



# JOINT UTILITIES

## Interconnection Technical Working Group

November 8<sup>th</sup>, 2016

THE JOINT UTILITIES OF NEW YORK



nationalgrid

 Orange & Rockland

 conEdison



# Agenda

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- Introduction
- Current Inverter Capabilities and Limitations
- Benchmarking and Outreach Key Findings
- Application of Sandia Screens and Risk of Islanding (ROI) Studies
- Unintentional Islanding Protection Requirements
- Utility Projects to Mitigate Cost Impacts of DTT
- Risks Associated with Implementing Alternatives to DTT
- Summary of Joint Utility position

# Introduction

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- **Unintentional islanding** may have adverse effect on:
  - Power quality
  - Customer equipment and utility asset integrity
  - Public safety
- **Direct Transfer Trip (DTT) for anti-islanding:**
  - Increases costs of interconnection
  - Limits operational flexibility
- **The Joint Utilities common position on anti-islanding schemes to address:**
  - Concerns regarding inverter performance and the updated anti-islanding criteria
  - Common Joint Utility position on Sandia screening, Risk of Islanding (ROI) Studies, and Reclose Blocking Schemes
  - DTT cost impact and implementation alternatives
  - Unintentional island negative impacts and mitigation

# Current Inverter Capabilities and Limitations

- **UL 1741 Certification on *Individual* basis** – rather than in multiple-inverter scenarios
  - Anti-islanding mechanisms implemented within PV inverters may vary across different inverter manufacturers and models
  - Mixing different inverter types will lead to a degradation of islanding detection effectiveness (Sandia<sup>1</sup>)
  - It is difficult to predict the impact of islanding detection due to multiple inverters in the distribution system (NREL<sup>2</sup>)
  - General Electric (“GE”) could not conduct meaningful studies of the islanding behaviors and possible interactions of multiple inverters due to proprietary inverter algorithms (GE<sup>3</sup>)
- Testing to date has been completed on single phase inverters, not three phase inverters on unbalanced systems

<sup>1</sup>Ropp, Mike. Sandia National Laboratory, (2012) *Suggested Guidelines for Anti-Islanding Screening*. <http://prod.sandia.gov/techlib/access-control.cgi/2012/121365.pdf>

<sup>2</sup> Bell, Frances. National Renewable Energy Laboratory (NREL) (2016) *Experimental Evaluation of PV Inverter Anti-Islanding with Grid Support Functions in Multi-Inverter Island Scenarios*. <http://www.nrel.gov/docs/fy16osti/66732.pdf>

<sup>3</sup> General Electric (GE) (2016) *Quantification of Risk of Unintended Islanding and Re-Assessment of Interconnection Requirements in High Penetration of Customer Sited PV Generation*.

Prepared for CA PUC and PG&E

# Benchmarking and Outreach Key Findings

- **The Joint Utilities pursued a number of benchmarking and outreach efforts to compare anti-islanding practices across the nation**
  - Northern Plains Power Technologies (NPPT), Pacific Gas & Electric Company (PG&E), Arizona Public Service (APS), Xcel Energy (Minnesota), National Renewable Energy Laboratory (NREL), Electric Power Research Institute (EPRI), Pterra, DPS Staff and NYSERDA
- **Key findings from the benchmarking**
  - The **current state of interconnection in NY is unique** in terms of solar PV connected beyond the meter without substantial load offsetting the generation
    - Community solar projects vs remotely connected net energy meter (NEM) PV
    - Feeders have many zones of protection, creating several opportunities for islanding risk
  - Many utilities rely on the **UL 1741 certified inverter's anti-islanding** capabilities to some extent
    - Reclose blocking or other protection measures may be required to mitigate the risk associated with island formation
      - Specific technical details of reclose block implementation will need to be further developed. The position paper by Joint Utilities provided an example
    - Non UL 1741 certified inverters or rotating machinery may still require the need for DTT
  - Most utilities require **a recloser or RTU at the PCC**

# Application of Sandia Screens and ROI Studies

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- The JU will continue applying the Sandia screens and will offer a “Risk of Islanding” (ROI) study if the project fails the Sandia screens.
  - As described in the flow charts on the following slides, the Sandia screens may be unnecessary in many cases.
- Following receipt of CESIR results, the developer/customer can request to have a ROI study performed by providing payment to the utility.
- Failure of an ROI study may result in the need for installation of reclose blocking schemes or DTT.

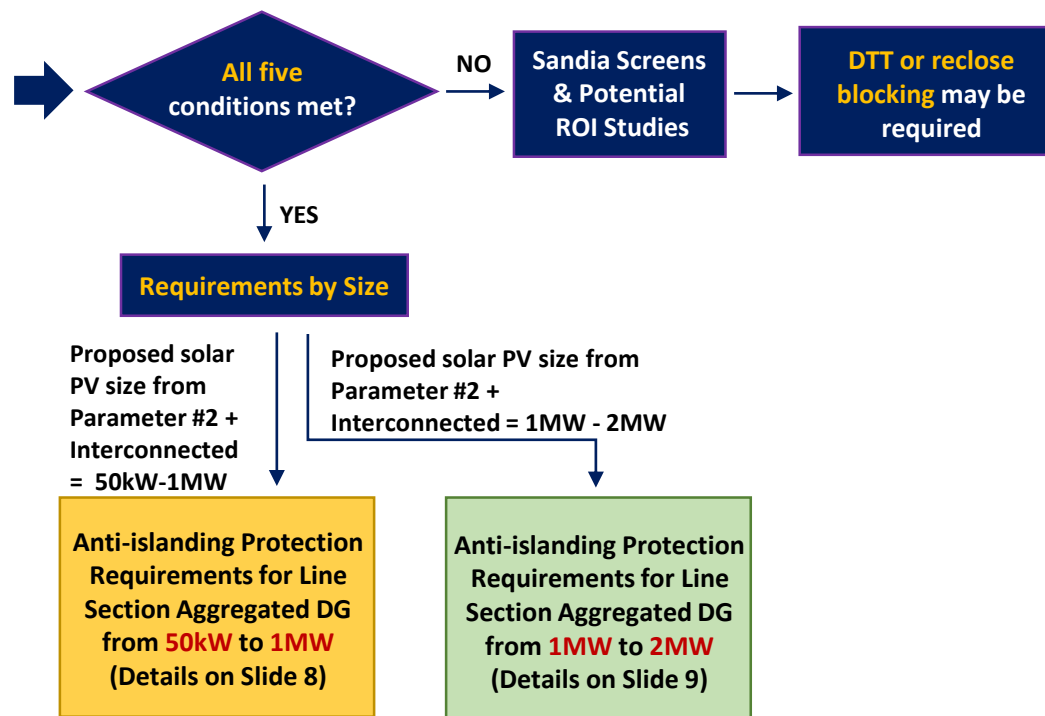
# Unintentional Islanding Prevention Requirements

## 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.*

### Five-Parameter Conditions

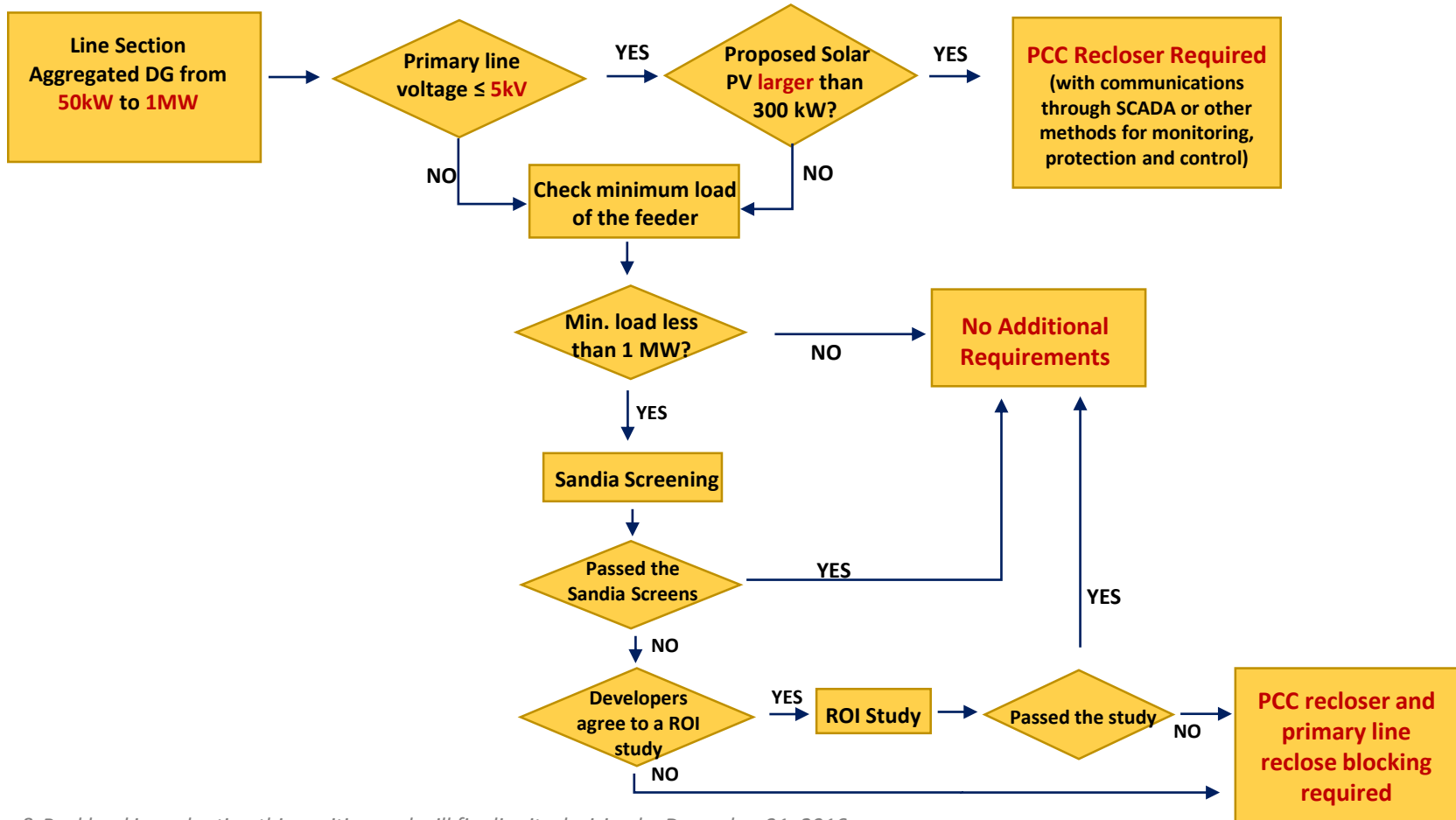
1. Proposed interconnection is for a solar PV system with up to **2 MW** nameplate rating.
2. Individual interconnection applications on **sub-divided or adjacent parcels** are evaluated based upon total **aggregate** nameplate ratings.
3. Aggregate DG on the feeder that is not UL 1741 certified, inverter-based generation shall be **less than 50 kW**.
4. Interconnection is to the distribution system, **at voltage levels 15kV and below**.
5. Distribution systems are **radial** without automated loop schemes.



*\*Orange & Rockland is evaluating this position and will finalize its decision by December 31, 2016.*

# Unintentional Islanding Prevention Requirements (cont'd)

## Anti-islanding Protection Requirements for Line Section Aggregated DG from 50kW to 1MW

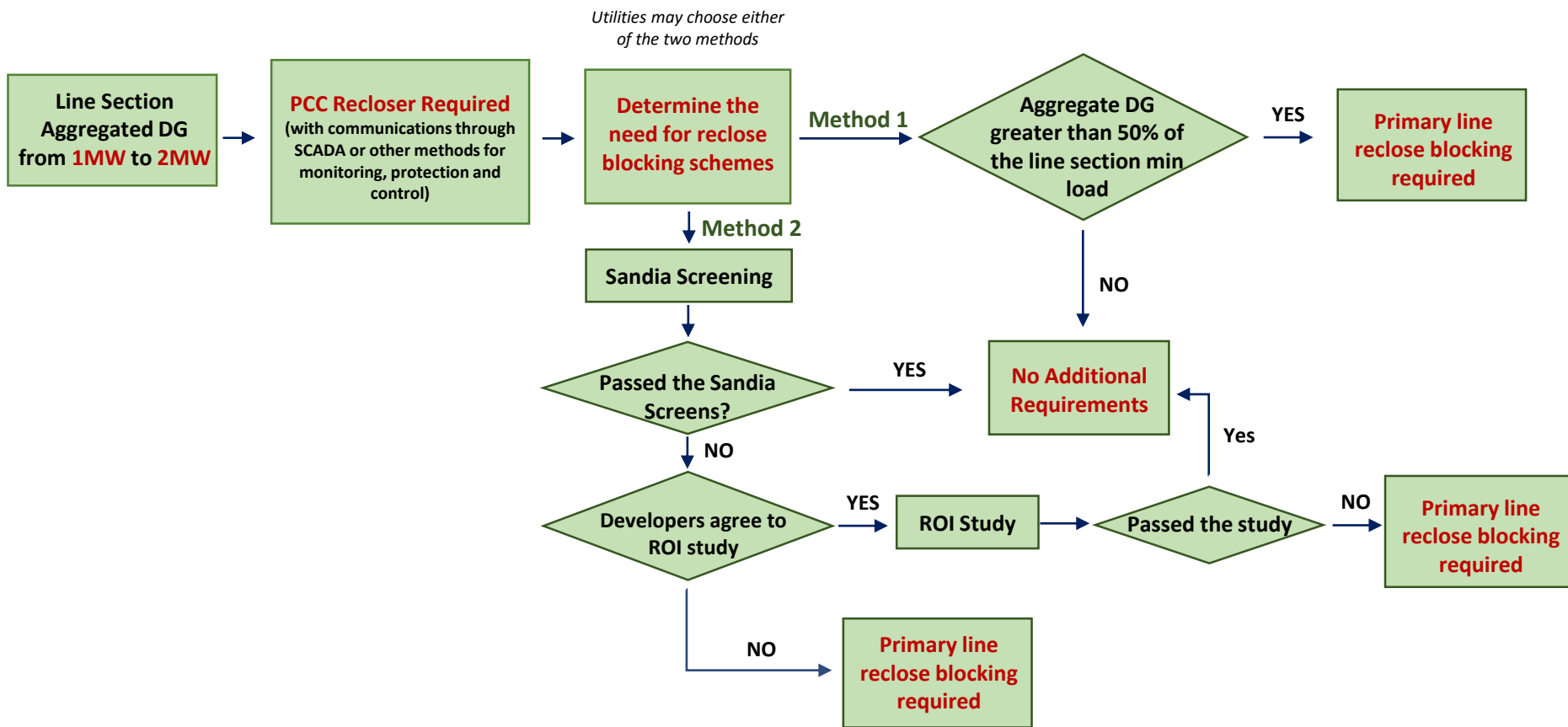


\*Orange & Rockland is evaluating this position and will finalize its decision by December 31, 2016.



# Unintentional Islanding Prevention Requirements (cont'd)

**Anti-islanding Protection Requirements for Line Section Aggregated DG from 1MW to 2MW**



\*Orange & Rockland is evaluating this position and will finalize its decision by December 31, 2016.

# Utility Projects to Mitigate Cost Impacts of DTT

- Utilities have taken steps to mitigate the cost impact associated with traditional DTT or other anti-islanding protection schemes by investing in different communication methods:
  - PLCC (Power Line Carrier Communication)
    - Pilot project conducted by Central Hudson and National Grid
  - Radio Communication
    - Pilot project conducted by Central Hudson and National Grid
- Utilities are researching and testing new alternatives to DTT:
  - Con Edison is exploring a new phase comparison scheme for synchronous generation consisting of a synchro-phasor over a radio/cell link. The cost of this new system will be a fraction of the cost of DTT

# Risk Associated with Implementing Alternatives to DTT

- Elimination of instantaneous reclosing will result in:
  - Visibility of reclose operations for all customers on feeder
  - Reduction in ability to implement fuse saving schemes
  - Negative impact on customer reliability
  - Impacts on Distribution Automation
- Increased risk to public safety
- Other requirements
  - SIR contract updates required
    - Proof of insurance/liability risk to developer or customer
  - Ability for utility to require DTT at the developer's expense at later point
  - Utility relief from negative implications to electric reliability performance metrics by the application of reclose blocking

# Summary of Joint Utility Position

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1. DTT will be eliminated in many cases, and where still necessary, each utility will continue to take steps to mitigate cost impacts.
2. The Joint Utilities will evaluate the Sandia screens and IEEE 1547 standards as they are updated and resulting impact on anti-islanding mechanisms.
3. When necessary, the Joint Utilities will uniformly apply the Sandia screens and offer subsequent ROI studies when the screens fail.
4. The Joint Utilities will continue to evaluate opportunity for common positions on items not yet covered in this presentation, based on priority that can be discussed.
5. The resolution of legal/risk sharing issues is crucial to facilitating the implementation of alternatives to DTT.



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