Pursuant to your request, here is the response from the Joint Utilities of New York (“JU”) regarding penetration of projects in the 50kW - 1 MW range as one consideration to inform monitoring and/or control requirements. The data is based on the updated queue per the Order Adopting Interconnection Management Plan and Cost Allocation Mechanism, and Making Other Findings. This response reflects the position of all of the utilities identified on this letterhead, although it does not necessarily apply to network systems. This information is preliminary for discussion purposes and is not intended to represent a final position on any issues. This response is not intended to replace the previously submitted Planning and Operational drivers for Monitoring and Control requirements.

## Analysis of Solar PV Capacity

The following figures represent a summary on the JU’s interconnected and queued PV systems as of March 31<sup>st</sup>, 2017 and are grouped by system size. As shown in Figure 1, assuming the total capacity in the updated solar PV queue is interconnected, PV systems below 1 MW will represent close to a third of the aggregate capacity in New York. Figure 2 shows that the PV penetration by size also varies greatly between utilities. For example, systems less than 1 MW make up 92% of Con Edison’s queued and interconnected PV capacity, whereas they will still represent a significant 19% of the aggregate capacity for RG&E.

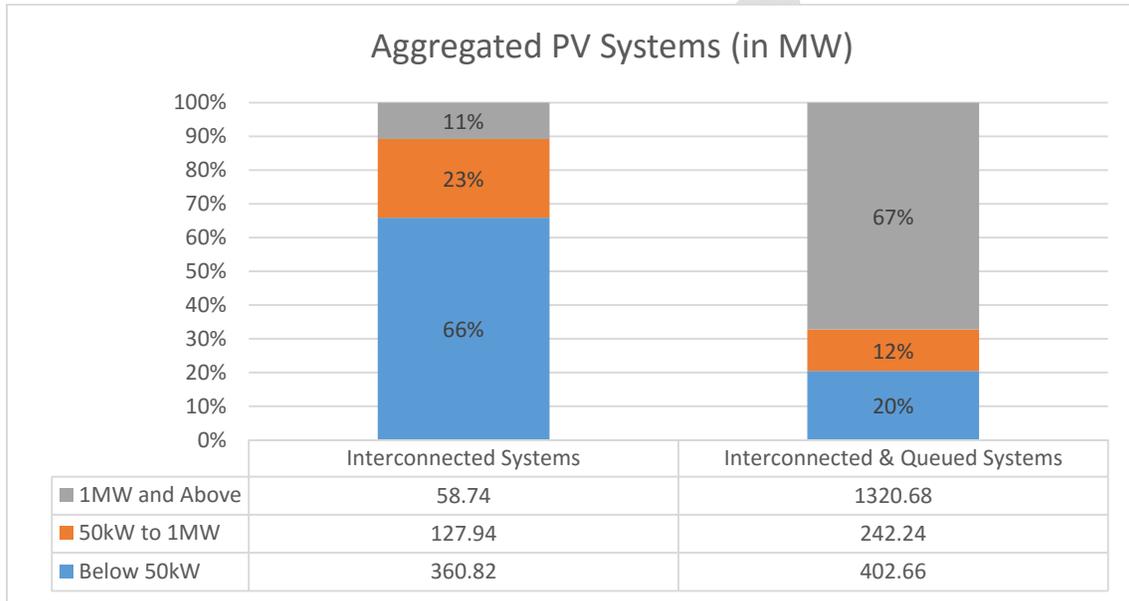


Figure 1: Aggregated PV Capacity in MW

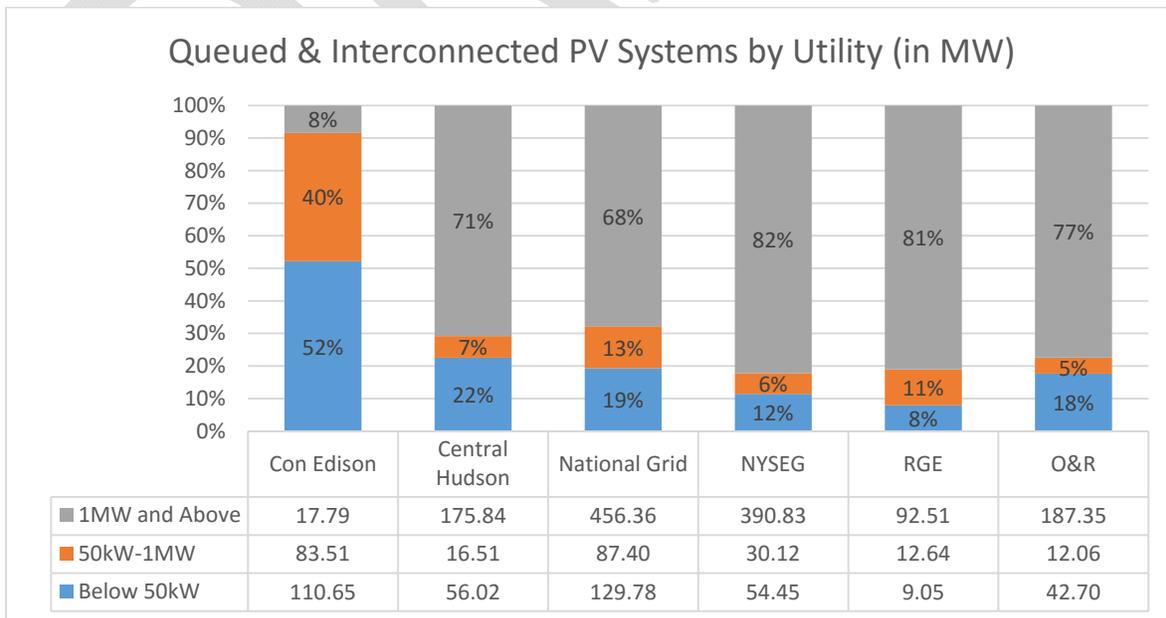


Figure 2: Aggregate PV Capacity by Utility in MW

Considering the number of associated systems, the quantity of solar PV installations less than 1 MW is virtually all of the installations. Specifically, as shown in Table 1, there are 1,377 solar PV systems in the 50kW – 1 MW range for all utilities, which is not an insignificant number.

Number of Queued and Interconnected Systems							
	Con Edison	Central Hudson	National Grid	NYSEG	RGE	O&R	Total
<b>Below 50kW</b>	16,172	7,405	16,479	6,446	1,095	5,902	<b>53,499</b>
<b>50kW-1MW</b>	499	84	526	162	61	45	<b>1,377</b>
<b>1MW and Above</b>	12	90	239	202	49	95	<b>687</b>

*Table 1: Number of queued and interconnected solar PV systems by size per each utility*

## High Penetration Circuits

While PV penetration by size may vary by utility, it can be even more disparate at the circuit level. For example, while utilities may have distribution circuits with little to no installed or queued PV capacity in some areas, other distribution circuits are subject to a significant amount of PV penetration, irrespective of size. The JU have collected a number of circuits, shown in Table 2, that demonstrate that high PV penetration of systems below 1 MW pose a significant risk to system safety and reliability without the necessary monitoring and control capabilities. The listed feeders support the case that, both at the below-50 kW, and 50 kW – 1MW size thresholds, the JU will have aggregate PV capacity on specific circuits greater than 1 MW that would otherwise be absent from distribution system visibility. Not only does this pose a significant safety and reliability risk without monitoring and control, it also reduces confidence in load readings of a particular circuit in regards to distribution planning and operations, as the balance between local demand and generation is unknown. The points mentioned above, with subsequent figures, support the direction of the industry requiring telemetry irrespective of size.

### Breakdown of Solar PV Penetration by Size on High Penetration Circuits

	Circuit ID	Circuit Rating <sup>1</sup> (MW)	Below 50kW (MW)	50kW - 1MW (MW)	1MW and Above (MW)	Total PV (MW)	% Visibility <sup>2</sup>
NYSEG / RG&E	1107433	6.0	0.052	0.98	1.0	2.03	49%
	2301358	5.0	0.082	1.02	2.0	3.10	65%
	2301614	3.3	0.037	0.95	2.0	2.99	67%
Central Hudson	3071	6.0	0.077	1.14	0.0	1.22	0%
	4027	6.0	0.291	1.11	0.0	1.40	0%
National Grid	13-81755	9.2	0.233	1.25	2.0	3.48	57%
	17-60451	9.1	0.024	1.30	2.0	3.32	60%
	18-76257	9.7	0.019	0.84	2.0	2.86	70%
	30-14951	11.1	0.190	0.98	3.8	4.95	76%
	30-14952	11.1	0.224	1.18	0.0	1.40	0%
	35-36654	11.1	0.212	0.91	2.0	3.11	64%
	31-32851	9.9	0.484	0.89	2.0	3.38	59%
	32-26554	10.1	0.957	1.18	0.0	2.14	0%
	31-33351	7.4	0.516	0.74	2.0	3.25	61%
	32-13757	10.0	0.271	1.20	0.0	1.47	0%
	32-13853	11.1	0.354	0.96	2.0	3.31	60%
	33-08756	9.2	0.125	1.45	0.0	1.57	0%
O&R	109-2-13	13.4	0.403	0.98	0.0	1.39	0%
	51-2-13	13.6	0.089	0.92	0.0	1.01	0%
Con Edison	13W74	10.2	0.457	0.67	0.0	1.13	0%
	13W80	10.7	0.507	0.56	0.0	1.07	0%
	16W53	11.1	0.000	0.73	1.3	1.98	63%
	33R06	23.4	0.000	0.82	1.2	1.98	58%
	33R35	20.1	0.024	1.06	0.0	1.08	0%
	3R33	20.0	1.420	0.00	0.0	1.42	0%
	3R36	20.0	1.140	0.00	0.0	1.14	0%
	5R14	10.0	0.911	0.34	0.0	1.25	0%
	5R20	8.9	1.039	0.00	0.0	1.04	0%
	5R28	10.0	0.267	0.15	0.0	0.42	0%
	6Q82	15.9	0.072	1.58	0.0	1.65	0%

Table 2: PV Penetration by Size on High Penetration Circuits (in MW)

<sup>1</sup> Circuit rating is defined as the distribution planning design rating at the feeder head. This rating is not intended to represent the hosting capacity of the feeder, nor is it indicative of the minimum load for a given circuit.

<sup>2</sup> Percent visibility assumes monitoring is required for systems 1 MW and above, and is calculated by dividing the total nameplate capacity of PV systems 1 MW and above by the total PV nameplate capacity of that circuit.

The following figure shows example circuits included in Table 2 from three different utilities, and further illustrates the variations of PV penetration by project size.

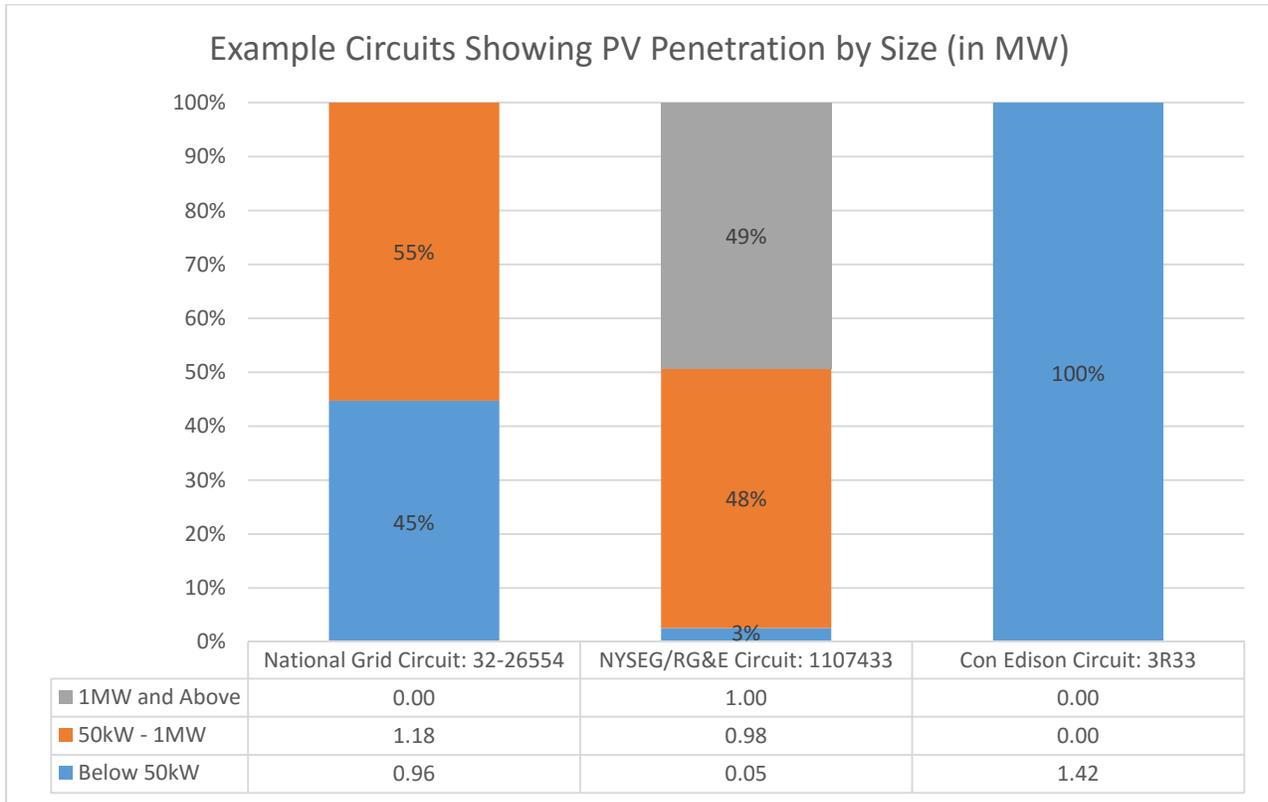


Figure 3: Example circuits from three different utilities showing the various mix of PV penetration by size

## JU Comments and Conclusions

- The queued and interconnected solar PV capacity has no bearing on the use of monitoring and in some cases, control, to secure the system, as this is driven by operational needs.
- The impact of the 50kW – 1MW PV systems to the distribution system is location-specific, which could be substantial on specific feeders with higher penetrations of these systems as compared to local loads.
- Although projects less than 50kW comprise 20% of the interconnected and queued capacity, the JU understands that we must operate without control of these systems at this time. This makes monitoring and control of systems in the 50kW – 1MW even more essential.
- With the proliferation of distribution automation schemes on utilities' systems, the generation activities of the systems ranging from 50kW to 1MW will cause potential impacts on system operation and reconfiguration and thus requires monitoring and control.
- The interaction of PV with other aspects of REV are important; Distribution Automation (DA), Volt/VAR Operations (VVO), Voltage Regulation (VR), etc., complicate operations and this queue and interconnection data solely does not provide a basis for requirements.
- To be sensitive to both the JU's operational requirements and project economics, the separation of monitoring and control should be raised for discussion. For example, a list of criteria could be developed to determine when control is an additional requirement to allow for lower cost alternatives to monitoring for systems 50 kW and above where control is not deemed necessary.