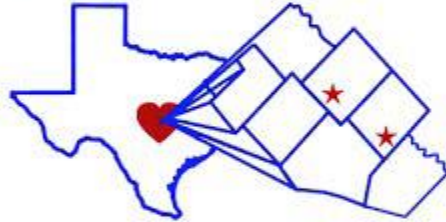


**HEART of TEXAS**



**ELECTRIC CO-OP**

# **DISTRIBUTED GENERATION GUIDELINES MANUAL**

Updated: April 2024



## Introduction

The Heart of Texas Electric Cooperative Association (HOTEC) has developed the Distributed Generation Guidelines Manual to offer accurate and valuable guidance to its members contemplating the installation of a distributed generation (DG) system, typically involving solar photovoltaic or wind renewable energy systems. To ensure the successful installation, interconnection, and operation of such DG systems, specific system requirements, procedural steps, and approvals are necessary to meet the technical and operational standards for safe interconnection and parallel operation within the HOTEC electric distribution system.

It is crucial for HOTEC members considering DG system installations to grasp the following points:

1. HOTEC is committed to guiding and supporting its members throughout the entire process, from pre-installation to operational system.
2. It is recommended to reach out to HOTEC before commencing your project to ensure compliance with all technical requirements and to facilitate a smooth application, installation, and interconnection process.

The HOTEC DG Guidelines Manual is structured as follows:

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



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## Frequently Asked Questions

### *Q1: What is the purpose of HOTEK Distributed Generation (DG) Interconnection Guidelines?*

The HOTEK Distribution Generation Interconnection Guidelines Manual has been crafted to establish the necessary requirements and procedures for the safe installation, interconnection, and parallel operation of distributed generation facilities within the HOTEK electric service area.

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 such as the Texas Public Utilities Regulatory Act (PURA), these DG Interconnection Guidelines ensure compliance and facilitate the interconnection and parallel operation of Distributed Renewable Generation with electric utilities in Texas.

Designed for HOTEK members interested or considering the installation of interconnected distributed generation, this Manual provides comprehensive technical and procedural information. HOTEK aims to equip its members with the necessary knowledge to fully understand the requirements involved in advance of any decision to install a DG system.

Moreover, the Manual includes details for HOTEK members concerning the rate (tariff) established by HOTEK for the purchase of energy generated by a DG system and delivered to the HOTEK distribution system.

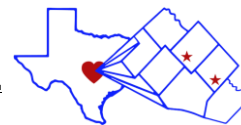
In summary, HOTEK is dedicated to ensuring the safe interconnection and operation of all DG installations within its electric distribution system.

### *Q2: I am a HOTEK member and I'm considering installing a DG system. Where should I start?*

HOTEK emphasizes the importance of early engagement by its members in the decision-making process regarding Distributed Generation (DG) systems. Our representatives are available to address inquiries and provide both technical and procedural guidance regarding potential DG installations.

It's essential to adhere to the HOTEK DG Policy, which stipulates that DG systems cannot interconnect or operate until the following steps have been completed:

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1. Members must submit information and an application for the proposed DG system(s) to HOTECH. The HOTECH DG Application Form is included in the DG Interconnection Guidelines Manual and is accessible on the HOTECH website (www.HOTECH.coop) and at the HOTECH office.
2. The DG application undergoes review and approval by HOTECH before installation of the DG system. HOTECH verifies that the proposed system meets technical requirements and specifications and determines if an engineering study is necessary. Engineering studies may be required to ensure safe and proper operation, and in some cases, may lead to the denial of a DG application.
3. Following installation, HOTECH conducts an inspection to ensure compliance with the DG Application and all HOTECH requirements. This inspection must occur before interconnecting the DG system with the HOTECH distribution system.
4. Prior to interconnecting the DG system with the HOTECH distribution system, the member must execute a DG Agreement with HOTECH. This agreement is mandatory and serves to confirm that the system complies with all technical requirements. Additionally, the DG Agreement outlines the rate at which HOTECH will purchase any surplus energy delivered to HOTECH beyond what is utilized by the member.

### ***Q3: Does HOTECH sell and/or install DG systems?***

Certainly! The HOTECH Board of Directors has approved the recommendation from HOTECH's management to offer high-quality and cost-effective solar photovoltaic (PV) systems to HOTECH members. This initiative aligns with HOTECH's mission and is seen as providing long-term value to both the Cooperative and its membership.

Following a thorough evaluation of potential partners, HOTECH has established a business arrangement with a leading solar PV provider. This partnership ensures the provision of all necessary equipment, including PV panels, mounting materials, wiring, inverters, and other essentials for installing ground-mounted systems on HOTECH members' premises. Trained and certified electricians from HOTECH will handle the installation and maintenance of these systems.

HOTECH is eager to offer members consultation, recommendations, and proposals tailored to their premises for the installation of solar PV systems.

**Additionally, it's important to note that at present, HOTECH is not actively selling or installing DG systems. However, there is a possibility that such services may be resumed in the future.**



## ***Q4: Are Solar PV systems cost-effective?***

HOTEC is committed to providing firm estimates for the cost of installing a solar PV (DG) system, along with projections of energy output and associated cost savings. The installed cost of solar DG has witnessed a significant decrease in recent years, attributed to economies of scale in procuring main system components such as PV panels and inverters.

The return on investment (ROI) for these systems varies based on factors such as system size, typical output, location, and the avoided costs of purchasing energy from HOTEC. Various tools are available to assess ROI on solar installations. HOTEC leverages meter data and specific information related to the member's account/premise to tailor proposals. Additionally, HOTEC recommends the use of the "[PV Watts Calculator](#)," developed by the National Renewable Energy Laboratory (NREL), to members interested in evaluating the cost-effectiveness and financial analysis of solar DG systems.

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

Understanding and navigating the technical requirements involved in the DG application, installation, and agreement process can sometimes be complex. Here are some key points to consider:

- HOTEC has adopted technical requirements and specifications that align with the Texas Public Utility Commission (PUC) DG Rule. These specifications ensure the safe interconnection and operation of DG systems and determine whether an engineering study is necessary.
- Many technical requirements are met by using "pre-certified" equipment with IEEE, UL, and other industry certifications from the DG system manufacturer. These certifications assure HOTEC that the installed system meets or exceeds technical engineering requirements for major components such as solar panels and inverters.
- Technical requirements also pertain to the installation process. HOTEC has outlined these requirements, both technical and procedural, in the Manual. Several of these requirements are included in both the DG Application Form and the DG Agreement, which are provided within the Manual for reference.

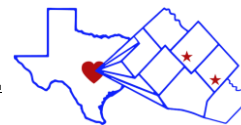


### *Q6: How will HOTEK account for (and reimburse) the energy that my DG system sends to the electric grid?*

HOTEK offers reimbursement to members for energy supplied to the HOTEK distribution system at the avoided cost of energy rate (ACER). This rate is determined based on the monthly invoices from the Cooperative's wholesale electric energy provider.

Members will receive compensation for any excess energy supplied to the Cooperative during the monthly billing period. This compensation accumulates as a monetary credit, which will be applied to future energy purchases by the member.





## Definitions

**Avoided Cost of Energy:** This refers to the purchased cost portion embedded in the cooperative's retail energy rate, along with the applicable Power Cost Recovery Factor (PCRF) for the month. The cooperative develops the avoided cost.

**Distributed Generation Agreement:** This is an agreement between a Member-Producer and the Cooperative, establishing the contractual conditions for interconnecting one or more facilities with the cooperative's electric system.

**Distributed Generation Application:** This is the application form submitted by a Member-Producer seeking interconnection and parallel operation of distributed generation with the cooperative's electric system.

**Distributed Generation System:** This term refers to an electrical generating facility located at a Member-Producer's point of delivery, with a capacity of one megawatt (MW) or less and connected at a voltage below sixty kilovolts (kV). These systems can operate in parallel with the cooperative's electric system.

**ERCOT:** This stands for the Electric Reliability Council of Texas, Inc., or any successor independent organization under the Public Utility Regulatory Act (PURA) §39.151, responsible for the power region to which the cooperative's electric system is connected.

**Interconnection:** This refers to the physical connection of distributed generation to the utility system, allowing for parallel operation in accordance with tariff requirements.

**Interconnection Study:** These are studies conducted by the cooperative in response to a completed DG Application. These studies may include service, coordination, and utility system impact assessments.

**Manual Disconnect Device:** This is a manual switch located at the Point of Interconnection, providing clear indication of its position. When in the open position, it isolates the distributed generation from unrelated load or facility operation.

**Member-Producer:** This term encompasses any entity owning or operating a distributed generation system. It includes owners of distributed generation, operators of such systems, and individuals with ownership rights to energy produced from distributed generation located at the premises.

**Parallel Operation:** This denotes the operation of distributed generation by a Member-Producer while connected to the cooperative's electric system.



**Point of Interconnection (Point of Service, Point of Common Coupling):** This is the location where the cooperative's utility system conductors connect with those of the Member-Producer, facilitating the exchange of electric power. This typically occurs at switchgear near the meter.

## Procedures and Policies / Obtaining an Interconnection

### *HOTEC Distributed Generation Interconnection Procedures*

Any individual owning or operating a distributed generation installation, hereafter referred to as the "Member-Producer," and wishing to connect with the Cooperative's system must:

- Apply for interconnection, furnish a satisfactory easement to the Cooperative, and adhere to the Cooperative's tariff.
- Submit an application and provide technical details for the distributed generation installation at least thirty (30) days before the planned interconnection. The Member-Producer must also furnish any additional information requested by the Cooperative.

Before the interconnection, the Member-Producer must have:

- Met all requirements outlined in the Agreement for the provision of electric utility service.
- Furnished the necessary information regarding the DG system (refer to DG Application).
- Complied with conditions for line extension if necessary.
- Provided satisfactory liability insurance if required.
- Signed and delivered the DG Agreement.
- Completed construction and complied with relevant laws, codes, and industry standards.
- Given notice of intent to energize and informed the Cooperative to schedule an inspection.

### *HOTEC Distributed Generation Interconnection Policy Requirements*

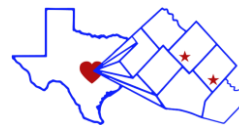
- The DG System installed at the Member-Producer's premises must not exceed a generation capacity of 50 KW and must be connected to the Cooperative's distribution at a voltage of 60 KV or lower.

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- Any DG system larger than 50 KW will be considered a special situation and necessitate an assessment to determine its compatibility with the HOTEC distribution system.
- The Cooperative and Member-Producer may establish additional or different terms, conditions, or rates for the sale or purchase of electricity.
- The Member-Producer is responsible for installing, operating, and maintaining the DG System in compliance with all applicable federal, state, and local laws, ordinances, rules, and regulations, as well as industry codes and standards such as the National Electrical Safety Code and the National Electrical Code.
- The Member-Producer is solely responsible for the design, installation, operation, maintenance, and repair of the DG System and its interconnection facilities. The interconnection of the DG System with the Cooperative's electrical system must comply with the Public Utility Commission of Texas Substantive Rules §25.212 or any successor rule addressing distributed generation.
- The Cooperative will inspect the DG System and interconnection equipment before interconnection.
- All costs associated with interconnecting to the Cooperative's electric system are the responsibility of the Member-Producer. The Cooperative is not obligated to purchase energy generated by the DG System until it successfully passes the Cooperative's Field Inspection, and the Member-Producer has reimbursed the Cooperative for all interconnection costs.
- The Member-Producer must maintain the DG System according to the applicable manufacturer's recommended maintenance schedule.
- The Member-Producer must promptly notify the Cooperative upon receipt of any citation or official notice of alleged violation of laws, ordinances, rules, or regulations concerning the DG System.
- Insurance Requirements:
  - The Member-Producer is required to provide a certificate of insurance coverage to the 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.
  - 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 requires.

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- 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 coincide with the term of the installation / interconnection contract or shall be specified to renew throughout the length of the Installation / Interconnection Contract.
- The Cooperative reserves the right to request a Member-Producer provide proof of such insurance at any time.
- Installation and Information Warranty:
  - The Member-Producer is required to confirm to the Cooperative that their 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.
  - Additionally, the Member-Producer must warrant and represent that:
    - The information regarding the characteristics of the DG System matches the specifications provided in the Application for Interconnection and Parallel Operation of Distributed Generation with the Cooperative's Electric System submitted by the Member-Producer.
    - The DG System and associated electrical components and devices meet National Electrical Code standards.
    - All necessary permits, inspections, approvals, and/or licenses 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.
  - The Member-Producer must provide manufacturer's data or other written proof acceptable to the Cooperative to verify the accuracy of these warranties and representations. If any of the aforementioned warranties and representations are found to be inaccurate, the Cooperative may, without waiver or prejudice to any other remedy, immediately disconnect the DG system from the Cooperative's electric system and terminate the agreement.
- Interconnection Studies:
  - The Cooperative reserves the right to conduct interconnection studies, which may include service studies, coordination studies, and utility system impact studies, as deemed necessary and determined solely by the Cooperative. If such studies are deemed necessary, their scope will be based on the specific characteristics of the distributed generation facility to be



interconnected and the Cooperative's distribution system at the proposed location.

- Furthermore, the Cooperative may impose fees on the Member to cover the costs of conducting these interconnection studies. Any modifications or additions to the Cooperative's Electric system identified through the interconnection study as necessary for the safe and reliable interconnection of the Member's facility will be the sole responsibility of the Member. The Member shall not acquire any ownership in such modifications or additions to the Cooperative's electric distribution system.
- Metering Equipment:
  - The specific metering equipment required, including its voltage rating, number of phases and wires, size, current transformers, number of inputs, and associated memory, varies depending on the type, size, and location of the electric service provided. For all approved DG installations, HOTEK will supply meters capable of measuring both the "Delivered KWh" (energy delivered by the Cooperative) and the "Received KWh" (energy delivered to the Cooperative by the Member-Producer).
- Manual Safety Disconnect:
  - The Member-Producer is required to provide and install a manual load break switch at the Point of Interconnection to ensure clear separation between the Cooperative's electrical system and the Member-Producer's electrical generation system. The location of this disconnect switch must be approved by the Cooperative.
  - Furthermore, the disconnect switch must meet certain criteria:
    - It should be easily visible and mounted separately from metering equipment.
    - It must be always readily accessible to Cooperative personnel.
    - It should be capable of being locked in the open position with a Cooperative padlock.
  - The Cooperative reserves the right to operate the disconnect switch under various circumstances, including:
    - Facilitating maintenance or repair of the Cooperative's electrical system.
    - Emergency conditions on the Cooperative's electrical system.
    - Determination that the Member-Producer's electrical generating system poses a hazard or operates in an unsafe manner, potentially affecting the Cooperative's electrical system waveform.



- Adverse effects on other electric consumers on the Cooperative's electrical system.
- Failure of the Member-Producer to comply with applicable codes, regulations, or standards.
- Failure to abide by contractual arrangements or operating agreements with the Cooperative.
- The Cooperative may operate the disconnect switch to protect its system, even if it affects the Member-Producer's distributed generation system. However, in such cases, the Cooperative shall not be responsible for energization or restoration of parallel operation of the generating installation. Reasonable efforts will be made to notify the Member-Producer if the disconnect switch has been operated, and the Member-Producer must not bypass the disconnect switch at any time for any reason.
- Cooperative Right to Disconnect:
  - The Cooperative reserves the right to temporarily curtail, interrupt, or reduce deliveries of energy from the Member-Producer if necessary for the construction, installation, maintenance, repair, replacement, removal, investigation, inspection, or testing of any part of the interconnection facilities, equipment, or any part of the Cooperative's electric system.
  - Additionally, the Cooperative may disconnect the DG System from the electric distribution system without notice if, in the Cooperative's opinion, a hazardous condition exists. Immediate action may be deemed necessary to protect persons, Cooperative facilities, or other members' facilities from damage or interference caused by the Member-Producer's DG System or due to the lack of properly operating protective devices.

## Operational Requirements

### *HOTEC Distributed Generation Operations Policies & Procedures*

1. Responsibility for Equipment and Operation
  - a. Member-Producers are responsible for installing, safely operating, protecting, and maintaining all equipment and wiring from the point where their conductors meet the Cooperative's conductors onwards.
2. Compatibility of Generated Power
  - a. The electrical power generated must align with the Cooperative's standard distribution system at the point of delivery, ensuring that the Cooperative's system is not adversely affected.

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3. Electricity Purchases from Member-Producers
  - a. In accordance with the Cooperative's Distributed Generation Tariff:
    - i. Member-Producers agree to exclusively sell electrical output to the Cooperative.
    - ii. The Cooperative will pay Members for the "kWh Received" at the Avoided Cost of Power Rate (ACER), determined monthly based on wholesale electric energy provider invoices. The ACER may be adjusted monthly, with the Cooperative retaining the right to amend it at any time.
    - iii. Member-Producers must purchase any additional electric energy requirements from the Cooperative at the applicable tariff rate. Changes in tariffs or rates will apply to services provided after their effective date.
4. Payment and Reimbursement
  - a. The Cooperative will credit monthly amounts due for all measured, received, and purchased output against the Member-Producer's monthly bill for consumed services.
  - b. The Cooperative may, at its discretion, issue a check to the Member-Producer for any cumulative balance of credits.
5. Premises Access and DG System Interconnection
  - a. Member-Producers grant the Cooperative access to their property at reasonable times to inspect, read, test meters and metering equipment, and maintain Cooperative facilities.
  - b. Cooperative inspections do not impose liability for the operation, safety, or maintenance of the DG system or interconnection facilities onto the Cooperative.



## Technical/Engineering Requirements

### *General Requirements*

- All interconnections must adhere to P.U.C. SUBST. R. 25.212 and any subsequent revisions, along with compliance with relevant state and federal laws and regulations.
- Compliance with local building and electric codes is mandatory for all interconnections.
- HOTEK must inspect and approve the installation of all interconnections, which is a prerequisite and ongoing condition for interconnection and parallel operation of distributed generation.
- Any deviations from the Technical Requirements outlined herein must receive prior approval from HOTEK before implementation. Changes in the point of interconnection require approval from HOTEK and must be documented in the Distributed Generation Agreement between the Member-Producer and HOTEK.

### *Protection of Line Workers and HOTEK System*

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

### *Manual Disconnect*

The customer is responsible for providing and installing a manual load break switch at the Point of Interconnection to ensure clear indication of the switch position, facilitating the separation between HOTEK's electrical system and the customer's electrical generation system. The location of the disconnect switch must receive approval from HOTEK. It should be conspicuously visible, mounted separately from metering equipment, easily accessible to HOTEK personnel at all times, and capable of being secured in the open position with a HOTEK padlock. HOTEK retains the right to open the disconnect switch, thereby isolating the customer's electrical generating system from HOTEK's electrical system for the following reasons:

- To facilitate maintenance or repair of HOTEK's electrical system,
- In case of emergency conditions on HOTEK's electrical system,



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- When the customer's electrical generating system is found to be operating in a hazardous or unsafe manner, or has the potential to adversely affect HOTEK's electrical system waveform,
- If the customer's electrical generating system is found to be adversely impacting other electric consumers on HOTEK's electrical system,
- In the event of the customer's failure to comply with applicable codes, regulations, and standards, or
- In case of the customer's failure to adhere to any contractual arrangement or operating agreement with HOTEK.

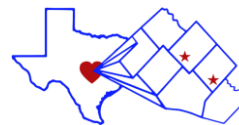
## ***Power Quality***

**Voltage:** HOTEK will strive to maintain distribution voltages on the electrical system within acceptable limits but cannot be held responsible for factors beyond its control. The customer must install an automatic disconnect mechanism for generation equipment from HOTEK's electrical system within 10 cycles if a sustained voltage deviation of more than +5% or -10% from normal occurs for more than 30 seconds (1800 cycles), or a deviation greater than +10% or -30% from normal is sustained for more than 10 cycles. If high or low voltage complaints, or flicker complaints arise from the customer's electrical generation, the generating system must be disconnected until the issue is resolved.

**Frequency:** HOTEK will aim to maintain a nominal 60-hertz frequency on the electrical system. The customer must install an automatic disconnect mechanism for generation equipment from HOTEK's electrical system within 15 cycles if a frequency deviation of +0.5Hz or -0.7Hz from normal occurs.

**Harmonics:** According to IEEE 519, the total harmonic distortion (THD) of voltage should not exceed 5% of a pure sine wave at 60-hertz frequency, or 3% of the 60-hertz frequency for any individual harmonic, measured at the point of interconnection with HOTEK's electrical system. The total current distortion should not exceed 5% of the fundamental frequency sine wave. If harmonics beyond the allowable range arise from the customer's electrical generation, the generating system must be disconnected until the issue is resolved.

**Flicker:** The distributed generation facility must not cause excessive voltage flicker on HOTEK's electrical system. Flicker should not exceed a 3% voltage dip, as measured at the point of interconnection, in accordance with IEEE 519 (Section 10.5).



**Power Factor:** The customer's electrical generation system must be designed, operated, and controlled to provide reactive power requirements at the point of interconnection from 0.97 lagging to 0.97 leading power factor. Induction generators must have static capacitors providing at least 97% of the magnetizing current requirements of the induction generator field. HOTEK may authorize the omission of capacitors in the interest of safety. However, if capacitors are used for power factor correction, additional protective devices may be required to prevent self-excitation of the customer's generator field.

## ***Loss of Source***

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

The customer's generating system must automatically disconnect from the grid within 10 cycles if the voltage on one or more phases falls and remains 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 HOTEK's service voltage and frequency are restored to within the normal operating range and the system is stabilized.

## ***Coordination and Synchronization***

The customer is solely responsible for coordination and synchronization of the customer's electrical generating system with all aspects of HOTEK's 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 HOTEK's electrical system.

## ***Metering***

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



## ***Interconnection Study***

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

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

The interconnection study may conclude that the proposed system may not be approved or authorized by HOTEC. In such cases, HOTEC 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.

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

- The proposed generation equipment is pre-certified. Generation equipment that is 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, the system must have UL 1703 listed PV modules.
- The proposed generation system does not expect to export more than 15% of the total load on the feeder.
- The proposed generation system does not contribute more than 25% of the maximum possible short circuit current of the feeder.

## ***Protection Requirements for Distributed Generation Facilities***

The distributed generation facility must incorporate various protection devices to ensure safe and reliable operation. These devices include:

- Interrupting devices capable of interrupting the maximum available fault current.
- An interconnection disconnect device to isolate the facility from the grid.
- A generator disconnect device for disconnecting the generator from the system.



- Over-voltage trip and under-voltage trip mechanisms to protect against voltage deviations.
- Over/under frequency trip mechanisms to safeguard against frequency variations.
- Manual or automatic synchronizing check for facilities with standalone capability.
- For facilities rated over 10 kW, three-phase:
  - Reverse power sensing capability.
  - Either a ground over-voltage or a ground over-current trip, depending on the grounding system.

Grounding of the facility should adhere to standards outlined in UL 1741, IEEE 1547, and NEC Article 250 to ensure compliance with safety and regulatory requirements.

## ***Three-Phase Generators***

### **Synchronous Machines:**

The distributed generation facility's circuit breakers must be three-phase devices equipped with electronic or electromechanical control.

The responsibility for properly synchronizing the generator with the HOTEK system lies solely with the Customer.

- The excitation system response ratio must not be less than 0.5.
- The generator's excitation system must adhere to the field voltage versus time criteria outlined in ANSI Standard C50.13-1989.

### **Induction Machines:**

Induction machines used for generation purposes may be brought up to synchronous speed if it can be proven that the initial voltage drop at the point of interconnection falls within the flicker limits specified in this document.

## ***Inverters***

- Line-commutated inverters do not necessitate synchronizing equipment.
- Self-commutated inverters necessitate synchronizing equipment.

## ***Standards***

The distributed generation equipment must be designed, installed, operated, and maintained in compliance with, but not limited to, ANSI standards, UL standards, IEEE standards, the National Electrical Code, ERCOT Operating Guides, and any other relevant local, state, or federal codes and statutes. In the event of a conflict between the

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requirements outlined in this document and any of those standards or codes, this document shall take precedence.



## Appendix 1: Application

This application is for the coordination of interconnection of a distributed generation (DG system) and associated / required metering equipment between “Member”, the Heart of Texas Electric Cooperative Association (HOTEC) and the electrician / contractor doing the proposed work. The following needs to be filled out completely and clearly.

### **APPLICATION AND MEMBER INFORMATION**

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

Member’s First Name: \_\_\_\_\_

Member's Last Name: \_\_\_\_\_

Account #: \_\_\_\_\_

Meter Number: \_\_\_\_\_

Premise Type: \_\_\_ Residential      \_\_\_ Commercial      \_\_\_ Other

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

Email: \_\_\_\_\_

Installation Address (Physical Address):

### **DG SYSTEM INFORMATION**

Total Nameplate Rating (kW): \_\_\_\_\_ Over 50 kW? \_\_\_ YES \_\_\_ NO

(If Solar DG) Panel Manufacturer: \_\_\_\_\_

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

Does the system have a battery backup? \_\_\_ YES \_\_\_ NO

IEE and/or UL Certification(s): \_\_\_\_\_  
(list all or attach documentation)

Please provide the system engineering and/or manufacturers drawings and specifications

- \_\_\_ System one-line diagram
- \_\_\_ Additional system documentation

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## INFORMATION PREPARED AND SUBMITTED BY

License Number: \_\_\_\_\_  
(Master Electrician, Electrical Engineer, or Homestead Owner)

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

Project Contact Person: \_\_\_\_\_

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

Email: \_\_\_\_\_

Signature: \_\_\_\_\_

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

## NOTES TO MEMBER / APPLICANT

1. Any charges related to the interconnection of a DG system must be paid in accordance with HOTEK Distributed Generation Guidelines Manual.
2. If work has not been completed within a 180-day period – the application will be voided.
3. If additional work is required by HOTEK – there will be additional charges that will need to be paid to HOTEK.
4. **ALLOW A MINIMUM OF FIVE WORKING DAYS FOR PROCESSING**
5. Return to Heart of Texas Electric Cooperative, P.O. Box 357, McGregor Texas 76657, or email to [Solar@hotec.coop](mailto:Solar@hotec.coop)



## **Appendix 2: Interconnection Agreement**

This agreement, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, is entered into by \_\_\_\_\_, referred to as the "Member-Producer," and Heart of Texas Electric Cooperative, referred to as the "Cooperative," and reads as follows:

### **Purpose**

This agreement establishes the terms governing the relationship between the Cooperative and the Member-Producer, encompassing pricing and other relevant conditions impacting the buying and selling of electricity, as well as reasonable provisions for interconnection and simultaneous operation. The Cooperative operates an electric utility serving portions of McLennan, Bell, Bosque, Falls, Milam, Coryell, and Hamilton Counties, while the Member-Producer either owns or intends to own, operate, and maintain a Distributed Generation System (DG System) of 50 KW or less. The Member-Producer seeks to interconnect and operate such a system alongside the Cooperative's electric distribution network at the following address:

\_\_\_\_\_. Both parties aim to enter into an agreement for the purchase and sale of electrical output from the DG System and establish terms for its interconnection with the Cooperative's electric distribution system. In consideration of the mutual covenants and agreements contained herein, the parties hereby contract and agree as follows:

### **Article 1 | Effective Date**

This Agreement shall take effect on the date of execution by the latter of the two parties (the Effective Date) and, subject to the other provisions of this Agreement, shall remain in force for a period of one year, with subsequent renewal on a month-to-month basis thereafter.

### **Article 2 | General Terms**

The DG System will be installed at the Member-Producer's premises located at the address specified above. The DG System's generation capacity shall not exceed 50 KW and must be connected to the Cooperative's distribution network at a voltage of 60KV or lower. The Member-Producer is responsible for the installation, operation, and maintenance of the DG System in complete compliance with all relevant federal, state, and local laws, ordinances, rules, and regulations, as well as industry codes and standards, including but not limited to the National Electrical Safety Code and the National Electrical Code. In the event of any citation or official notice regarding alleged violations of laws, ordinances, rules, or regulations concerning the DG System, the Member-Producer shall promptly notify the Cooperative.

The Cooperative undertakes to make reasonable efforts to provide simultaneous electric service. Interconnection, parallel operation, sales, and purchases of electricity shall be governed by the Cooperative's Distributed Generation Interconnection Manual, encompassing technical, interconnection, parallel operation, and procedural requirements, as well as the Cooperative's



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Distributed Generation Tariff. ***This tariff, along with any approved or ordered amendments by relevant regulatory authorities, including all service rules, regulations, and rates, constitutes an integral part of this Agreement to the same extent as if fully delineated herein and is available for reference at the Cooperative's office(s).***

## **Article 3 | Interconnection Process and Requirements**

Prior to interconnection Member-Producer shall:

- Fulfill all requisites for the provision of electric utility service as outlined in the Agreement.
- Provide the necessary information (refer to DG Application) regarding the DG system.
- Comply with conditions for line extension, if deemed necessary.
- Provide satisfactory liability insurance.
- Sign and deliver this Agreement.
- Complete construction and adhere to applicable laws, codes, and industry practices.
- Notify the Cooperative of the intent to energize and schedule an inspection accordingly.

The Member-Producer bears full responsibility for the design, installation, operation, maintenance, and repair of both the DG System and its interconnection facilities with the Cooperative's electrical system. The interconnection process must adhere to the Technical Requirements for Interconnection and Parallel Operation of On-Site Distributed Generation as mandated by the Public Utility Commission of Texas Substantive Rules §25.212 (16 Texas Administrative Code §25.212) or any succeeding regulations governing distributed generation. The Cooperative will conduct inspections of both the DG System and the interconnection equipment.

All expenses related to connecting to the Cooperative's electric system are the obligation of the Member-Producer. The Cooperative is not obligated to procure or pay for any energy generated by the DG System until it successfully passes the Cooperative's Field Inspection, and the Member-Producer has reimbursed the Cooperative for all interconnection costs. Maintenance of the DG System must adhere to the maintenance schedule recommended by the manufacturer.

## **Article 4 | Insurance Requirements**

The Member-Producer must furnish Cooperative with a certificate of insurance coverage. This insurance coverage should safeguard the Member-Producer against claims for property damage, personal injury, or death arising from the installation, operation, and maintenance of the Member-Producer's generating equipment.

- The insurance coverage amount must be a minimum of \$500,000 per occurrence, with Cooperative listed as an additional insured. Cooperative retains the right to increase this amount at its sole discretion if the project's nature warrants.
- The certificate of insurance must stipulate that the insurance policy cannot be altered or terminated during its term without providing thirty days' written notice to Cooperative. The insurance term should align with the duration of the installation/interconnection contract or be specified to renew throughout the contract's duration.

# **DISTRIBUTED GENERATION GUIDELINES MANUAL**



- Cooperative reserves the right to request proof of such insurance from the Member-Producer at any time.

## **Article 5 | Indemnification**

**THE COOPERATIVE'S LIABILITY IS LIMITED ACCORDING TO THIS AGREEMENT. MEMBER-PRODUCER SHALL INDEMNIFY, DEFEND, AND HOLD HARMLESS THE COOPERATIVE, ALONG WITH ITS ELECTED AND NON-ELECTED OFFICIALS, OFFICERS, AGENTS, AND EMPLOYEES, FROM ANY AND ALL LIABILITIES, LOSSES, CLAIMS, DAMAGES, ACTIONS, SUITS, OR DEMANDS FOR DAMAGES (INCLUDING COSTS AND ATTORNEY'S FEES, BOTH AT TRIAL AND ON APPEAL) ARISING FROM ANY BREACH OF WARRANTY OR REPRESENTATION MADE BY MEMBER-PRODUCER IN THIS AGREEMENT, OR IN CONNECTION WITH THE DESIGN, CONSTRUCTION, OPERATION, MAINTENANCE, OR REPAIR OF ANY PART OF MEMBER-PRODUCER'S DG SYSTEM OR INTERCONNECTION FACILITIES. THIS INCLUDES, BUT IS NOT LIMITED TO, LIABILITIES, LOSSES, CLAIMS, DAMAGES, ACTIONS, SUITS, OR DEMANDS FOR DAMAGES RESULTING FROM PERSONAL INJURY OR DEATH OF ANY PERSON, OR DAMAGE TO, DESTRUCTION, OR LOSS OF PROPERTY BELONGING TO MEMBER-PRODUCER, THE COOPERATIVE, OR ANY THIRD PARTY.**

## **Article 6 | Installation and Information Warranty**

Member-Producer warrants to Cooperative that the power generating installation (DG System) is constructed and will be maintained in a safe and reliable condition and will adhere to the latest applicable codes.

Member-Producer further warrants and represents that:

- The information regarding the DG System's characteristics aligns with the specifications provided in the Application for Interconnection and Parallel Operation of Distributed Generation submitted by Member-Producer to Cooperative.
- The DG System and associated electrical components and devices comply with National Electrical Code standards.
- All necessary permits, inspections, approvals, and/or licenses for the installation or operation of the DG System have been acquired. Additionally, the DG System has either been successfully tested to UL 1741 and IEEE 1547 standards or has undergone satisfactory testing by an independent laboratory with published results.

The Member-Producer must provide manufacturer's data or other written proof acceptable to Cooperative to validate the accuracy of these warranties and representations. In the event any of these warranties and representations are found to be inaccurate, Cooperative reserves the right, without waiving or prejudicing any other remedy, to immediately disconnect the DG system from the Cooperative's electric system and terminate this agreement.

## **Article 7 | Interconnection Studies**



The Cooperative reserves the right to conduct interconnection studies, which may consist of service studies, coordination studies, and utility system impact studies, as deemed necessary in its sole discretion. If such studies are necessary, their scope will be determined based on the characteristics of the specific distributed generation facility to be connected and the Cooperative's distribution system at the proposed location. The Cooperative may impose fees on Members for Pre-Interconnection Studies to cover the costs of conducting these studies. Any modifications or enhancements to the Cooperative's Electric system identified through the interconnection study as necessary for the safe and reliable connection of the Member's facility will be the sole responsibility of the Member. The Member will not gain any ownership rights over such modifications or additions to the Cooperative's electric distribution system.

## **Article 8 | Metering Equipment**

The specific metering equipment needed, including its voltage rating, number of phases and wires, size, current transformers, number of inputs, and associated memory, will vary based on the type, size, and location of the electric service provided. For all approved DG installations, HOTEK will supply a meter capable of measuring both the "Delivered kWh" (energy provided by the Cooperative) and the "Received kWh" (energy supplied to the Cooperative by the Member-Producer).

## **Article 9 | Manual Safety Disconnect**

The Member-Producer is responsible for providing and installing a manual load break switch at the Point of Interconnection. This switch must clearly indicate its position and ensure separation between the Cooperative's electrical system and the Member-Producer's electrical generation system. The location of the disconnect switch must be approved by the Cooperative.

Furthermore, the disconnect switch should:

- Be easily visible and mounted separately from metering equipment.
- Be always readily accessible to Cooperative personnel.
- Be 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), for any of the following reasons:

- To facilitate maintenance or repair of the Cooperative electrical system.
- When emergency conditions exist on the Cooperative electrical system.
- When the Member-Producer's electrical generating system is determined to be operating in a hazardous or unsafe manner or is potentially capable of unduly affecting the Cooperative electrical system waveform.
- When the Member-Producer's electrical generating system is found to be adversely affecting other electric consumers on the Cooperative electrical system.

# **DISTRIBUTED GENERATION GUIDELINES MANUAL**



- In the event of the Member-Producer's failure to comply with applicable codes, regulations, and standards in effect at the time.
- In case of the Member-Producer's failure to abide by any contractual arrangement or operating agreement with the Cooperative.
- The Cooperative also reserves the right to operate the disconnect for the protection of its system, even if it affects the Member-Producer's distributed generation system. In such instances, the Cooperative will not be responsible for the energization or restoration of parallel operation of the generating installation. Reasonable efforts will be made to notify the Member-Producer if the disconnect switch has been operated. The Member-Producer is prohibited from bypassing the disconnect switch at any time for any reason.

## **Article 10 | Cooperative Right to Disconnect**

The Cooperative is not obligated to accept and reserves the right to request the Member-Producer to temporarily curtail, interrupt, or reduce deliveries of energy. This may be necessary to carry out activities such as construction, installation, maintenance, repair, replacement, removal, investigation, inspection, or testing of any part of the interconnection facilities, equipment, or any portion of the Cooperative's electric system.

Additionally, the Cooperative may disconnect the DG System from the electric distribution system without prior notice if, in the opinion of the Cooperative, a hazardous condition exists. Immediate action may be required to safeguard individuals, Cooperative facilities, or other members' facilities from damage or interference caused by the Member-Producer's DG System or the lack of properly operating protective devices.

## **Article 11 | Parallel Operation**

The Member-Producer bears responsibility for the installation, safe operation, protection, and maintenance of all equipment and wiring from the point where the Member-Producer's conductors contact the Cooperative's conductors and beyond. The electrical power generated must align with the Cooperative's standard distribution system at the point of delivery and maintain a quality that does not adversely impact the Cooperative's system.

## **Article 12 | Purchases of Electricity from Member-Producer**

As outlined in the Cooperative's Distributed Generation Tariff:

- Both Member-Producer and the Cooperative mutually agree that the Member-Producer will sell its electrical output exclusively to the Cooperative from the DG system.
- The Cooperative will compensate the Member for the "kWh Received" (energy received by the Cooperative's Distribution System) at the Avoided Cost of Energy Rate (ACER).
- The ACER is determined based on the Cooperative's wholesale electric energy provider's monthly invoices. The Cooperative reserves the right to adjust the ACER at its discretion.
- The Member-Producer is required to purchase all its electric energy needs above the amounts generated by the DG system exclusively from the Cooperative at the applicable

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tariff rate. Any changes to tariffs or rates made by the Cooperative or by order or consent of any regulatory authority with jurisdiction, whether initiated by the Cooperative or not, will apply to the service provided hereunder from the effective date of such change.

## **Article 13 | Payment / Reimbursement for Energy**

The Member's compensation for any excess energy supplied to the Cooperative during the monthly billing period will be credited monetarily. This credit will be applied to future energy purchases by the Member. If, by the end of the calendar year, there remains an accumulated monetary credit for the excess energy supplied to the Cooperative during the monthly billing period, the Cooperative will issue payment to the Member equivalent to the remaining accumulated monetary credit. Any accumulated credits will not carry forward to the next calendar year.

## **Article 14 | Access to Premise and DG System Interconnection**

Member-Producer hereby authorizes the Cooperative to access its property at any reasonable time for the purpose of inspecting the DG System and interconnection equipment, as well as for reading or testing meters and metering equipment. Additionally, the Cooperative is granted permission to operate, maintain, and repair its facilities as necessary.

It is understood that Cooperative's inspection of the DG System or interconnection facilities does not impose any liability or responsibility on the Cooperative for the operation, safety, or maintenance of the DG system or Member-Producer's interconnection facilities.

## **Article 15 | Breach**

Any significant failure by either party to fully, faithfully, and promptly fulfill its obligations under this Agreement constitutes a breach. In the event of a breach that remains uncured for thirty (30) days after the defaulting party receives written notice, the non-defaulting party reserves the right to terminate this Agreement.

Additionally, notwithstanding any other provision in this agreement, the Cooperative retains the authority to discontinue service, disconnect the DG System, or suspend energy intake from the Member-Producer. All rights granted in this section are supplementary to any other rights or remedies available under law, this Agreement, or the Cooperative's applicable Rules and Regulations.

## **Article 16 | Entire Agreement**

This agreement represents the complete understanding between the parties and overrides all previous agreements between the Member-Producer and the Cooperative concerning the described service. The Cooperative, its agents, and employees have not made any representations, promises, or inducements, whether written or verbal, that are not included in this agreement. The Member-Producer acknowledges that it is not relying on any statements not contained herein.

## **Article 17 | Notice**

# **DISTRIBUTED GENERATION GUIDELINES MANUAL**



Following the initial term, this agreement will remain in effect unless terminated by either party providing at least thirty (30) days' written notice to the other. Notices issued under this Agreement are considered properly delivered if hand-delivered or sent via United States certified mail, with return receipt requested and postage prepaid, to the following address:

**If to Cooperative:**

Heart of Texas Electric Cooperative  
1111 Johnson Dr. PO Box 357, McGregor TX, 76657

**If to Member-Producer:**

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**Article 18 | Termination**

Termination of this agreement will result in the disconnection of the distributed generation facility from the Cooperative's distribution system, following good utility practice.

**Article 19 | Assignments**

This Agreement shall be advantageous to and enforceable by the heirs, successors, or assigns of each party involved. Member-Producer is prohibited from assigning this Agreement without obtaining prior written consent from the Cooperative. Any assignment made without such consent shall be deemed null and void.

**Article 20 | Waiver**

The failure of either party to insist on strict performance of any provision of this Agreement, or to exercise any of its rights hereunder in one or more instances, shall not be construed as a waiver of such provision or the forfeiture of any such right or any other right hereunder.

**Article 21 | Facility Extension Costs**

The Member-Producer agrees to pay for the extension of the Cooperative's facilities and other interconnection costs as follows: \$\_\_\_\_\_ in advance of any work by the Cooperative.

**Article 22 | Other Costs**

Member-Producer agrees to reimburse Cooperative for all future costs, including:

- Costs necessary to correct the quality of service provided by Member-Producer.

# **DISTRIBUTED GENERATION GUIDELINES MANUAL**



- Costs related to modifications to Cooperative’s system to purchase or continue purchasing Member-Producer’s output, as well as costs associated with meter reading, billing, or other activities undertaken by Cooperative due to the purchase of Member-Producer’s output.
- **Interconnection & Inspection fee of \$250**
- Any other costs that may be imposed on the Cooperative by ERCOT, the Public Utility Commission, or other agencies and their successors attributable to distributed generation systems.

These costs may encompass, but are not limited to, expenses for special interconnection equipment, protective devices, control devices, upgrading distribution system components, associated engineering and general administrative expenses, maintenance and repair costs of the modifications and equipment, and other just and reasonable costs allocable to Member-Producer's small power generating installation.

## **Article 23 | Review of Distributed Generation Tariff**

The Member-Producer acknowledges that it has reviewed the Cooperative's Distributed Generation Tariff.

## **Article 24 | Disputes**

This Agreement and any disputes arising hereunder shall be governed by the laws of the State of Texas. The venue for all such disputes shall be proper and exclusively in McLennan County, Texas.

## **Article 25 | Approvals**

In Witness Whereof, the parties hereto have caused their names to appear below, signed by Authorized Representatives.

### **Heart of Texas Electric Cooperative Association**

Name (Print): \_\_\_\_\_

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

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### **Member-Producer**

Name (Print): \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

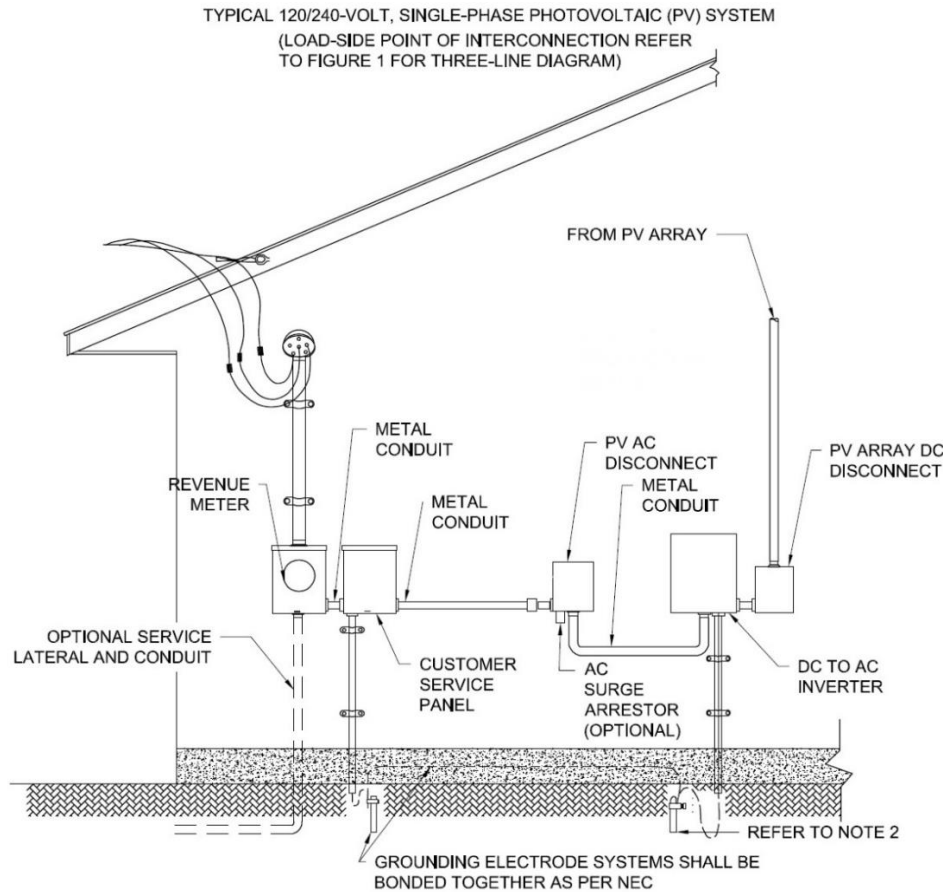




## Appendix 3: Diagram

### Electrical Distribution Construction Specifications

**Figure 1**



**Notes:**

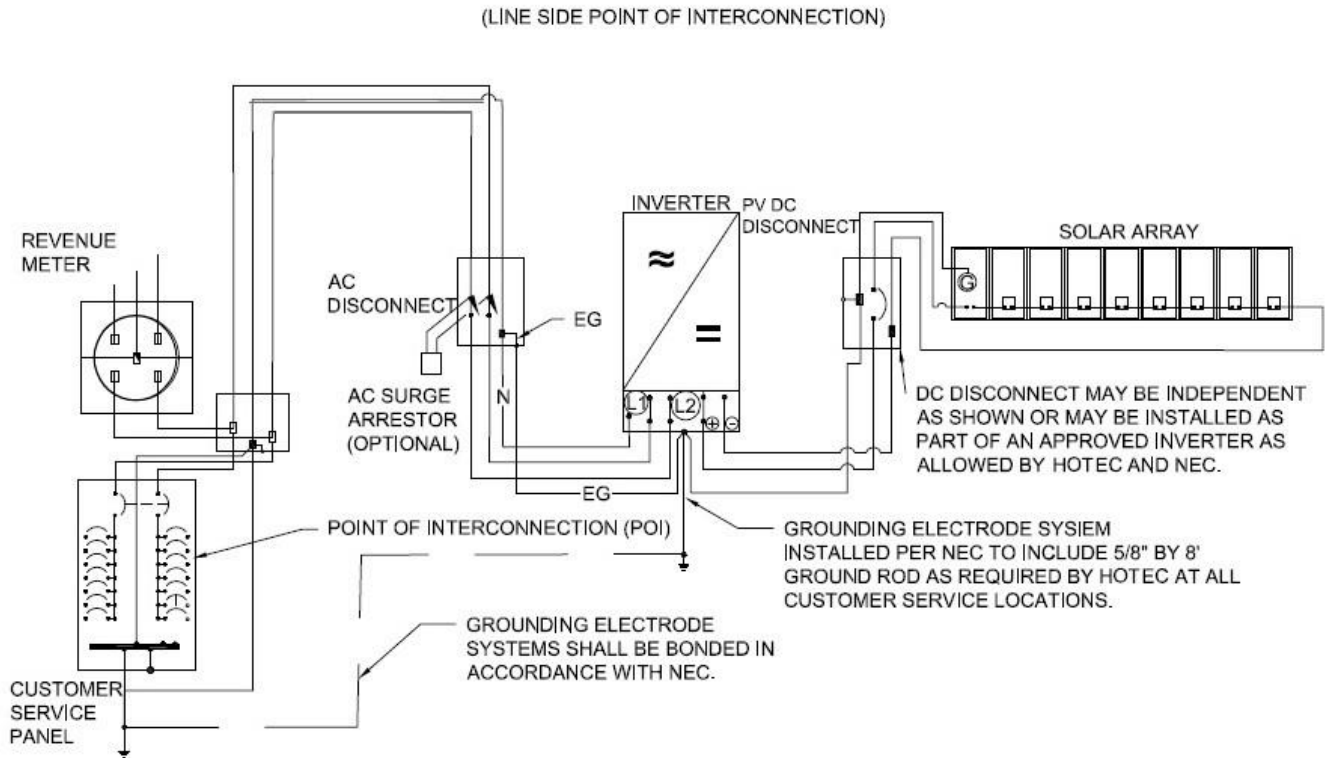
- Inverter output circuit conductor shall be installed in metal raceways from inverter to point of interconnection.
- Grounding electrode system installed as per NEC to include 5/8-inch x 8-foot ground rod as required by HOTEK at all customer service locations.
- The PV DC grounding system shall not be bonded to the AC grounding system by using a combined DC grounding electrode conductor and AC equipment grounding conductor. The contractor may choose to use the option shown above or may install a grounding electrode conductor directly from the inverter grounding electrode terminal to the main service grounding electrode system.
- The PV AC disconnect shall be located immediately adjacent to the revenue meter.
- Labeling and identification of all PV related equipment shall be done in accordance with the NEC.
- Where the point of interconnection is to be made ahead of the service equipment, it shall be made after the HOTEK revenue meter. Such installations must be pre-approved.





## Electrical Distribution Construction Specifications

Figure 2



### NOTES:

- Typical Interactive PV System Wiring Diagram, for Illustration Purposes Only. Refer to Equipment Manufacturer Literature for Actual Equipment Wiring Recommendations. Installation shall comply with Service Standards and National (NEC, UL, and IEEE) Codes.
- Inverter output circuit conductors shall be installed in continuous metal raceways.
- The PV DC Grounding System shall not be bonded to the AC Grounding System by using a Combined DC Grounding Electrode Conductor and AC Equipment Grounding Conductor. Contractors may choose to use the option shown above or may install a Grounding Electrode Conductor from the inverter directly to the service grounding electrode(s).
- The Point of Interconnection shall be made after the HOTEC Revenue Meter in a Junction Box Suitable for the conditions and provided with Locking Provisions. Such installation must be pre-approved by HOTEC.