JOINT UTILITIES
OF NEW YORK

Interconnection Technical Working Group

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NYSEG nationalgrid Orange & Rockland Rockland Electric Company conEdison Central Hudson RG&E

Monitoring & Control Overview

- **Definitions**
  - **Monitoring -** is the ability to observe the performance of various assets by providing telemetry such as voltage, kW, kVar, and power factor on the distribution system in near-real time
  - **Basic Control -** is the ability to disconnect solar PV from the distribution grid; basic automatic reclose shall be specified by each utility
  - **Advanced Control –** is defined as operational control, or the ability to change the output and/or dispatch other advanced capabilities of a solar PV asset
- **Requirements**
  - The Joint Utilities (JU) are currently investigating lower-cost M&C solutions for solar PV, but the requirements established will be applicable to all DG technologies
  - Future requirements pertaining to advanced control are out of the scope of this document

Monitoring & Control Overview

❑ Justification

- Operational: Monitoring and basic control is vital for situational awareness to ensure the safe and reliable operation of the distribution system, due to increasing complexity and interdependencies of interconnected systems (e.g. ADMS, DERMS)
- Planning: Monitoring and basic control provides better estimates of future operational parameters, enabling proactive development of solutions to address anticipated constraints
- Market: Monitoring and basic control enables increased DER interconnection, facilitating wholesale, distribution, and ancillary service markets

General Monitoring and Control Requirements

Proposed Monitoring and Control Requirements by Size for Solar PV in New York State			
	< 50 kW	**Aggregated 50 kW to 300 kW**	**300 kW and Greater**
Monitoring	Monitoring ***may*** be required	Monitoring ***shall*** be required	Monitoring ***shall*** be required
Basic Control (PCC Recloser)			PCC Recloser ***shall*** be required
Basic Control (RTU)		Basic control ***may*** be required	

The breakpoints included are consistent with the NY SIR. The above requirements however do not necessarily apply to network systems.

The following is a link to the previously-submitted JU Proposed Monitoring and Control Screens

Justification/Benchmarking

	DER Size for Monitoring	DER Size For Control
FERC NOPR	Strong references to M&C for DER standalone or in aggregation at 100 kW or greater	Strong references to M&C for DER standalone or in aggregation at 100 kW or greater
Tucson Electric Power	Above 300 kW: RTU (SCADA) 50 kW – 300 kW: RTU or Interval (Situational) Requires a second meter for all systems	
Toronto Hydro	Required at 50 kW and above through SCADA	Required at 50 kW and above through SCADA
San Diego Gas & Electric	Required at 30 kW and above; below 1 MW 5/15 min interval data; above 1 MW SCADA	30 kW- 1 MW situational through SCADA; above 1 MW required through SCADA
Xcel (Minnesota)	Required at 40 kW to 250 kW for remote dual meter (interval data) Required at 250 kW and above for monitoring through SCADA	May require an RTU for systems at 250 kW and above
Detroit Edison (DTE)	Required at 150 kW and above	May be required at 150 kW and above Shall be required at 550 kW and above
Eversource – Western Mass	Interval required at 60 kW and above; SCADA required at 500 kW and above	Shall be required at 500 kW and above

Monitoring Specific Requirements

- Monitoring parameters outlined in "REVing Up the Energy Vision in New York," are expected to be provided on a near real-time basis

- At the point of generation the monitoring of the energy source must include the following metering values at the point of common coupling (PCC):
  - Per phase voltage and current,
  - Three phase values for real (watts) and reactive power (VARs), and
  - Power factor

Audrey Zibelman, "Reving Up The Energy Vision in New York", IEEE power and energy magazine -Volume 14 –May/June 2016 issue – page 23

Control Specific Requirements

- Any solar PV system requiring control shall also require monitoring. The following are general requirements of the control system:
  - The PCC recloser or RTU points list shall be mapped in accordance with DNP3, IEC 61850, ANSI/C37.2 or as specified by the utility.
  - In addition to meeting the monitoring and remote trip capabilities, the RTU or PCC recloser must report the status of the disconnecting device.
  - Remote close capabilities will be as required at the individual utility's discretion

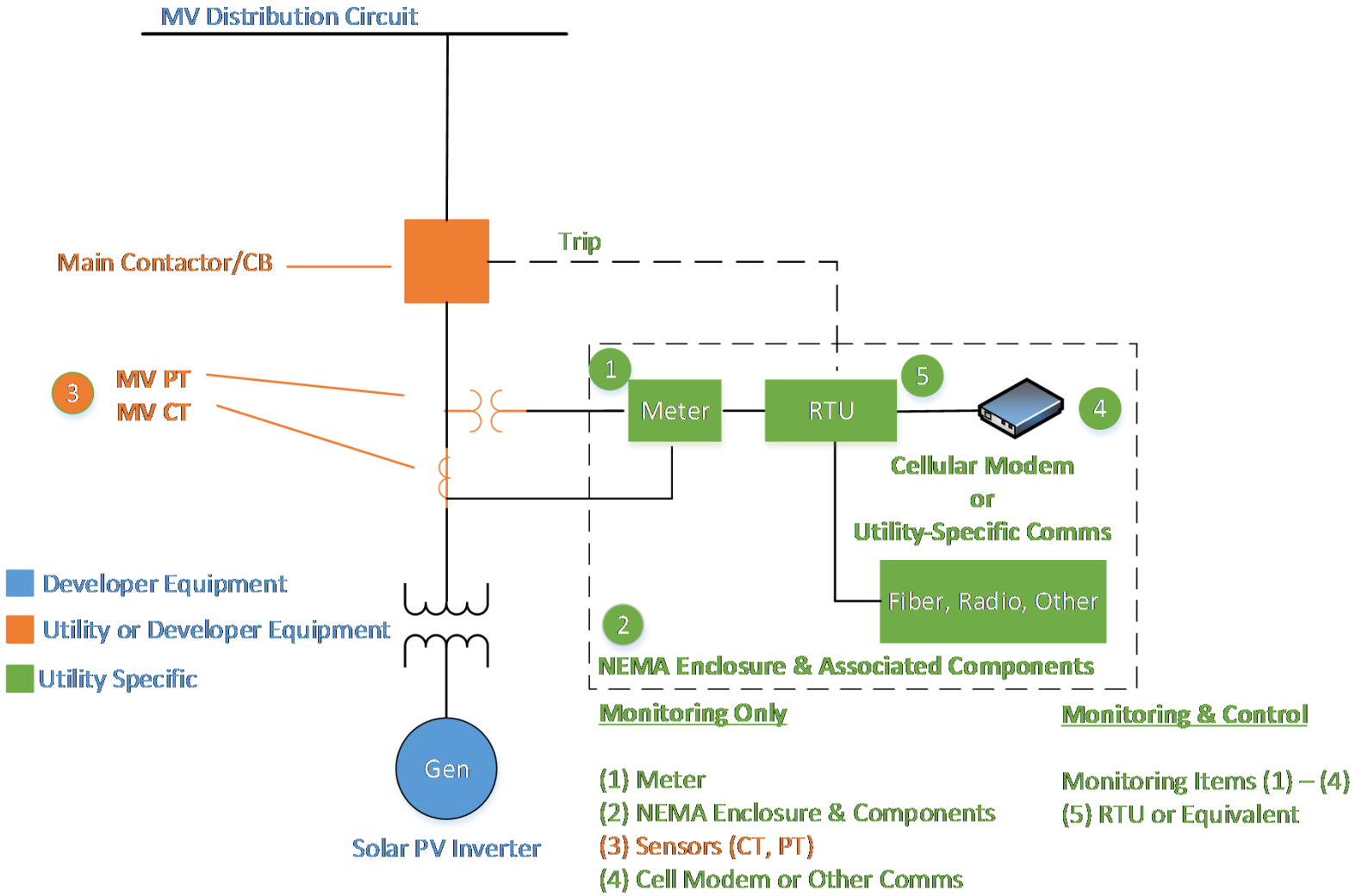
Smart Inverters

- The JU has been evaluating smart inverter capabilities in context of readiness for integration into low-cost M&C pilots

- While there are functions within the existing California Public Utilities Commission (CPUC) Rule 21 mandate and Smart Inverter Working Group (SIWG) that potentially could lower monitoring and control costs through direct integration, these functions are not yet widely implemented and are not anticipated to be standardized in 2017 (remote on/off, full real-time measurement metrology).
  - Further progress must be made in terms of cyber security, integration, functionality, and standardization before they can be used.

- Upon ratification of IEEE 1547-1 testing standard, the JU will require that newly installed smart inverters shall be over-the-air firmware upgradeable.

Monitoring & Control Reference Diagram



M&C Lower Cost Solutions

	< 50 kW	Aggregated 50 kW to 300 kW	300 kW and Greater
Monitoring (Communicating Meter)	Cachelan (SolarVu), Cleveland (LineScope), PMI (Boomerang), Micatu (Sensors), SEL (735-Meter)		
Control (PCC Recloser)			Cooper (VSA), G&W (Viper-S), ABB (OVR)
Controller		NovaTech (Orion) QEI (ePAQ Control/Gateway), SEL (735/3622 Meter & Control/Gateway)	

Note: these vendors are a sampling of possible solutions and are intended to be representative of a larger set of offerings.

Monitoring and Control Costs

Cost Components (Median Values) for 50 kW – 300 kW				
	Monitoring	Control (Additional to Monitoring)	Engineering, Installation, & Commissioning	Totals
Monitoring & Engineering	$7K		$22K	$29K
Monitoring, Control, & Engineering	$7K	$7K	$22K	$36K

Monitoring and Control Cost Drivers

- Cost and Project Variability Drivers
  - Available Communication Mediums in a Geographic Area
  - Security Requirements
  - Voltage Level at the Interconnection Point (primary/secondary)
  - Engineering, Design, Drafting, and Programming
  - Testing and Commissioning

- Cost Reduction Opportunities
  - Standardization of Design and/or Functionality
    - Allows for Economies of Scale
    - Reduces Engineering, Design, Drafting, Testing, and Commissioning Hours
  - Newly Emerging Technologies (but must be balanced with initial learning curve)

References

- Joint Utilities M&C Document 06-14-2017 http://www3.dps.ny.gov/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/def2bf0a236b946f85257f71006ac98e/$FILE/JU%20Response%20M&C%20Requirements%20for%20Solar%20PV%20Projects%20in%20NY%202017-06-....pdf
- Joint Utility ITWG Meeting Slides 01-18-2017 http://www3.dps.ny.gov/W/PSCWeb.nsf/All/DEF2BF0A236B946F85257F71006AC98E
- TEP, Distributed Generation Interconnection Requirements, https://www.tep.com/doc/dgir.pdf, Page 24
- Toronto Hydro, Distributed Generation Requirements, http://www.torontohydro.com/sites/electricsystem/business/ConditionsofService/Documents/DG%20Requirements%20-%20Rev5%20-%2030-Nov-2015.pdf, Page A4-1
- Salt River Project, Technical Requirements for Generating Facilities Interconnecting to The Distribution System, https://www.srpnet.com/electric/pdfx/interconnect_guidelines.pdf, page 5-1