1.0 GENERAL

1.1 National Grid (NG) may reclose at any distribution (electric power system) EPS segment at any time without checking for de-energized segments as normal system operations to maintain service reliability. It is important to identify this possibility to the distributed energy resources (DER) operator as it is the responsibility of the DER operator to trip off within 2 seconds in the event the EPS utility source is not present.

1.2 During DER impact evaluation, when a DER on the circuit causes NG system protection to be unable to trip for end of line faults, appropriate measures will be taken to correct this protection gap. NG device setting adjustments, additional protection devices, and/or customer impedance grounding may be required.

1.3 The requirements outlined below in regards to unintentional islanding mitigation risks are not applicable for DER proposed to be interconnected to an NG network system. NG network systems are not designed and cannot accept back feed.

2.0 TERMS

2.1 Line section: as used within this document a line section shall describe any EPS circuit segment that can be isolated via an automatic device such as a sectionalizer, recloser or circuit breaker. A complete distribution feeder may contain multiple line sections. Depending on the DER size to load ratio, multiple line sections may require review and be screened accordingly per the steps outlined.

2.2 Certified: the term certified shall mean UL 1741 certified where used throughout this document.

2.3 Non-certified: the term non-certified shall mean any non-UL 1741 inverter, induction or synchronous DER.

1.0 ISLANDING RISK MITIGATION METHODS REQUIRED

1.1 Condition for all cases

1.1.1 Line section aggregated DER ≤ 33% minimum load regardless of DER type mix and is connected to < 15 kV EPS

1.1.1.1 no additional requirements

1.2 Cases where NG point of common coupling (PCC) recloser is required

1.2.1 DER ≥ 300 kW and DER > 33% minimum load and is connected to < 5 kV EPS

1.2.2 DER connected to > 15 kV and < 45 kV EPS where DER > 50% onsite minimum host load

1.3 Cases where direct transfer trip (DTT) protection is required

1.3.1 If line faults (phase and ground where applicable) cannot be cleared by DER protective device.

1.3.2 Unique arrangements not explicitly defined within this document at National Grid's discretion.

1.3.3 If the DER cannot be tripped off with utility-owned devices when automated sectionalizing schemes will operate.

1.3.4 DER connected to > 15 kV EPS where DER > 50% onsite minimum load and the connecting line is radially supplied.

2.0 CERTIFIED DER[i]

2.1 For all interconnections, 88% voltage trip point is required.

2.2 For DER equipped with DTT, those DERs will not be factored into the 10, 25, 33 or 67% ratios identified below.

2.3 Proposed DER rated ≤ 50 kW

2.3.1 No requirements

2.4 Proposed DER rated > 50 kW and < 500 kW

2.4.1 Line section aggregated non-certified DER is ≤ 10% of mix.

2.4.1.1 no additional requirements

2.4.2 Line section aggregated noncertified DER is > 10% and ≤ 25% of aggregate DER.

2.4.2.1 Sandia screening may be applicable depending on inverter models on segment

2.4.2.2 NG PCC recloser and reclose blocking required if Sandia screens not passed.

2.4.2.2.1 Detailed ROI study may be performed at customer's request. If results of the detailed study show no significant risk of islanding for a period greater than 2 seconds, then the recloser and reclose blocking is waived.

2.4.3 Line section aggregated non-certified DER is > 25% of all DER.

2.4.3.1 NG PCC recloser and reclose blocking required.

2.4.3.1.1 Detailed ROI study may be performed. If results of the detailed study show no significant risk of islanding for a period greater than 2 seconds, then the recloser and reclose blocking is waived.

2.5 Proposed DER rated ≥ 500 kW < 1000 kW

2.5.1 Line section aggregated non-certified DER is ≤ 10% of mix.

2.5.1.1 No additional requirements

2.5.2 Line section non-certified DER is > 10% and ≤ 25% of aggregate DER.

2.5.2.1 Sandia screening may be applicable

2.5.2.2 NG PCC recloser and reclose blocking is required if Sandia screens not passed

2.5.2.2.1 Detailed ROI study may be performed at customer's request. If results of the detailed study show no significant risk of islanding for a period greater than 2 seconds, then the recloser and reclose blocking is waived.

2.5.3 Line section non-certified DER > 25% of aggregate DER.

2.5.3.1 NG PCC recloser and reclose blocking required

2.5.3.1.1 Detailed ROI study may be performed at customer's request. If results of the detailed study show no significant risk of islanding for a period greater than 2 seconds, then reclose blocking is waived. NG PCC waived for DER ≤ 67%. NG PCC recloser required for DER > 67%.

2.6 Proposed DER rated DER ≥ 1000 kW

2.6.1 NG PCC Recloser required

2.6.2 Reclose blocking required if aggregate DER > 50% of min load.

3.0 NON-CERTIFIED INVERTERS, INDUCTION & SYNCHRONOUS MACHINES

3.1 Proposed DER rated ≤ 50 kW

3.1.1 Require ANSI C37.90 protective relay with IEEE 1547 voltage & frequency tripping functions & restoration functions.

3.2 Proposed DER rated > 50 kW

3.2.1 DER < 33% minimum load

3.2.1.1 Require ANSI C37.90 protective relay with IEEE 1547 voltage & frequency tripping functions & restoration functions.

3.2.2 DER > 33% minimum load

3.2.2.1 DTT required.

[i] *Inverter firmware derating not applicable to reduce system size.*