

**ELECTRIC COOPERATIVE  
INTERCONNECTION PROCEDURES  
FOR  
COOPERATIVE - MEMBER  
DISTRIBUTED GENERATION  
PROGRAM**

**For Generating Facilities Rated 2 MW (2,000 kW) and Less**

**Version 12-6-2016**

# 1. GENERAL PROCEDURES & STANDARDS

## 1.1. Scope

The procedures below (“Interconnection Procedures”) describe the steps a member-consumer applying to participate in the Cooperative – Member Distributed Generation Program (“Participant”) must follow in order for their proposed distributed generation equipment (“DG Equipment”) to be evaluated and approved for parallel operation and interconnection to the distribution system of your electric provider (“Distributor”). Requirements for interconnection will be based on the size of the system and will be broken into the following categories:

Tier 1 – 10 kW or less;

Tier 2 – Greater than 10 kW and less than or equal to 100 kW; or

Tier 3 – Greater than 100 kW and less than or equal to 2 MW.

## 1.2. Application for Interconnection

Each Participant must submit a completed **Application for Interconnection of Distributed Generation** (“Application”) to Distributor prior to purchasing any DG Equipment.

1.2.1. If the DG Equipment meets the criteria for Tier 1, complete the application in Attachment 1.

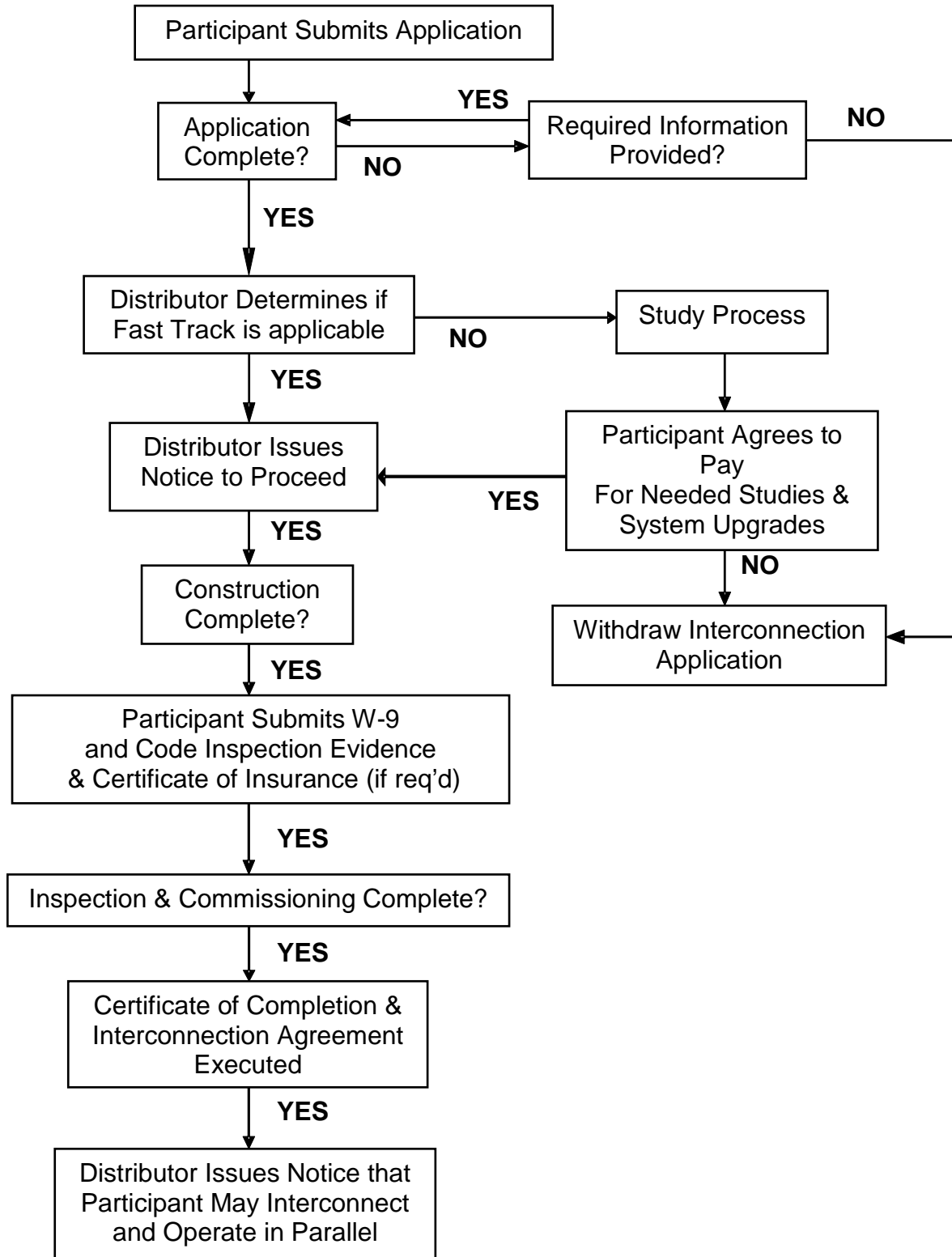
1.2.2. If the DG Equipment meets the criteria of Tier 2 or 3, complete the application in Attachment 2.

1.2.3. Participant is required to provide the supporting documents listed in the respective Application for Interconnection of Distributed Generation.

## 1.3. Application Processing (See Figure 1)

Participant will not be allowed to interconnect and operate in parallel their DG Equipment with the distribution system Distributor until all provisions of these procedures have been met and Distributor has given WRITTEN NOTIFICATION to proceed with interconnection and parallel operation.

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**Figure 1. The Application Process**

- 1.3.1. Participant will submit a completed Application to Distributor. Distributor will review the Application for sufficiency and completeness and notify the Participant within 10 business days of receipt of Application that Participant has provided all documents required or indicate how the Application submittal is deficient.
- 1.3.2. Within 15 business days of notifying Participant that the Application is complete, Distributor will evaluate the system using the criteria of Section 2, Fast Track Screening Process, to determine if an interconnection study is necessary. If the project does not pass the Fast Track Screening Process, the requirements outlined in Section 3, Study Process, will be followed. If the project passes the Fast Track Screening Process or meets the criteria for installation and interconnection under the Study Process, it will be classified as a Qualifying System (“Qualifying System”) and Distributor will notify the Participant in writing that Participant may proceed with installation of the Qualifying System.
- 1.3.3. Upon completing installation of the Qualifying System, the Participant will notify the Distributor the installation has been completed. Prior to authorization of interconnection and parallel operation, representatives of Distributor and/or Cooperative Energy (“Supplier”) may inspect the Qualifying System for compliance with the proposed design and may require witnessing of a Commissioning Test in accordance with the procedures defined by the latest version of IEEE 1547.1. Whether or not Distributor and/or Supplier elect to witness the Commissioning Tests, Participant will provide Distributor with the schedule for, and results of, all applicable Commissioning tests as well as testing information and results required in Section 3 of these Interconnection Procedures, or that are required in the Interconnection and Parallel Operation Agreement for Distributed Generation Rated 2 MW or Less (“Interconnection Agreement”). All testing information and results will be given to Distributor prior to or at the time of the Final Inspection of the Qualifying System.
- 1.3.4. An installed system must satisfactorily pass any required inspections and/or required Commissioning Test(s), or be waived by Distributor, prior to the Interconnection Agreement execution by all parties. Once all the requirements listed in Section 1.1 of the Interconnection Agreement have been met, Distributor will notify the Participant in writing when the Participant’s Qualifying System is authorized for interconnection and parallel operation.

#### 1.4. **Standards and Certification Criteria**

The DG Equipment must comply with the latest revision of the following standards and the Participant must provide evidence of the certification as required in the DG Interconnection Application:

- 1.4.1. IEEE1547 Standard for Interconnecting Distributed Resources with Electric Power Systems (including use of IEEE 1547.1 testing protocols to establish conformity)

- 1.4.2. IEEE1547.1 Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems
- 1.4.3. UL 1741 Inverters, Converters, and Controllers for Use in Independent Power Systems
- 1.4.4. NFPA 70 National Electrical Code
- 1.4.5. The DG Equipment shall be considered certified for interconnected operation if the generation equipment and all related interconnection components have been tested and listed by a Nationally Recognized Testing Laboratory (NRTL certification by Department of Labor) for continuous interactive operation with an electric distribution system in compliance with the codes and standards outlined in 1.4.1 – 1.4.4 above.
- 1.4.6. The Participant must provide evidence that the installation has been inspected and approved by state or local code officials, as applicable, prior to its interconnection and operation in parallel.

## **2. FAST TRACK SCREENING PROCESS**

### **2.1. Applicability**

Distributor will determine if the proposed system can follow the Fast Track process or if the design of the system would require evaluation under the Study Process of Section 3. Generally this process is available to a Participant whose proposed DG Equipment is no larger than 2 MW and meets the codes, standards, and certification requirements of Section 1.4 above.

2.1.1. Fast Track Review Screens

Within 15 business days after Distributor has notified Participant that the Application is sufficient and complete, Distributor shall perform an initial review using the screens set forth below and shall notify the Participant of the results.

2.1.2. Generation On Circuit As A Percent of Annual Peak Load

For interconnection of the proposed DG equipment to a radial distribution circuit, the aggregated generation, including the proposed DG Equipment, on the circuit shall not exceed 15 % of the line section annual peak load as most recently measured at the substation. A line section is that portion of a Distributor’s electric system connected to a member-consumer bounded by automatic sectionalizing devices or the end of the distribution line.

2.1.3. Maximum Fault Current

The proposed DG Equipment, in aggregation with other generation on the distribution circuit shall not contribute more than 10% to the distribution circuit’s maximum fault current at the point on the high voltage (primary) level nearest the proposed point of interconnection.

2.1.4. Short Circuit Interrupting capability

The DG Equipment, in aggregate with other generation on the distribution circuit, shall not cause any distribution protective devices and equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or Participant equipment on the system to exceed 87.5 % of the short circuit interrupting capability; nor shall the interconnection be proposed for a circuit that already exceeds 87.5 % of the short circuit interrupting capability.

2.1.5. Type of Interconnection

Using the table below; determine the type of transformer connection allowable to interconnect the DG Equipment with a primary distribution line through a transformer. This screen includes a review of the type of electrical service provided to the Participant, including line configuration and the transformer connection to limit the potential for creating over-voltages on the Distributor’s power system due to a loss of ground during the operating time of any anti-islanding function.

<b>Primary Distribution Line Type</b>	<b>Type of Interconnection to Primary Distribution Line</b>	<b>Result/Criteria</b>
Three-phase, three wire	3-phase or single phase, phase-to-phase	Pass screen
<i>Three-phase, four wire</i>	<i>Effectively-grounded 3 phase or Single-phase, line-to-neutral</i>	<i>Pass screen</i>

2.1.6. Maximum Size for Single Phase

If the DG Equipment is to be interconnected on single-phase secondary, shared secondary, or individual service, the aggregate generation capacity on the single-phase secondary, shared secondary, or individual service shall not exceed 10 kW.

2.1.7. Load Balance

If the DG Equipment is single-phase and is to be interconnected on a center tap neutral of a 240 volt service; its addition shall not create an imbalance between the two sides of the 240 volt service of more than 20 % of the nameplate rating of the service transformer. If the DG Equipment is single-phase and is to be interconnected to a three phase service secondary or service, its addition shall not cause the load on any of the individual phases to exceed twice the load on any of the other two phases.

2.1.8. Transient Stability Problems

The DG Equipment, in aggregate with other generation interconnected to the distribution side of a substation transformer feeding the circuit where the DG Equipment proposes to interconnect shall not exceed 2 MW in an area where there are known, or posted, transient stability limitations to generating units located in the general electrical vicinity (e.g., three or four distribution busses from the point of interconnection).

2.1.9. No Upgrades Required

No construction of facilities by Distributor on its own distribution system shall be required to accommodate the DG Equipment.

2.2 **Fast Track Screening Results**

If the DG Equipment passes the screens, the Participant's Application will be approved and Distributor will provide the Participant written notice that the DG Equipment of the Participant has been classified as a Qualifying System and Participant may proceed with the installation. If the proposed project does not pass the screens, the Participant will be notified and offered the opportunity to attend a meeting where the processes outlined in **3.0 Study Process** will be explained and a course of action determined.

### **3. STUDY PROCESS**

The study process (see Figure 2) consists of the Minimum Engineering Review, the System Impact Study and the Facilities Study. At an initial meeting, the parties shall determine whether a Minimum Engineering Review is sufficient, or the parties shall proceed directly to a System Impact study, or a System Upgrade Study.

#### **3.1. Minimum Engineering Review**

The “Minimum Engineering Review”, also known as the Feasibility Study in FERC Order 2006, is designed to identify any adverse system impacts that would result from interconnection of the DG Equipment. Examples of such negative impacts would include, but not be limited to, exceeding the short circuit capability rating of any distribution overcurrent equipment, violations of thermal overload or voltage limits, and a review of grounding requirements and electric system protection. If Distributor determines that the minimum engineering review will require substantial time, Distributor will require Participant to reimburse Distributor for the costs associated with this review.

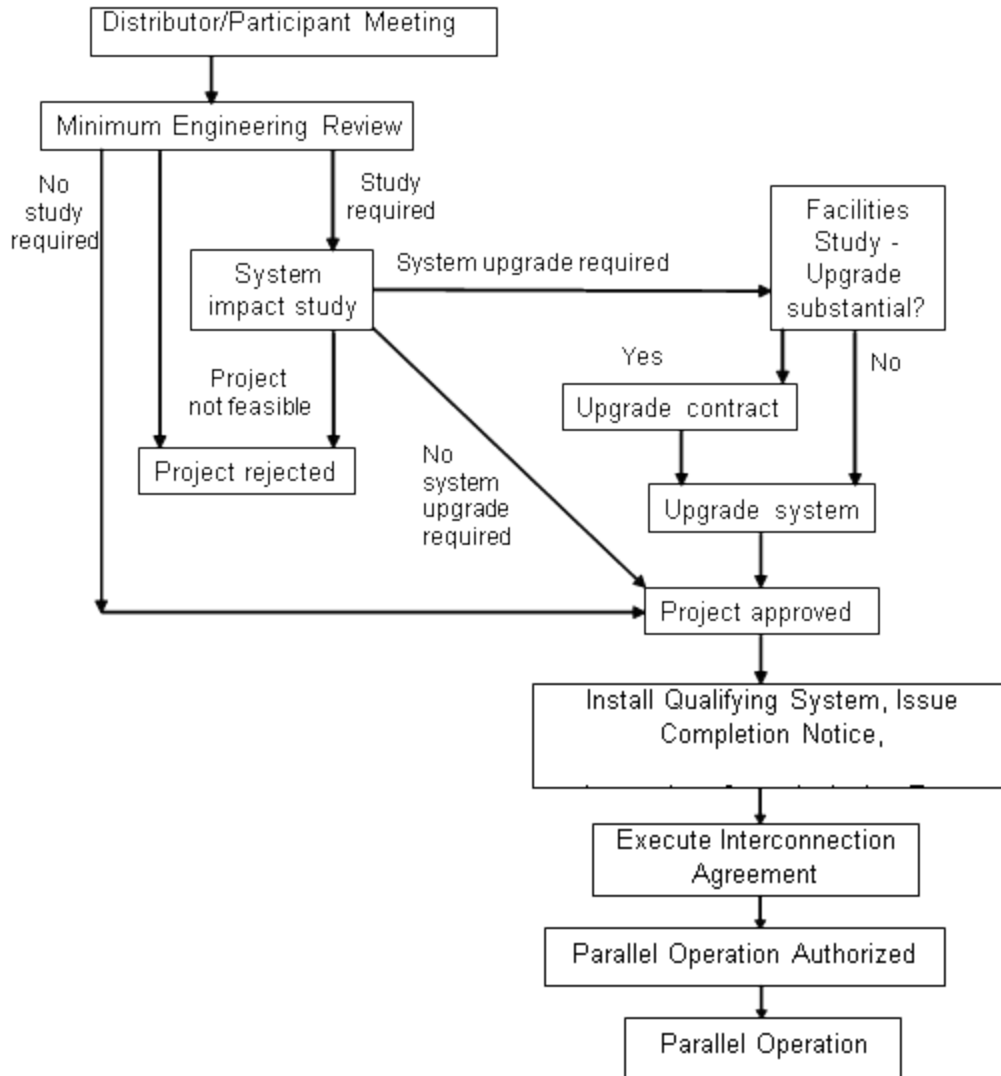
#### **3.2. System Impact and Facilities Studies**

Beyond the Minimum Engineering Review, the study process includes the System Impact Study and the Facilities Study. The System Impact Study is designed to identify and detail the electric system impacts that would result if the proposed project were interconnected without project modifications or electric system modifications, focusing on the adverse system impacts identified in the Feasibility Study. The System Impact Study shall evaluate the impact of the proposed interconnection on the reliability of the electric system.

In instances where the Minimum Engineering Review shows potential for distribution system adverse impacts, Distributor shall send the Participant a Distribution System Impact Study Agreement, including an outline of the scope of the study and a non-binding good faith estimate of the cost to perform the study, if such a study is required. Once the Participant agrees to pay the cost of the study, the process continues.

Once the required System Impact Study is complete, a Facilities Study Agreement if needed, including an outline of the scope of the study and a non-binding good faith estimate of the cost to perform the Facilities Study, shall be sent to the Participant. Design for any required Interconnection Facilities and/or Upgrades shall be performed under the Facilities Study Agreement. Upon completion of the Facilities Study, and with the agreement of the Participant to pay for Interconnection Facilities and Upgrades identified in the Facilities Study, including posting of security if required by Distributor, Distributor shall provide the Participant a notice that the DG Equipment of Participant has been classified as a Qualifying System and Participant may proceed with purchase and installation.





**Figure 2. The Study Process**

# Attachment 1 -- Application for Interconnection of Distributed Generation

## Tier 1(10 kW or less)

See Your Electric Distributor's Website for DG Application Submission and Contact information.

This Application is considered complete when it provides all applicable and correct information required below.

### **Participant**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone (Day): \_\_\_\_\_ (Evening): \_\_\_\_\_

Fax: \_\_\_\_\_ E-Mail Address: \_\_\_\_\_

Electric Service Account Number \_\_\_\_\_

Owner of Building if different than customer \_\_\_\_\_

### **Contact (if different from Customer)**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone (Day): \_\_\_\_\_ (Evening): \_\_\_\_\_

Fax: \_\_\_\_\_ E-Mail Address: \_\_\_\_\_

### **Owner of System (If different than customer)**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone (Day): \_\_\_\_\_ (Evening): \_\_\_\_\_

Fax: \_\_\_\_\_ E-Mail Address: \_\_\_\_\_

### **ELECTRICAL CONTRACTOR (as applicable)**

Company: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City: \_\_\_\_\_ County: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Representative: \_\_\_\_\_

Email Address: \_\_\_\_\_ Fax Number: \_\_\_\_\_

Contractor's License # \_\_\_\_\_ City/County/State \_\_\_\_\_

**Generating Facility Information**

Location (if different from above): \_\_\_\_\_

Vendor: \_\_\_\_\_

Account Number: \_\_\_\_\_

Inverter Manufacturer: \_\_\_\_\_ Model \_\_\_\_\_

Nameplate Rating: \_\_\_\_\_ (kW) \_\_\_\_\_ (kVA) \_\_\_\_\_ (AC Volts)

Single Phase \_\_\_\_\_ Three Phase \_\_\_\_\_

System Design Capacity: \_\_\_\_\_ (kW) \_\_\_\_\_ (kVA)

Energy Source: Solar  Wind  Hydro  Other (describe) \_\_\_\_\_

Attach support information to show testing and listing by a Nationally Recognized Laboratory for compliance with the codes and standards outlined in 1.4.1 – 1.4.4 for the proposed system.

Estimated Installation Date: \_\_\_\_\_ Estimated In-Service Date: \_\_\_\_\_

List components of the Small Generating Facility equipment package that are currently certified:

Equipment Type	Certifying Entity
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

***ADDITIONAL INFORMATION – Single Line Diagram***

In addition to the items listed above, please attach a detailed one-line diagram of the proposed facility, all applicable elementary diagrams, major equipment, (generators, transformers, inverters, circuit breakers, protective relays, batteries, number and location of PV Panels, etc.) specifications, test reports, etc., and any other applicable drawings or documents necessary for the proper design of the interconnection. Also describe the address or grid coordinates of the facility.

***Permission to Interconnect***

**Participant must not operate their generating facility in parallel with Distributor’s system until written authorization for interconnection and parallel operation has been received from Distributor.** Unauthorized parallel operation could result in injury to persons and /or damage to equipment and/or property for which the customer may be liable.

***Interconnection Participant Signature***

I hereby certify that, to the best of my knowledge, the information provided in this Application is true.

Signed: \_\_\_\_\_

Title: \_\_\_\_\_ Date: \_\_\_\_\_

**Attachment 2 -- Application for Interconnection of Distributed Generation  
Tier 2 (Greater than 10 kW and less than or equal to 100 kW)  
& Tier 3 (Greater than 100 kW and less than or equal to 2 MW)**

**See Your Electric Distributor's Website for DG Application Submission and Contact information.**

This application should be completed and returned to Distributor representative in order to begin processing the request.

**PART 1**

**PARTICIPANT INFORMATION**

Name: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City: \_\_\_\_\_ County: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Representative: \_\_\_\_\_

Email Address: \_\_\_\_\_ Electric Service Account Number \_\_\_\_\_

Fax Number: \_\_\_\_\_

**PROJECT DESIGN/ENGINEERING (as applicable)**

Company: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City: \_\_\_\_\_ County: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Representative: \_\_\_\_\_

Email Address: \_\_\_\_\_ Fax Number: \_\_\_\_\_

PE License \_\_\_\_\_ State \_\_\_\_\_

**ELECTRICAL CONTRACTOR (as applicable)**

Company: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City: \_\_\_\_\_ County: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Representative: \_\_\_\_\_

Email Address: \_\_\_\_\_ Fax Number: \_\_\_\_\_

Contractor's License # \_\_\_\_\_ City/County/State \_\_\_\_\_

**TYPE OF GENERATOR (as applicable)**

Photovoltaic \_\_\_\_\_ Wind \_\_\_\_\_ Other \_\_\_\_\_

## ESTIMATED LOAD AND GENERATOR RATING INFORMATION

The following information is necessary to help properly design Participant interconnection.

Total Site Load \_\_\_\_\_ (Highest kW Demand Last 12 Months)  
Residential \_\_\_\_\_ Commercial \_\_\_\_\_ Industrial \_\_\_\_\_  
System Rating \_\_\_\_\_ (kW) Annual Estimated Generation \_\_\_\_\_ (kWh)

### PART 2

(Complete all applicable items. Copy this page as required for additional generators)

#### **SYNCHRONOUS GENERATOR DATA**

Identification per Single Line Drawing: \_\_\_\_\_  
Total number of units with listed specifications on site: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Type: \_\_\_\_\_ Date of manufacture: \_\_\_\_\_  
Serial Number (each): \_\_\_\_\_  
Phases: Single \_\_\_\_\_ Three \_\_\_\_\_ R.P.M.: \_\_\_\_\_ Frequency (Hz): \_\_\_\_\_  
Rated Output (for one unit): \_\_\_\_\_ Kilowatt \_\_\_\_\_ Kilovolt-Ampere  
Rated Power Factor (%): \_\_\_\_\_ Rated Voltage (Volts): \_\_\_\_\_ Rated Amperes: \_\_\_\_\_  
Field Volts: \_\_\_\_\_ Field Amps: \_\_\_\_\_ Motoring power (kW): \_\_\_\_\_  
Synchronous Reactance (Xd): \_\_\_\_\_ % on \_\_\_\_\_ KVA base  
Transient Reactance (X'd): \_\_\_\_\_ % on \_\_\_\_\_ KVA base  
Negative Sequence Reactance (Xs): \_\_\_\_\_ % on \_\_\_\_\_ KVA base  
Sequence Reactance (Xo): \_\_\_\_\_ % on \_\_\_\_\_ KVA base  
Neutral Grounding Resistor Size (if applicable): \_\_\_\_\_  
 $I_2^2t$  or K (heating time constant): \_\_\_\_\_  
Additional information: \_\_\_\_\_  
.....

#### **INDUCTION GENERATOR DATA**

Rotor Resistance (Rr): \_\_\_\_\_ ohms Stator Resistance (Rs): \_\_\_\_\_ ohms  
Rotor Reactance (Xr): \_\_\_\_\_ ohms Stator Reactance (Xs): \_\_\_\_\_ ohms  
Magnetizing Reactance (Xm): \_\_\_\_\_ ohms Short Circuit Reactance (Xd''): \_\_\_\_\_ ohms  
Design letter: \_\_\_\_\_ Frame Size: \_\_\_\_\_  
Exciting Current: \_\_\_\_\_ Temp Rise (deg C°): \_\_\_\_\_  
Reactive Power Required: \_\_\_\_\_ Vars (no load), \_\_\_\_\_  
Vars (full load) Additional information: \_\_\_\_\_

**PRIME MOVER (Complete all applicable items)**

Identification per Single Line Diagram \_\_\_\_\_ Unit Number: \_\_\_\_\_

Type: \_\_\_\_\_

Manufacturer: \_\_\_\_\_

Serial Number: \_\_\_\_\_ Date of manufacture: \_\_\_\_\_

H.P. Rated: \_\_\_\_\_ H.P. Max.: \_\_\_\_\_ Inertia Constant: \_\_\_\_\_ lb.-ft.<sup>2</sup>

Energy Source (hydro, wind, etc.) \_\_\_\_\_

\_\_\_\_\_

**INVERTER DATA (if applicable)**

Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

Rated Power Factor (%): \_\_\_\_\_ Rated Voltage (Volts): \_\_\_\_\_ Rated Amperes: \_\_\_\_\_

Inverter Type (ferroresonant, step, pulse-width modulation, etc.): \_\_\_\_\_

Single or Three Phase \_\_\_\_\_ Type commutation: forced \_\_\_\_\_ line \_\_\_\_\_

Harmonic Distortion: Maximum Single Harmonic (%) \_\_\_\_\_

Maximum Total Harmonic (%) \_\_\_\_\_

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**POWER CIRCUIT BREAKER (if applicable)**

Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_

Rated Voltage (kilovolts): \_\_\_\_\_ Rated ampacity (Amperes) \_\_\_\_\_

Interrupting rating (Amperes): \_\_\_\_\_ BIL Rating: \_\_\_\_\_

Interrupting medium / insulating medium (ex. Vacuum, gas, oil) \_\_\_\_\_ / \_\_\_\_\_

Control Voltage (Closing): \_\_\_\_\_ (Volts) AC DC

Control Voltage (Tripping): \_\_\_\_\_ (Volts) AC DC Battery Charged Capacitor

Close energy: Spring Motor Hydraulic Pneumatic Other: \_\_\_\_\_

Trip energy: Spring Motor Hydraulic Pneumatic Other: \_\_\_\_\_

Bushing Current Transformers: \_\_\_\_\_ (Max. ratio) Relay Accuracy Class: \_\_\_\_\_

Multi ratio? No Yes: (Available taps) \_\_\_\_\_

Description of Control System \_\_\_\_\_

\_\_\_\_\_

.....

**ADDITIONAL INFORMATION - Single Line Diagram**

In addition to the items listed above, please attach a detailed one-line diagram of the proposed facility, all applicable elementary diagrams, major equipment, (generators, transformers, inverters, circuit breakers, protective relays, batteries, number and location of PV Panels, etc.) specifications, test reports, etc., and any other applicable drawings or documents necessary for the proper design of the interconnection. Also describe the address or grid coordinates of the facility.

***Permission to Interconnect***

**Participant must not operate their generating facility in parallel with Distributor's system until written authorization for interconnection and parallel operation has been received from Distributor.** Unauthorized parallel operation could result in injury to persons and /or damage to equipment and/or property for which the customer may be liable.

**END OF PART 2**



**SIGN OFF AREA**

The Participant agrees to provide Distributor with any additional information required to complete the interconnection.

\_\_\_\_\_  
Participant

\_\_\_\_\_  
Date



**DISTRIBUTOR CONTACT FOR APPLICATION SUBMISSION AND FOR MORE INFORMATION:**

Distributor: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

E-mail: \_\_\_\_\_

