

**APPALACHIAN ELECTRIC COOPERATIVE
SERVICE POLICIES**

POLICY NO. 1900

INTERCONNECTION PROCEDURES FOR DISTRIBUTED GENERATION

I. GENERAL PROCEDURES & STANDARDS

A. Scope

These procedures describe the steps Interconnection members (herein after called member) must follow in order for their distributed generation (DG) equipment to be evaluated and approved for interconnection to Appalachian Electric Cooperative's (AEC) distribution system for parallel operation. To assure that the DG equipment does not cause significant degradation of the safety, power quality, or reliability to AEC's distribution system, these procedures and standards have been established.

Requirements for interconnection will be based on the size of the system and are defined in the following categories:

- Tier 1 – 50kW or less; or
- Tier 2 – Greater than 50kW and less than 20 MW; or
- Tier 3 – Greater than or equal to 20 MW
- Tier 4 – DPP for 50kW or less; or
- Tier 5 – DPP for Greater than 50kW

AEC has an all requirements contract to purchase its total electric power requirements from the Tennessee Valley Authority (TVA). However, under a new power contract amendment in 2019, TVA has provided provisions for limited contract flexibility. AEC can provide distribution facilities to connect the DG and to transmit the energy to TVA or AEC. The owner of the DG must obtain from TVA or AEC either 1) a Power Purchase Agreement to buy the electrical energy; or 2) a transmission Service Contract to move the power to another utility.

B. Application for Interconnection and Fees

Application Fee

Applications are available for commercial or residential requests, including new construction projects. Each member should submit a completed application and supporting documents, along with payment of an application fee to AEC prior to purchasing any DG equipment. The application fee will be \$250.00 and is non-refundable / non-transferable.

Interconnection Fee

After review of the application by AEC's engineering and member services departments, an interconnection agreement will be furnished to the member for review and completion. This document will describe the actual costs of interconnecting to the AEC distribution system. These costs represent the interconnection fee and include 100% of metering, engineering, labor and equipment expenses, less any TVA subsidy. The member will be required to pay the interconnection fee prior to AEC approving the interconnection agreement.

Service Fee

AEC reserves the right to charge a monthly service fee to be assessed on the members' electric bill. The amount is to be cost-based and is intended to recover the costs associated with administering the monthly bill preparation and reporting to TVA. The charge is to be determined by management and is subject to periodic change as required.

Tier 1

Projects less than 50kW are included in Interconnection agreement for distributed generation operating behind the meter. For more information please see Policy No. 1900 Attachment 1 which outlines all rules and regulations associated with this service.

Tier 2

Projects with generation between 50kW and 20 MW will be required to submit the application form and all supporting information identified in Attachment 2. These projects will also be submitted to TVA for assessment of any potential impacts to the bulk transmission system.

Tier 3

If the generation is a Tier 3 project of greater than or equal to 20 MW, these large generation projects must follow the TVA Large Generator Interconnection Projects (LGIP) process detailed at www.tva.gov. This process will assess and mitigate the impacts of connecting larger amounts of generation to both AEC's distribution and TVA's transmission facilities.

Tier 4

Projects less than 50kW are included in Interconnection agreement for distributed generation in parallel with DPP. For more information please see Policy No. 1900 Attachment 4 which outlines all rules and regulations associated with this service.

Tier 5

DPP Projects with generation 50kW and Greater will be required to submit the application form and all supporting information identified in Attachment 5. These projects will also be submitted to TVA for assessment of any potential impacts to the bulk transmission system.

The latest application and completion forms along with other program details can be obtained by contacting the AEC office at

Appalachian Electric Cooperative
P.O. Box 400
New Market, TN 37820-0400
1109 Hill Drive
New Market, TN 37820
865-475-2032
Or on our website at
www.aecoop.org

C. Application Processing (See Figure 1)

1. AEC will review the applications for new projects for sufficiency and completeness and notify the member of receipt of application that it has received all documents required or indicate how the application is deficient. Tier 2 & 3 projects will be submitted by AEC to TVA for additional review. AEC will identify and authorize the approved KW system size, to protect the balance between load and generation.
2. AEC 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. Otherwise, AEC will notify the member that they may proceed with purchase and installation of the project and will send an interconnection agreement to the member for execution. The member will also be notified of any additional requirements. **Member will not be allowed to proceed with parallel operation until all provisions of these procedures have been met and AEC has given written notification to proceed with parallel operation.**
3. The member must execute the interconnection agreement and return it to AEC at least 30 calendar days prior to the desired date of parallel operation and within one hundred eighty (180) days after AEC executes the agreement.
4. After installation, the Member must contact AEC. Prior to parallel operation, AEC may inspect the DG equipment for compliance with the proposed design and may require a Commissioning Test in accordance with the procedures defined by the latest version of IEEE 1547.1. AEC will have the option of witnessing the Commissioning test or may require documentation from the equipment owner describing which tests were performed and their results.
5. If the inspection of the completed system and any required Commissioning test are satisfactory, AEC will issue a certificate of completion and notify the Member in writing that interconnection of the DG equipment is authorized for parallel operation. If the system does not pass the inspection and/or Commissioning test, AEC has the right to Lockout the Facility. The Member shall not under any circumstance take any action to operate the system in parallel until the problems have been corrected and a new inspection and Commissioning test are performed, or waived by AEC.

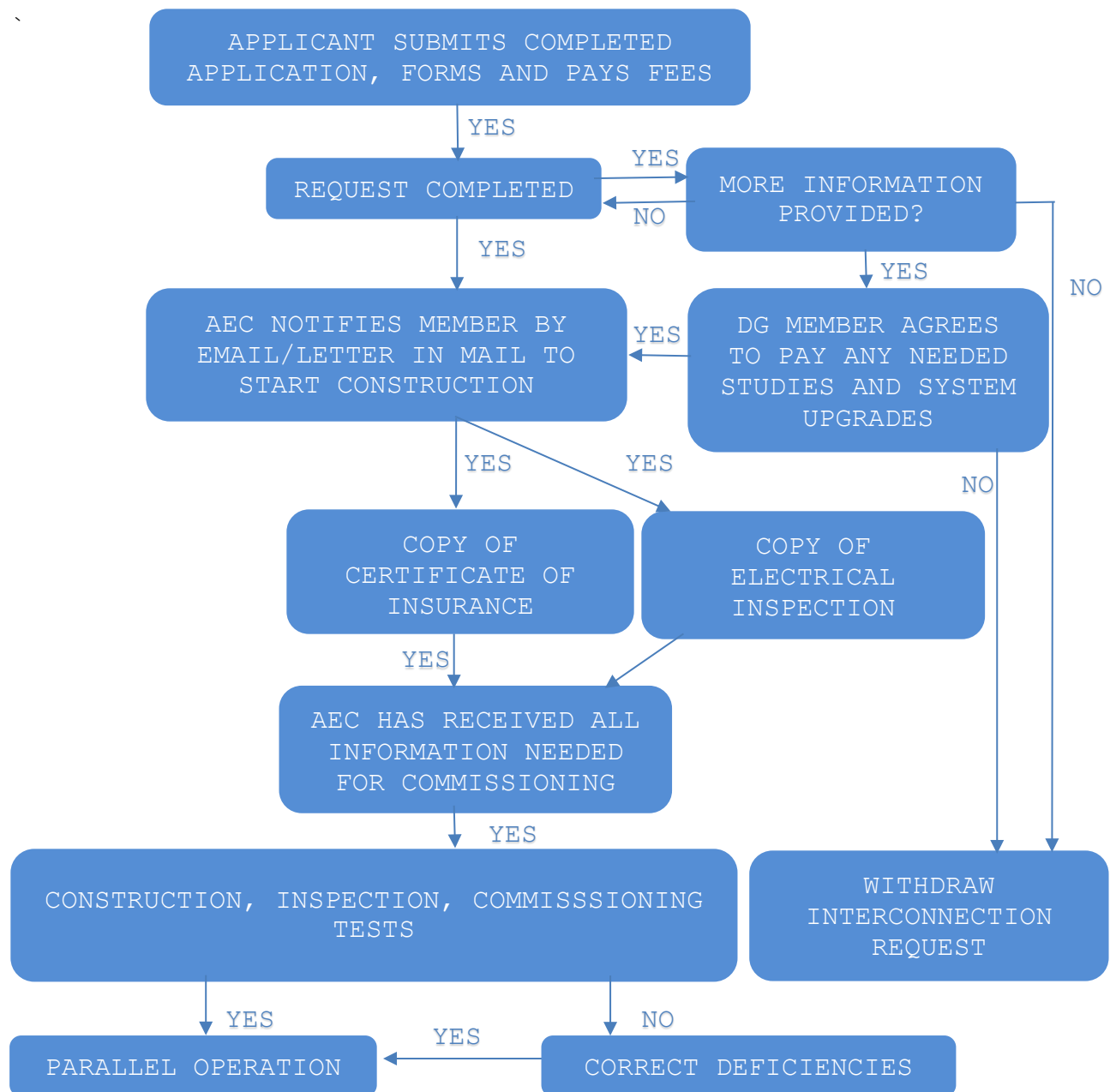


Figure 1. The Application Process

D. Standards and Certification Criteria

Installation of the distributed generation system / equipment must be performed by a certified contractor. The DG equipment must comply with the latest revision of the following standards and the member must provide evidence of certification with the DG Equipment Application or upon Completion:

1. IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems (including use of IEEE 1547.1 testing protocols to establish conformity)
2. IEEE 1547.1 Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems
3. UL 1741 Inverters, Converters, and Controllers for Use in Independent Power Systems
4. NFPA 70 National Electrical Code
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.
6. The member must provide evidence that the installation has been inspected and approved by state or local code officials, as applicable, prior to its operation in parallel.

II. FAST TRACK SCREENING PROCESS

A. Applicability

AEC 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 Member whose proposed DG equipment is no larger than 50kW and meets the codes, standards, and certification requirements of 1.4 above.

B. Fast Track Review Screens

After AEC has received a sufficient and complete Interconnection Application, AEC shall perform an initial review using the screen tests set forth below and shall notify the Interconnection Member of the results.

1. **Generation On Circuit As A Percent of Annual Peak Load**
For interconnection of a 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 AEC's electric system connected to a member bounded by automatic sectionalizing devices or the end of the distribution line.

2. **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.

3. **Short Circuit Interrupting Capability**

The proposed 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 Member 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.

4. **Type of Interconnection**

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

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

5. **Maximum Size for Single Phase**

If the proposed 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 50 kW.

6. **Load Balance**

If the proposed 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 proposed 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.

7. **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 10 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).

8. **No Upgrades Required**

No construction of facilities by AEC on its own system shall be required to accommodate the DG equipment.

C. **Fast Track Screening Results**

If the proposed DG equipment passes the screen tests, the Member's Application will be approved and AEC will provide the Member an executable interconnection agreement. If the proposed project does not pass the screens, the Member will be notified and offered the opportunity to attend a meeting where the processes outlined in Section 3.0 will be explained and a course of action determined.

III. **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.

A. **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 exceeding the short circuit capability rating of any breakers, violations of thermal overload or voltage limits, and a review of grounding requirements and electric system protection. If AEC determines that the Minimum Engineering Review will require substantial time, AEC may ask member to reimburse AEC for the costs associated with this review.

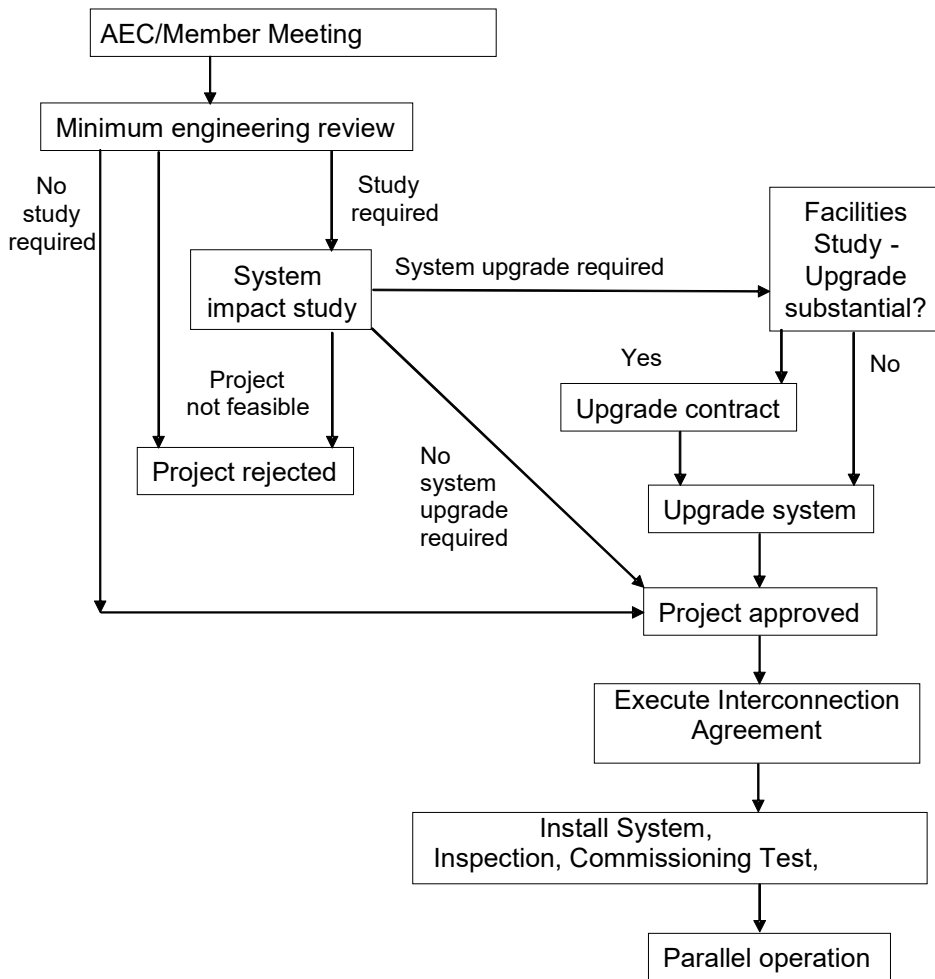


Figure 2. The Study Process

B. System Impact and Facilities Studies

Beyond the minimum engineering review (or Feasibility Review), the study process includes the System Impact Study and the Facilities Study. A 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. A system impact study shall evaluate the impact of the proposed interconnection on the reliability of the electric system.

In instances where the system impact study shows potential for distribution system adverse impacts, AEC shall send the Member 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 member 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 member. 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 Member to pay for Interconnection Facilities and Upgrades identified in the facilities study, AEC shall provide the Member an executable interconnection agreement.

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