



## **Standard for Interconnecting Small Generation 150 kW or Less with Electric Power Systems (EPS) (Interconnection Standard)**

### **1. Overview:**

This Standard contains the requirements, in addition to applicable tariffs and service regulations, for parallel interconnection of non-utility owned single phase small generation systems which are rated at 25 kW or less for residential members and 150 kW or less for nonresidential members and are consistent with Section 6 below. “Small” generator procedures for application for and acceptance of an interconnection request for such generators are included in Section 8.

Small Generators meeting the criteria and conditions included and/or referenced herein will normally be approved for interconnection except in extenuating site specific circumstances.

#### **1.1 Scope:**

This Standard applies only to “Small” generators installed at existing radial fed Area EPS (Area Electric Power System) distribution members, with a determination of minimal impact.

#### **1.2 Purpose:**

This document was developed to provide a uniform simplified standard for interconnecting certain small generators of 150 kW or less capacity in North Carolina.

#### **1.3 Limitations:**

This Standard does not cover momentary parallel systems used for the exclusive purpose of closed transition of loads. The Standard does not cover small generators connecting to area EPS network systems. The Standard does not cover members served directly from area EPS transmission facilities. The interconnection of generators is subject to applicable EnergyUnited tariffs, rate schedules and service regulations in addition to compliance with this Standard.

Although outside the scope of this document, generators failing to meet the requirements of this Standard may still be considered for interconnection after more detailed review specific to the proposed application and generator.

## 2. References:

IEEE 1547 – (Standard for Interconnecting Distributed Resources with Electric Power Systems, latest published edition).

IEEE 1547.1 – (Standard for Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems, latest published edition)

IEEE 1547.2 – (Application Guide for IEEE Standard 1547, Interconnecting Distributed Resources with Electric Power Systems)

IEEE 1547.3 – (Guide For Monitoring, Information Exchange, and Control of Distributed Resources Interconnected with Electric Power Systems, latest published edition)

UL 1741 – (Inverters, Converts and Controllers for use in Independent Power Systems, latest published edition).

NFPA 70 – (National Electrical Code, latest published edition).

EU Policies – EnergyUnited approved policies including, but not limited to, rate schedules, riders, service regulations and terms and conditions.

## 3. Definitions:

3.1 **Area EPS:** Area Electric Power System: The electric facilities of the local utility.

3.2 **Cooperative:** The electric utility owning and operating the Area EPS.

3.3 **Closed Transition of Loads:** A make-before-break load transfer scheme, in which the Generator is operated in parallel with the Area EPS for a brief period of time, to ensure that the load is maintained while in transition from the Cooperative to the Generator or vice versa. This transition scheme includes fast transfer systems, generally less than 100 msec, and soft load systems where the parallel condition is maintained for a number of seconds.

3.4 **Generator:** The distributed “generation system” and equipment to be interconnected to the Area EPS.

3.5 **Isolation Device:** A manual load-break disconnect switch or safety switch with a clear visible indication of switch position between the Area EPS and the Generator. The switch must have pad lock provisions for locking in the open position, but shall not be lockable in the closed position. The switch must be visible to, and accessible to Cooperative personnel. The switch must be in close proximity, and visible from, the Member’s point of electrical interconnection with the Cooperative’s Area EPS. The switch must be labeled

“Generator Disconnect Switch”. The switch may isolate the Generator system and its associated load from the area EPS or disconnect only the Generator from the Area EPS.

The Cooperative shall have access to the Isolation Device at all times.

- 3.6 **Member:** The electric Member of record for the location where the generation will be interconnected.
- 3.7 **Momentary Parallel Systems:** A Generator utilizing only a Closed Transition mode of operation.
- 3.8 **Point of Common Coupling:** “Point of common coupling” means the point of interconnection of a member-generator facility with an electric delivery system and shall have the same meaning as in IEEE Standard 1547.

#### **4. General Requirements:**

4.1 **Service Regulations and Tariff / Rate Schedule:** This *Standard for Interconnecting Small Generation 150 kW or Less with Electric Power Systems (EPS)* is governed by the Cooperative’s Service Regulations and Tariff/Rate Schedules as approved by the EnergyUnited Board of Directors.

4.2 **Acceptance for Interconnection:** Each application and Generator is evaluated individually and accepted or denied for interconnection with the Cooperative’s Area EPS. Any Cooperative evaluation is from the perspective of the impact of the interconnection on the Cooperative and its system. The Member is solely responsible for ensuring the safe installation and operation of the Generator. Generators shall not be interconnected until the requirements and process described in this Standard have been satisfied.

The acceptance for interconnection is for the original applicant only. Subsequent owners or occupants of a site with an interconnected generator must submit a new Application to the Cooperative. **The existing member assumes the responsibility of ensuring a new member is aware the new member must re-apply and obtain the Cooperative’s written acceptance or the equipment must be removed or disabled to prevent future interconnection and/or operation.** The application fee for the re-applying new member is waived and the technical requirements may be grandfathered for subsequent owners as long as the Generator’s maximum output capacity has not been changed and/or the interconnection protection system has not been modified.

4.3 **Waiving Requirements:** All requirements of this Standard must be met although the Cooperative may, in its sole discretion, waive all or some of the requirements of this Standard.

4.4 **Interconnect Cost:** The Member will bear all the cost of interconnection on the Member’s side of the point of interconnection as well as necessary

changes or upgrades to the Area EPS to meet all technical and protection requirements to address any power quality, reliability or safety issues caused by the Generator operation or connection to the Area EPS.

- 4.5 **Isolating or Disconnecting the Generator:** The Cooperative may isolate the Member's premises and/or Generator from Cooperative's Area EPS when necessary in order to construct, install, repair, replace, remove, investigate, or inspect any of Cooperative's equipment or part of Cooperative's system; or if Cooperative determines that isolation of the Member's premises and/or Generator from Cooperative's Area EPS is necessary because of emergencies, forced outages, force majeure or compliance with prudent electrical practices. Whenever feasible, the Cooperative shall give the Member reasonable notice of the isolation of the Member's premises and/or Generator from Cooperative's Area EPS. Notwithstanding any other provision of this Standard, if at any time the Cooperative determines that either the Generator may endanger the Cooperative's personnel or other persons or property, or the continued operation of the Member's Generator may endanger the integrity or safety of the Cooperative's electric system, the Cooperative shall have the right to isolate the Member's premises and/or Generator from the Cooperative's Area EPS.

The Cooperative may disconnect the Area EPS electric service to any Generator determined to be malfunctioning, or not in compliance with this Standard. The Member must provide proof of compliance with this Standard before the electrical service will be reconnected.

- 4.6 **Limitation of Liability:** Each party's liability to the other party for any loss, cost, claim, injury, liability, or expense, including reasonable attorney's fees, relating to or arising from any act or omission hereunder, shall be limited to the amount of direct damage actually incurred. In no event shall either party be liable to the other party for any indirect, special, incidental, consequential, or punitive damages of any kind.
- 4.7 **Indemnification:** The parties shall at all times indemnify, defend and save the other party harmless from any and all damages, losses, claims, including claims and actions relating to injury or death of any person or damage to property, demand, suits, recoveries, costs and expenses, court costs, attorney's fees, and all other obligations by or to third parties, arising out of or resulting from the other party's action or inaction of its obligations hereunder on behalf of the indemnifying party, except in cases of gross negligence or intentional wrongdoing by the indemnified party.
- 4.8 **Access to and Operation of the Generator:** The Member shall limit access to and operation of the Generator to qualified persons and assumes the responsibility of maintaining control of the operation of the Generator.
- 4.9 **Insurance:** The Member shall obtain and retain, for as long as its Generator is interconnected with the Cooperative's system, liability insurance which

protects the Member from claims for bodily injury and/or property damage. For a non-residential Member the minimum coverage shall be comprehensive general liability insurance with coverage at least \$300,000 per occurrence and for a residential Member the minimum coverage shall be a standard homeowner's insurance policy with liability coverage in the amount of at least \$100,000 per occurrence. This insurance shall be primary for all purposes. The Member shall provide certificates evidencing this coverage as required by the Cooperative. The Cooperative reserves the right to refuse to establish, or continue the interconnection of the Member's Generator with the Cooperative's system, if such insurance is not in effect.

- 4.10 **Generator Alterations:** Changes to the Generator output capacity and/or modification to the protection system required to meet this Standard are prohibited without submitting a new "Application to Interconnect Small Generator" and obtaining a new acceptance from Cooperative.
- 4.11 **Discontinuing Operation:** The Member shall notify the Cooperative prior to permanently discontinuing operation of the Generator interconnected with the Cooperative.
- 4.12 **Interconnection Application Fee:** The nonrefundable interconnection application fee covers only the application process for interconnection of Generators and shall be one of the following:
  - 4.12.1. For residential service members: \$100.00
  - 4.12.2. For nonresidential service members: \$250.00

## **5. Generator, Inverter and Protective Equipment Technical Requirements:**

- 5.1 **General:** The Cooperative may elect to visit the site and verify compliance with any requirement of these Standards.

This standard applies to single-phase Generators. Three phase Generators are not covered by this Standard although three-phase and multiple single phase Generators meeting all requirements of this Standard may be allowed at the sole discretion of the Cooperative.

- 5.2 **Required Standards:** The Member must certify the following requirements:
  - 5.2.1. The installation of the Generator and all equipment in the system must comply with the latest published edition of IEEE 1547, 1547.1 and 1547.3 as applicable.
  - 5.2.2. The Member's inverter or interconnection protection system must be tested and listed for compliance with the latest published edition of Underwriters Laboratories, Inc. (UL) 1741.
  - 5.2.3. The Generator must pass the anti-islanding test in UL 1741. This test may be waived for small inverter-based systems at the sole discretion of the Cooperative.

- 5.2.4. The Member's inverter or interconnection protection system must be manufactured after November 7, 2000.
- 5.2.5. Any protection settings affecting anti-islanding performance must not be adjusted after passing anti-islanding tests.
- 5.3 **Electrical Contractors and NEC Code Inspections:** All installed wiring, protection devices, cabinets and connectors, etc. must comply with the latest published edition of the NEC as used by the local jurisdiction and all applicable local codes. An approved electrical inspection by the authority having jurisdiction is required.
- 5.4 **Isolation Device:** An Isolation device as defined in Section 3.6 is required. The Cooperative in its sole discretion determines if the device is suitable.

## **6. Screens and Requirements for determination of minimal impact:**

- 6.1 **Area EPS Circuit Level Saturation:** The cumulative total of the maximum rated output of all interconnected Generation shall not exceed the following limits, per circuit, for the given Area EPS distribution circuit phase to phase voltage rating: Circuits 20 kV or greater: 100 kW, Circuits 10 kV but less than 20 kV: 60 kW, Circuits less than 10 kV: 30 kW. Aggregate or single-unit amounts larger than this may be allowed upon an engineering determination by the Cooperative.
- 6.2 **Limitations of Area EPS Facilities:**
- 6.2.1. **General:** The Generator shall meet each of the following requirements to qualify for interconnection and each requirement must be maintained after commissioning.
- 6.2.2. **Secondary, Service and Service Entrance Limitation:** The Generator capacity shall be less than the capacity of the Area EPS owned secondary, service and service entrance cable connected to the Point of Common Coupling. The Cooperative will make this determination after reviewing the Area EPS installed facilities.
- 6.2.3. **Transformer Loading Limitation:** The Generator shall not have the ability to overload the Area EPS transformer or any EPS transformer winding beyond manufacturer or nameplate ratings.
- 6.2.4. **Integration with Area EPS Grounding:** The grounding scheme of the Generator shall comply with IEEE 1547.
- 6.2.5. **Balance Limitation:** The generator shall not create a voltage imbalance of more than 3% if the Area EPS transformer, with the secondary connected to the Point of Common Coupling, is a three-phase transformer.

6.2.6. Any changes or upgrades to Area EPS to accommodate the Generator will be pursuant to Section 4.4.2 above.

## **7. Commissioning, Maintenance and Inspections:**

- 7.1 **General:** The Member or Member's authorized representative shall perform commissioning and maintenance as outlined in this section for all Generator equipment. All testing shall be documented and the Cooperative shall be granted the right to audit the documentation. The Cooperative reserves the right to require and witness testing of the Member's Generator.

The Member's Generator is subject to inspection by a Cooperative representative at any time, upon reasonable notice to the Member, as the Cooperative deems necessary.

The Cooperative's inspection and/or witnessing the testing of the Member's equipment shall not be construed as the Cooperative warranting or implying that the Member's equipment is safe or reliable. The Cooperative shall not be liable to the Member or others as a result of inspection and witnessing of tests of the Member's Generator or equipment.

- 7.2 **Commissioning:** The manufacturer's recommended and required commissioning, installation and functional tests shall be completed, with successful results, in accordance with the manufacturer's published recommendations. Commissioning tests in IEEE 1547 may, at the Cooperative's discretion, also be completed with successful results unless these IEEE 1547 tests are duplications of the manufacturer's factory tests, in which case the factory tests will be accepted as proof of IEEE 1547 compliance. After obtaining the final electrical inspection, the Member shall invite the Cooperative to the commissioning test and perform the test at a mutually agreed date but not later than 25 days after the invitation.
- 7.3 **Maintenance and Testing:** Maintenance shall be performed in accordance with the manufacturer's published maintenance procedures. Periodic testing shall be completed with successful results in accordance with the manufacturer's published recommendations for periodic testing at, or before, the recommended testing intervals. If the manufacturer does not publish recommendations for periodic testing, suitable testing shall be performed that assures proper protection for the Area EPS, at an interval not to exceed two years. All test results shall be documented and available to the Cooperative for review upon request.
- 7.4 **Failure of Test:** If a Generator fails any test, it shall be disabled and the Isolation Device must be opened until the equipment is repaired.

## **8. Procedures**

- 8.1 **Interconnection Request:** The Member submits to the Cooperative an

“Application to Interconnect Small Generation” accompanied with the appropriate Interconnection Application Fee to a designated Cooperative contact or department.

- 8.2 **Queue Position:** The Cooperative considers the application based on the date a completed application is received by the Cooperative in reference to priority when evaluating the Area EPS screen limits.
- 8.3 **Impact Screens:** The Cooperative accepts or rejects the application for interconnection after reviewing the application and performing the screens outlined in this Standard. If the application is rejected, the Member may request the Cooperative to reconsider interconnection outside the scope of this Standard. If the application is accepted, the process will continue.

It may be necessary to visit the site to gather information on the Area EPS facilities or the Member’s Generator equipment.

The Cooperative will complete the Impact Screen process within 30 days (absent extenuating circumstances) of receipt of a complete “Application to Interconnect Small Generation.” Extenuating circumstances include, but are not limited to, Force Majeure, adverse weather conditions, system emergencies.

- 8.4 **Agreement for Interconnection:** After all previous items in the process are complete, the Cooperative will provide an agreement to the Member within 10 days of the completion of the Impact Screens as stated in 8.3. Once the Member returns the executed Agreement to the Cooperative, the Cooperative will execute the Agreement and return a copy to the Member. Member shall not interconnect the generator to Cooperative’s Area EPS Facilities unless an Agreement between Member and Cooperative has been executed by both parties.
- 8.5 **Installation and Inspections:** The Member installs the Generator and the Member is responsible for obtaining an approved electrical inspection from the local authority having jurisdiction for the Generator installation. The Member shall request the inspector to forward a copy of the approved inspection to the Cooperative contact processing the Generator interconnect request.
- 8.6 **Area EPS Facilities:** At the Member’s expense the Cooperative installs or alters the Area EPS facilities as necessary to accommodate the interconnection.
- 8.7 **Commissioning Test:** The Member performs the required commissioning test and forwards a confirmation letter to the Cooperative unless the Cooperative witnesses the test and it is successful. The Member shall invite the Cooperative to the commissioning test and perform the test at a mutually agreed date and time if the Cooperative elects to attend. The Cooperative may, at its sole discretion, waive the requirement for any commissioning



tests.

- 8.8 **Completion of Application/Expiration Process:** The application shall be valid for no less, and no more, than one year once the Impact Screen process is completed.