DISTRIBUTED GENERATION GUIDELINES MANUAL

UPDATED: NOVEMBER-2021

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INTRODUCTION

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Comanche Electric Cooperative Association (CECA) developed the **Distributed Generation Guidelines Manual** to provide accurate and helpful information for CECA's members that are considering the installation of a distributed generation (DG) system (typically solar photovoltaic or wind renewable energy systems). To successfully install, interconnect and operate a DG system, there are system requirements, procedural steps and approvals necessary to ensure DG installations meet the technical and operational standards for the safe interconnection and parallel operation of these systems on CECA electric distribution system.

It is very important that CECA members that are considering the installation of a DG system understand the following:

1. **CECA is here to guide and assist our members** through the entire process (pre-installation to operational system);
2. **Please contact CECA before you start your project** to be sure your system meets all technical requirements and the application, installation and interconnection process goes well.

CECA DG Guidelines Manual is organized in the following manner:

Section	Purpose
1. FAQs	Answer basic questions that members will likely ask / need to know prior to starting on a DG project.
2. Definitions	Define the main terms associated with DG.
3. Policies and Procedures / Obtaining an DG Interconnection	The policy and procedural requirements for all DG systems to interconnect with CECA distribution system.
4. Operational Requirements	The policy and procedural requirements related to the operation of the interconnected DG system.
5. Technical Engineering Requirements	The engineering-based technical requirements and specifications that all DG systems must meet prior to installation / interconnection.
6. Appendix-1: DG Interconnection / Application Form	The form that must be completed and provided to CECA prior to a member beginning the process to install a DG system.
7. Appendix-2: DG Agreement	The agreement between CECA and a member that desires to install, interconnect, and operate a DG system in parallel with CECA's distribution system.
8. Appendix-3: DG Interconnection Diagram	A simple diagram that illustrates key installation and interconnection requirements for all DG systems.

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FREQUENTLY ASKED QUESTIONS

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Q1: What is the purpose of CECA Distributed Generation (DG) Interconnection Guidelines?

CECA Distribution Generation Interconnection Guidelines Manual was developed to establish the requirements and procedures for the safe installation, interconnection and parallel operation of distributed generation facilities within CECA electric service area.

CECA's DG Interconnection Guidelines are aligned with the Texas Public Utility Commission's (PUC) DG rules and regulations (P.U.C. SUBST. R. 25.211, 25.212 and 25.217) as well as other statutory guidelines, including the Texas Public Utilities Regulatory Act (PURA), which provides for the interconnection and parallel operation of Distributed Renewable Generation with electric utilities in Texas.

The information contained in this Manual has been developed for CECA's members that are interested and/or considering the installation of interconnected distributed generation. CECA strives to ensure that our members have all the technical and procedural information needed to have a full understanding of the requirements involved with this process in advance of any decision to install a DG system.

This Manual also provides information for CECA members regarding the rate (tariff) that CECA has put in place regarding the purchase of any energy that is generated by a DG system and delivered to CECA distribution system.

The bottom line: CECA is committed to the safe interconnection and operation of all DG installations on CECA electric distribution system.

Q2: I am a CECA member and I'm considering installing a DG system - where should I start?

CECA members should contact CECA very early in the "DG decision-making" process. Our representatives will be glad to take time to answer questions and provide both technical and procedural information regarding your potential DG installation. CECA DG Policy is clear – DG systems will not be allowed to interconnect and/or operate until the following steps have occurred:

1. Member must submit information and application to CECA for the proposed DG system(s). CECA DG Application Form is included in CECA DG Interconnection Guidelines Manual – and is also available on CECA's website (www.ceca.coop) and at CECA office.
2. The DG application must be reviewed and approved by CECA, prior to installation of the DG system. CECA must confirm that the proposed system meets the technical requirements and specifications and determine if the proposed DG installation requires an engineering study. In some cases, engineering studies are essential to ensure the safe and proper operation of the DG system. Engineering studies may also result in the denial of a DG application.
3. Once the DG system is installed CECA will confirm the installation is consistent with the DG Application and meets all CECA requirements. This inspection must take place prior to interconnecting the DG system with CECA distribution system. There is no cost for the inspection,

however if the DG system or system installation does not pass the initial inspection, CECA will charge a trip fee based on time and mileage to conduct additional inspection(s).

4. The member must execute a DG Agreement with CECA. This agreement is required prior to interconnecting the DG system with CECA distribution system. The DG Agreement confirms that the system meets all technical requirements and sets forth the rate at which CECA will purchase any energy that is delivered to CECA (in excess of the DG output that is used by the member).

Q3: Does CECA sell and/or install DG systems?

Yes! CECA's Board of Directors approved the recommendation from CECA's management for the Cooperative to provide high-quality / cost-effective solar PV to CECA members. CECA believes this is a service that is consistent with CECA's mission and provides long-term value to the Cooperative and our membership.

After considering several potential partners for this service, CECA has entered into a business arrangement with a leading solar PV provider to provide all the necessary equipment (PV panels; mounting materials; wiring; inverter; and other materials) needed to install ground-mounted systems on CECA's member's premise. CECA will use trained and certified CECA personnel to install and maintain the systems.

CECA would be glad to provide members with a consultation, recommendation, and proposal for the installation of solar PV system that is appropriate for the member's premise.

Q4: Are Solar PV systems cost-effective?

CECA will provide firm estimates for the cost of an installed solar PV (DG) system along with estimates of energy output and the associated costs savings for the proposed system. In general, the installed cost of solar DG has decreased significantly over the past several years as the industry realizes economies of scale in the purchase of the main system elements (PV panels and inverters). That said, the return-on-investment (ROI) for these systems is based on the size, typical output, location of the system and the avoided costs to purchase energy from CECA. There are excellent tools available to consider ROI on solar.

CECA utilizes meter data and information specific to the Member's account / premise and is able to incorporate this information to the proposal for the Member. CECA also recommends the "PV Watts Calculator" that has been developed by National Renewable Energy Laboratory (NREL) to Members that are interested in obtaining information about the cost effectiveness and financial analysis for solar DG systems.

Q5: What are the technical specifications and requirements for the interconnection of a DG system?

The term "technical requirements" can be a little confusing in terms of the DG application, installation and agreement process. Here are some key things to know and consider regarding technical requirements:

- ✓ CECA has adopted the technical requirements and specifications that are aligned and consistent with the Texas Public Utility Commission (PUC) DG Rule. These specifications set forth the requirements

for the safe interconnection and operation of DG systems. These requirements also establish the criteria used to determine if an engineering study is needed.

- ✓ Many technical requirements are addressed / covered by having "pre-certified" equipment with appropriate IEEE, UL and other "stamps of approval" from the DG system manufacturer. For most systems, these certifications signal to CECA that the system being installed meets and/or exceeds technical engineering requirements for the major components of the system (e.g., the solar panels and inverter(s)).
- ✓ There are also technical requirements related to the installation. CECA has provided the requirements (technical and procedural) in this Manual. Several of these requirements are included in the DG Application Form and the DG Agreement. These documents are included in this Manual.
- ✓ The DG Applicant shall install a secondary meter base for a "DG Output Meter" to measure the output of the DG system. The DG meter will be supplied by CECA. DG Applicant responsible for cost of the secondary meter base and the DG meter, however meter cost may be waived by CECA based on availability of DG meters.

Q6: How will CECA account for (and reimburse) for energy that my DG system sends to the electric grid?

CECA will reimburse members for energy "delivered to" CECA distribution system at the avoided cost of energy rate (ACER). The ACER is calculated based on the Cooperative's wholesale electric energy provider's monthly invoices. The Member's compensation for the excess energy supplied to the Cooperative during the monthly billing period shall accumulate as a monetary credit to be applied to future energy purchases by Member.

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DEFINITIONS

DEFINITIONS

1. Avoided Cost of Energy: The embedded purchased cost portion of the cooperative's retail energy rate under which the member is billed plus the Power Cost Recovery Factor (PCRF) applicable for the month. The avoided cost shall be developed by the Cooperative.
2. Distributed Generation Agreement: An agreement between a Member-Producer and the Cooperative that sets forth the contractual conditions under which a company and a Member-Producer agree that one or more facilities may be interconnected with the Cooperative's electric system.
3. Distributed Generation Application: The form of application of a Member-Producer seeking interconnection and parallel operation of distributed generation with the Cooperative's electric system.
4. DG Meter Base: The meter base for the DG Output Meter. This meter base must be supplied and installed by the DG Applicant.
5. Distributed Generation Output Meter: A meter to measure the output of the DG system. Meter will be configured to have the DG output directed to the "top" of the meter (see attached DG Diagrams).
6. Distributed Generation System: Shall mean an electrical generating facility located at a Member-Producer's point of delivery (point of common coupling) of one (1) megawatt (MW) or less and connected at a voltage less than sixty (60) kilovolts (kV) which may be connected in parallel operation to the Cooperative of Cooperative's electric system.
7. ERCOT: The Electric Reliability Council of Texas, Inc. or successor independent organization under Public Utility Regulatory Act ("PURA') §39.151 for the power region to which the Cooperative's electric system is connected.
8. Interconnection: The physical connection of distributed generation to the utility system in accordance with the requirements of this tariff so that parallel operation can occur.
9. Interconnection Study: A study or studies that may be undertaken by the Cooperative in response to its receipt of a completed DG Application. Pre-interconnection studies may include, but are not limited to, service studies, coordination studies and utility system impact studies.
10. Manual Disconnect Device: A manual switch at the Point of Interconnection that provides clear indication of the switch position, and when in the open position isolates the distributed generation from load unrelated to generation of electricity or operation of the facility.
11. Member-Producer: Means any person, firm, corporation, partnership, or other entity owning or operating a distributed generation system. An owner of distributed generation, the Member-Producer on whose side of the meter distributed generation is installed and operated, regardless of whether or not the Member-Producer takes ownership of the distributed generation, or a person who by contract is assigned ownership rights to energy produced from distributed generation located at the premises of the Member-Producer on the Member-Producer's side of the meter.
12. Parallel Operation: The operation of distributed generation by a Member-Producer while the Member-Producer is connected to the Cooperative's electric system.

13. Point of Interconnection (Point of Service, Point of Common Coupling): The point where the electrical conductors of the Cooperative's utility system are connected to the Member-Producer's conductors and where any transfer of electric power between the Member-Producer and the Cooperative's utility system takes place, such as switchgear near the meter.

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PROCEDURES AND POLICIES / OBTAINING AN INTERCONNECTION

CECA Distributed Generation Interconnection Procedures

1) Any person owning or operating a distributed generation installation (hereafter "Member-Producer") and desiring to interconnect with the Cooperative's system shall:

   a) Apply for interconnection, provide an easement satisfactory to the Cooperative, and otherwise comply with the tariff of the Cooperative.

   b) At least thirty (30) days in advance of interconnection, Member-Producer shall make application and provide technical information for the distributed generation installation. Member-Producer shall also provide such additional information as may be required by the Cooperative.

2) Prior to interconnection Member-Producer shall have:

   a) Fulfilled all requisites for the provision of electric utility service contained in the Agreement;

   b) Provide required information (see DG Application) regarding the DG system;

   c) Comply with conditions for line extension (if required);

   d) Provide satisfactory liability insurance (if required);

   e) Sign and deliver DG Agreement;

   f) Complete construction / comply with applicable laws, codes and industry practices; and

   g) Give notice of intent to energize and notify Cooperative to schedule inspection;

CECA Distributed Generation Interconnection Policy Requirements

1) The DG System will be installed at Member-Producer's premises shall not have a generation capacity greater than 50 KW and must be connected on the Cooperative's distribution at a voltage of 60KV or lower.

2) Any DG system larger than 50 KW will be considered as a special situation and will require an assessment to determine if the system may be connected to CECA distribution system.

3) The Cooperative and Member-Producer may establish additional or different terms, conditions, or rates for the sale or purchase of electricity.

4) Member-Producer shall install, operate and maintain the DG System in full and faithful compliance with all applicable federal, state and local laws, ordinances, rules and regulations, and generally accepted industry codes and standards, including, but not limited to the National Electrical Safety Code and the National Electrical Code.

5) Member-Producer shall be solely responsible for the design, installation, operation, maintenance, and repair of the DG System and Member-Producer's interconnection facilities. The interconnection of the DG System to the Cooperative electrical system shall comply with the Public Utility Commission of Texas Substantive Rules §25.212 relating to Technical Requirements for Interconnection and Parallel Operation of On-Site Distributed Generation, (16 Texas administrative Code §25.212) or any successor rule addressing distributed generation.

6) Cooperative shall inspect the DG System and the interconnection equipment prior to interconnection.

7) All costs to interconnect with the Cooperative electric system shall be the responsibility of Member-Producer. Cooperative shall not be required to take or pay for any energy generated by the DG System until the DG System successfully passes Cooperative's Field Inspection and Member-Producer shall have reimbursed Cooperative for all its interconnection costs.

8) Member-Producer must maintain the DG System in accordance with the applicable manufacturer's recommended maintenance schedule.

9) Member-Producer must promptly notify Cooperative upon receipt of any citation or other official notice of alleged violation of laws, ordinances, rules and regulations concerning the DG System.

10) Insurance Requirements:

The Member-Producer is required to provide a certificate of insurance coverage to Cooperative. The Member-Producer must carry liability insurance coverage which insures the Member-Producer against all claims for property damage and for personal injury or death arising out of, resulting from or in any manner connected with the installation, operation and maintenance of the Member-Producer's generating equipment.

a) The amount of such insurance coverage shall be not less than $500,000 per occurrence and name Cooperative as an additional insured. This amount may be increased at the sole discretion of Cooperative if the nature of the project so requires.

b) The certificate of insurance shall provide that the insurance policy will not be changed or canceled during its term without thirty days written notice to the Cooperative. The term of the insurance shall

be coincident with the term of the installation / interconnection contract or shall be specified to renew throughout the length of the Installation / Interconnection Contract.

c) The Cooperative reserves the right to request a Member-Producer provide proof of such insurance at any time.

11) Installation and Information Warranty

a) Member-Producer must confirm to Cooperative that Member-Producer's power generating installation (DG System) is constructed and will be maintained in a safe and reliable condition and will comply with the latest applicable codes.

b) Member-Producer must warrant and represents that:

i) The information regarding the characteristics of the DG System are as specified in the Application for Interconnection and Parallel Operation of Distributed Generation with the Cooperative's Electric System filed by the Member-Producer with Cooperative;

ii) The DG System and associated other electrical components and devices meet National Electrical Code standards;

iii) All permits, inspections, approvals, and/or licenses necessary for the installation or operation of the DG System have been obtained. The DG System has been successfully tested to UL 1741 and IEEE 1547 standards or has been satisfactorily tested by an independent laboratory with published results.

c) Member-Producer shall provide manufacturer's data or other written proof acceptable to Cooperative to verify the accuracy of the foregoing warranties and representations. If any of foregoing warranties and representations are inaccurate, Cooperative may, without waiver of or prejudice to any other remedy, immediately disconnect the DG system from the Cooperative's electric system and terminate this agreement.

12) Interconnection Studies

a) Cooperative may perform interconnection studies, which shall include service study, coordination study, and utility system impact study, as needed and determined in the sole discretion of the Cooperative. In instances where such studies are deemed necessary, the scope of such studies shall be based on the characteristics of the particular distributed generation facility to be interconnected and the Cooperative's distribution system at the specific proposed location.

b) Cooperative may charge Member fees for Interconnection Studies that recover the costs of performing such studies. Any modifications or additions to the Cooperative's Electric system identified through the interconnection study as required for the safe and reliable interconnection of Member's facility shall be solely at the Member's expense. Member shall not acquire any ownership in such modifications or additions to Cooperative's electric distribution system.

13) Metering Equipment

The actual metering equipment required, its voltage rating, number of phases and wires, size, current transformers, number of input and associated memory is dependent upon the type, size and location of the electric service provided. For all approved DG installations, CECA will provide a meter that can measure the "Delivered KWh" (energy delivered by the Cooperative); the "Received KWh" (energy delivered to the Cooperative by the Member-Producer).

14) Manual Safety Disconnect

a) The Member-Producer shall provide and install a manual load break switch that provides clear indication of the switch position at the Point of Interconnection to provide separation between the Cooperative electrical system and the Member-Producer's electrical generation system. The location of the disconnect switch must be approved by the Cooperative.

b) The disconnect switch shall be easily visible, mounted separately from metering equipment, readily accessible to Cooperative personnel at all times, and capable of being locked in the open position with a Cooperative padlock. The Cooperative reserves the right to open the disconnect switch isolating the Member-Producer's electrical generating system (which may or may not include the Member-Producer's load) from Cooperative electrical system for any of the following reasons:

i) To facilitate maintenance or repair of the Cooperative electrical system, or

ii) When emergency conditions exist on the Cooperative electrical system, or

iii) When the Member-Producer's electrical generating system is determined to be operating in a hazardous or unsafe manner or is or potentially can unduly affect the Cooperative electrical system waveform, or

iv) When the Member-Producer's electrical generating system is determined to be adversely affecting other electric consumers on the Cooperative electrical system, or

v) Failure of the Member-Producer to comply with applicable codes, regulations and standards in effect at the time, or

vi) Failure of the Member-Producer to abide by any contractual arrangement or operating agreement with the Cooperative.

vii) The Cooperative reserves the right to operate the disconnect for the protection of the Cooperative's system even if it affects Member-Producer's distributed generation system. In the event the Cooperative opens and closes the disconnect switch it shall not be responsible for energization or restoration of parallel operation of the generating installation. The Cooperative will make reasonable efforts to notify the Member-Producer in the event the disconnect switch has been operated. The Member-Producer will not bypass the disconnect switch at any time for any reason.

15) Cooperative Right to Disconnect

a) Cooperative shall not be obligated to accept and shall have the right to require Member-Producer to temporarily curtail, interrupt, or reduce, deliveries of energy in order to construct, install, maintain, repair, replace, remove, investigate, inspect, or test any part of the interconnection facilities, equipment, or any part of the Cooperative's electric system.

b) Cooperative may disconnect, without notice, the DG System from the electric distribution system, if, in the Cooperative's opinion, a hazardous condition exists and such immediate action is necessary to protect persons, or Cooperative's facilities or other member's facilities from damage or interference caused by Member-Producer's DG System or lack of properly operating protective devices.

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OPERATIONAL REQUIREMENTS

CECA Distributed Generation Operations Policies and Procedures

1) Member-Producer is responsible for installation, safe operation, protection, and maintenance of all equipment and wiring at and beyond the point where Member-Producer's conductors contact the Cooperative's conductors.

2) The electrical power generated shall be compatible with Cooperative's standard distribution system at the point of delivery and of such quality that Cooperative's system is not adversely affected.

3) Purchases of Electricity from Member-Producer

   a) As provided for in the Cooperative's Distributed Generation Tariff,

      i) Member-Producer and the Cooperative agree that the Member-Producer will sell exclusively to the Cooperative the electrical output from the DG system

      ii) the Cooperative shall pay Member for the "KWh Received" (energy received by the Cooperative's Distribution System) at the Avoided Cost of Power Rate (ACPR).

      iii) The ACPR is calculated based on the Cooperative's wholesale electric energy provider(s) monthly invoices. The Cooperative will update the ACPR monthly. The Cooperative reserves the right to amend the ACPR at any time.

      iv) Member-Producer shall exclusively purchase from the Cooperative its requirements of electric energy above the amounts generated by the DG system at the applicable tariff rate. If any tariff or rate is changed by the Cooperative, or by order or consent of any regulatory authority having a jurisdiction thereof whether or not at the request of the Cooperative, such changed tariff, rate/or redefined class of service shall be applicable to service provided hereunder from and after the effective date of such change.

4) Payment / Reimbursement for Energy

   a) The Cooperative will credit the monthly amounts due for all output measured, received, and purchased from the Member-Producer's generating installation against the monthly bill for service rendered to the Member-Producer for the Member-Producer's consumption.

   b) The Cooperative, at its sole discretion, may also render a check at any time to the Member-Producer for the cumulative balance of credits.

5) Access to Premise and DG System Interconnection

   a) Member-Producer hereby grants Cooperative access on and across its property at any reasonable time to inspect the DG System and the interconnection equipment, to read or test meters and metering equipment, and to operate, maintain and repair Cooperative's facilities. No inspection by Cooperative of the DG System or the interconnection facilities shall impose on Cooperative any liability or responsibility for the operation, safety or maintenance of the DG system or Member-Producer's interconnection facilities.

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TECHNICAL / ENGINEERING REQUIREMENTS

1) General Requirements

a) All interconnections shall comply with P.U.C. SUBST. R. 25.212 and successors. In addition, all interconnections shall comply with applicable state and federal laws and regulations.

b) All interconnections shall comply with local building and electric codes.

c) Installation of all interconnections shall be inspected by CECA. Inspection and approval of the installation by CECA is a prerequisite and a continuing condition of interconnection and parallel operation of distributed generation.

d) Variations from the Technical Requirements herein must be reviewed and approved by CECA prior to implementation. Variations in the point of interconnection must be approved by CECA and included in the Distributed Generation Agreement between Member-Producer and CECA.

2) Protection of line workers and CECA system

a) The distributed generation facility must have an interrupting device capable of interrupting the maximum available fault current, an interconnection disconnect device, a generator disconnect device, an over-voltage trip, an under-voltage trip, an over/under frequency trip, and a manual or automatic synchronizing check (for facilities with stand-alone capability).

3) Manual Disconnect

a) The customer shall provide and install a manual load break switch that provides clear indication of the switch position at the Point of Interconnection to provide separation between CECA electrical system and the customer's electrical generation system. The location of the disconnect switch must be approved by CECA. The disconnect switch shall be easily visible, mounted separately from metering equipment, readily accessible to CECA personnel at all times, and capable of being locked in the open position with a CECA padlock. CECA reserves the right to open the disconnect switch isolating the customer's electrical generating system (which may or may not include the customer's load) from CECA electrical system for any of the following reasons:

i) To facilitate maintenance or repair of CECA electrical system, or

ii) When emergency conditions exist on CECA electrical system, or

iii) When the customer's electrical generating system is determined to be operating in a hazardous or unsafe manner or is or potentially can unduly affect CECA electrical system waveform, or

iv) When the customer's electrical generating system is determined to be adversely affecting other electric consumers on CECA electrical system, or

v) Failure of the customer to comply with applicable codes, regulations and standards in effect at the time, or

vi) Failure of the customer to abide by any contractual arrangement or operating agreement with CECA.

4) Power Quality

a) Voltage: CECA shall endeavor to maintain the distribution voltages on the electrical system but shall not be responsible for factors or circumstances beyond its control. The customer shall provide an automatic method of disconnecting generation equipment from CECA electrical system within 10

cycles should a voltage deviation greater than +5% or -10% from normal be sustained for more than 30 seconds (1800 cycles) or a voltage deviation greater than +10% or -30% from normal be sustained for more than 10 cycles. If high or low voltage complaints or flicker complaints result from the operation of the customer's electrical generation, the customer's generating system shall be disconnected until the problem is resolved.

b) Frequency: CECA shall endeavor to maintain a 60-hertz nominal frequency on the electrical system. The customer shall provide an automatic method of disconnecting generation equipment from CECA electrical system within 15 cycles should a deviation in frequency of +0.5Hz or -0.7Hz from normal occur.

c) Harmonics: In accordance with IEEE 519, the total harmonic distortion (THO) of voltage shall not exceed 5% of a pure sine wave of 60-hertz frequency or 3% of the 60-hertz frequency for any individual harmonic when measured at the point of interconnection with CECA electrical system. Also, the total current distortion shall not exceed 5% of the fundamental frequency sine wave. If harmonics beyond the allowable range result from the operation of the customer's electrical generation, the customer's generating system shall be disconnected until the problem is resolved.

d) Flicker: The distributed generation facility shall not cause excessive voltage flicker on CECA electrical system. This flicker shall not exceed 3% voltage dip, in accordance with IEEE 519 (Section 10.5), as measured at the point of interconnection.

e) Power factor: The customer's electrical generation system shall be designed, operated and controlled at all times to provide reactive power requirements at the point of interconnection from 0.97 lagging to 0.97 leading power factor. Induction generators shall have static capacitors that provide at least 97% of the magnetizing current requirements of the induction generator field. CECA may, in the interest of safety, authorize the omission of capacitors. However, where capacitors are used for power factor correction, additional protective devices may be required to guard against self-excitation of the customer's generator field.

5) Loss of Source

a) The customer shall provide approved protective equipment necessary to immediately, completely and automatically disconnect the customer's electrical generation equipment from CECA electrical system in the event of a fault on the customer's system, a fault on CECA system or loss of source on CECA system. Such protective equipment shall conform to the criteria specified in UL 1741 and IEEE 1547.

b) The customer's generating system shall automatically disconnect from the grid within 10 cycles if the voltage on one or more phases falls and stays below 70% of nominal voltage for at least 10 cycles. The automatic disconnecting device may be of the manual or automatic reclose type and shall not be capable of reclosing until after CECA service voltage and frequency are restored to within the normal operating range and the system is stabilized.

6) Coordination and Synchronization

a) The customer shall be solely responsible for coordination and synchronization of the customer's electrical generating system with all aspects of CECA electrical system, and the customer assumes all responsibility for damage or loss that may occur from improper coordination and synchronization of its generating system with CECA electrical system.

7) Metering

a) The actual metering equipment required, its voltage rating, number of phases and wires, size, current transformers, number of input and associated memory is dependent upon the type, size and location of the electric service provided. For all approved DG installations, CECA will provide a meter that can measure the "Delivered KWh" (energy delivered by the Cooperative); the "Received KWh" (energy delivered to the Cooperative by the Member-Producer).

b) DG applicant shall install a Secondary (PV Meter base) meter base for a meter to measure the output of the DG system. Applicant shall pay for the DG meter base and the installation of the DG meter base.

c) The DG meter will be supplied by CECA. DG Applicant responsible for cost of the DG meter, however meter cost may be waived by CECA based on availability of DG meters.

d) DG output meter will be installed in a forward energy configuration (input to the top of the meter).

8) **Interconnection Study**

a) CECA will determine whether an interconnection study is necessary, based on relevant engineering factors including the output of the system, the location of the system and other CECA distribution system factors. Interconnection studies, include service study, coordination study, and utility system impact study, as needed and determined in the sole discretion of CECA. If the interconnection study is deemed necessary, CECA shall perform the study under reasonable terms and conditions agreed upon by both the customer and CECA and at the customer's sole expense.

b) Any modifications or additions to CECA Electric system identified through the interconnection study as required for the safe and reliable interconnection of Customer's facility shall be solely at the Customer's expense. Customer shall not acquire any ownership in such modifications or additions to CECA distribution system.

c) The interconnection study may conclude the proposed system may not be approved / authorized by the CECA. In such cases, the CECA will make the study available to the customer and may also offer recommendations for modifications that could result in authorization to proceed with a revised system.

d) No study fee will be charged if the proposed generation site is not on a networked secondary and if all of the following apply:

i) The proposed generation equipment is pre-certified. Generation equipment that are less than 20 kW AC shall be considered pre-certified if a UL 1741 listed inverter that also meets IEEE 1547 specifications is used. For solar PV installations, to be pre-certified system must have UL 1703 listed PV modules, and

ii) The proposed generation system does not expect to export more than 15% of total load on the feeder, and

iii) The proposed generation system does not contribute more than 25% of the maximum possible short circuit current of the feeder.

9) Protection. The distributed generation facility must have interrupting devices capable of interrupting the maximum available fault current, an interconnection disconnect device, a generator disconnect device,

an over-voltage trip, an under-voltage trip, an over/under frequency trip and a manual or automatic synchronizing check (for facilities with standalone capability). Facilities rated over 10kW, three-phase, must also have reverse power sensing and either a ground over-voltage or a ground over-current trip depending on the grounding system. Grounding shall be done in accordance with UL 1741, IEEE 1547 and NEC Article 250.

10) Three-Phase Generators.

a) Synchronous machines:

i) The distributed generation facility's circuit breakers shall be three-phase devices with electronic or electromechanical control.

ii) The Customer is solely responsible for proper synchronization of its generator with CECA system.

(1) The excitation system response ratio shall not be less than 0.5.

(2) The generator's excitation system shall conform to the field voltage versus time criteria specified in ANSI Standard C50. 13-1989.

b) Induction machines: The induction machines used for generation may be brought up to synchronous speed if it can be demonstrated that the initial voltage drop at the point of interconnection is within the flicker limits specified in this document.

11) Inverters:

a) Line-commutated inverters do not require synchronizing equipment.

b) Self-commutated inverters require synchronizing equipment.

12) Standards. The distributed generation equipment shall be designed, installed, operated and maintained in accordance with, but not limited to, ANSI standards, UL standards, IEEE standards, the National Electrical Code, ERCOT Operating Guides and any other applicable local, state or federal codes and statutes. In the case of a conflict between the requirements in this document and any of those standards or codes, this document shall prevail.