Distributed Generation (DG) Manual

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The June 6th, 2014 (5th Edition) of the CPS Energy Distributed Generation (DG) Manual has been revised as of January 15th, 2016. This revised edition is presented for the convenience of DG Owners, Electricians, Contractors, Installers, and Developers to assist in the updated procedures and processes related to DG installations/interconnections within the CPS Energy distribution service boundaries including the downtown distribution network.

This DG Manual is intended as a supplement to the PUCT (Public Utility Commission of Texas) and the IEEE (Institute of Electrical and Electronics Engineers) for installation/interconnection of DG systems on CPS Energy’s electric distribution grid. The CPS Energy distribution grid includes the downtown network system and is composed of 13kV and 35kV electrical distribution systems. This Manual provides mandates for installations/interconnections of DG systems less than 10 MWac within the CPS Energy system.

CPS Energy is dedicated and committed to work cooperatively with all DG Owners, Electricians, Contractors, Installers, and Developers and is pleased to provide this DG Manual as a reference to aid in completing the necessary forms for DG system installations/interconnections in a safe and proper manner.

CPS Energy looks forward to working with you to help you complete your installation/interconnection within CPS Energy’s service territory.

Sincerely,

DG Section
1. Introduction

This CPS Energy Distributed Generation Manual (“Manual”) has been prepared for use by both CPS Energy personnel and potential Distributed Generation (energy resources) owners to connect and operate generation systems less than 10 MW.<sup>*</sup>

Generation less than 10 MW on the CPS Energy electric distribution system at voltages of 35kV and below will require approval from CPS Energy.

Generation 10 MW and over and/or directly connected to the transmission system will be dealt with on a case-by-case basis.

Examples of Distributed Generation (“DG”) include, but are not limited to systems that generate energy such as solar photovoltaic, wind, combined heat and power, fuel cells, micro-turbines, reciprocating engines, Stirling engines, energy storage, landfill gas, and diesel.

*Note: Watt [W] unit(s) in alternating current - W<sub>ac</sub> used throughout this Manual

1.1. Goals and Perspective

CPS Energy has developed this Manual keeping in perspective the three main goals:

**Safety First**  
The first, most important goal for CPS Energy is safety—the safety of the general public and of the employees working on the electrical systems.

**Reliability**  
The second goal is reliability—the interconnection of the DG to CPS Energy’s distribution system must not compromise the reliability and/or the service quality of any of CPS Energy’s customers.

**Economics**  
The third goal is economics—the installation/interconnection must be designed in a cost effective manner.

1.2. Business Purpose

Distributed Generation is normally installed for one of two business purposes. The business purposes are known as either Net-Metering or Grid-Tied as outlined below.

1.2.1. Net-Metering

DG System energy is provided to supply the DG Owner’s premises and thus displaces the DG Owner’s energy consumption from CPS Energy when installed behind the Point of Delivery (POD) on the DG Owner side. The customer must also be the DG System’s owner. Any excess power generated will be delivered to CPS
Energy and credit provided to the customer as per the appropriate Rate Rider.

1.2.2. **Grid-Tied**

The DG System is designed with the sole purpose to sell all of its generated net power to CPS Energy under a power purchase agreement or tariff.

The DG System is connected to CPS Energy’s distribution system at a location and in a manner approved by CPS Energy. The DG System does not directly provide power to any other entity or customer.

1.3. **Manual**

CPS Energy is dedicated and committed to working with DG Owners to allow installation/interconnection. This DG manual is a guide for a successful, safe, and reliable installation/interconnection of the DG System to the CPS Energy System. The technical and operational impacts on the CPS Energy system will vary depending on the size of DG System and in the manner of installation/interconnection. CPS Energy may require different equipment depending on the size of the DG System, the amount of power being exported to the CPS Energy system, and the location of the DG System. The DG System owner must conduct their own analysis and conform to CPS Energy interconnection requirements as directed in this manual.

CPS Energy reserves the right to amend this Manual at any time. Ensure that you have the latest edition. This Manual is located on the CPS Energy website at:


- DG Section phone and fax number: 210-353-2700
- Email: DG@cpsenergy.com

2. **Installation/Interconnection with CPS Energy**

This Manual includes the requirements for installing/interconnecting DG Systems to the CPS Energy System. CPS Energy is dedicated and committed to working with DG Owners to allow installation/interconnection. Certain steps must be followed to result in a successful, safe, and reliable installation/interconnection of the DG System to the CPS Energy System.

2.1. **Installation/Interconnection Utility Facilities and System Modifications**

The installation/interconnection of DG Systems may require construction of new facilities on CPS Energy’s side of the point of delivery (POD) or modifications to existing supply facilities in order to accommodate such connections. The determination of the need for system modifications is made
by CPS Energy in the context of system studies conducted during the installation/interconnection application and review process.

There may be costs to the DG owner as a result of CPS Energy having to make necessary arrangements for installation/interconnection of the DG System. CPS Energy may require the installation and use of more sophisticated protective devices and operating schemes, especially when the Facility is exporting power directly to CPS Energy.

Although the DG Owner may be responsible for the costs associated with such construction or modifications, CPS Energy will own and operate all facilities that are installed on the utility’s side of the POD.

2.2. Application Review and Installation/Interconnection Evaluation

An installation/interconnection evaluation study by CPS Energy is required to evaluate the Application (see Appendix D) along with site plans and drawings for all DG sites.

This technical evaluation is needed to identify and to assist in resolution of any issues associated with the proposed DG System being installed and/or interconnecting to the CPS Energy distribution system.

Note: The DG Owner acknowledges and agrees that any review or acceptance of such plans, specifications and other information by CPS Energy shall not impose any liability on CPS Energy and does not guarantee the adequacy of the DG Owner’s DG Facility or Facilities to perform its intended function. CPS Energy disclaims any expertise or special knowledge relating to the design or performance of such generating installations and does not warrant the efficiency, cost-effectiveness, safety, durability, or reliability of such DG Facilities and installations.

While CPS Energy accepts no liability related to the installation and operation of the DG System, it is required that the design and installation utilize qualified and experienced contractors and consultants, and be performed in accordance with minimum requirements of the National Electrical Code (NEC) and all applicable codes, and be in accordance with industry best practices.

2.3. Installation/Interconnection Provisions for DG Systems

The DG Owner or its contractor shall design and install the DG System as necessary for the installation/interconnection to CPS Energy’s System at the point of interconnection as located and approved by CPS Energy (See definition of “Point of Interconnection” in Appendix F). Design shall be in accordance with requirements and provisions contained in this Manual, including its attachments.

2.4. Installation/Interconnection Facilities and/or System

The DG Owner will be responsible for the expenses associated with Installation/Interconnection Facilities required by CPS Energy and for the costs
of any additional protective facilities which are required or prudent in order to protect CPS Energy’s System from disruption or damage caused by the DG System (See definitions of “Installation/Interconnection Facilities” and “Distributed Generation Facilities” in Appendix F).

2.4.1. **Measuring Energy at Facilities**

The Installation/Interconnection Facilities shall have provisions and equipment to measure both the energy produced by the DG Facility and any energy provided by CPS Energy for DG Owner’s use at the DG Site.

2.4.2. **Disconnection of Installation/Interconnection at Facilities**

DG Owner may disconnect from CPS Energy's System by operation of its own switch, in accordance with Appendix A “Installation/Interconnection Requirements for Distributed Generation” in this Manual.

*Note: The DG Owner shall have no right to operate CPS Energy's switch or any of CPS Energy’s Equipment located on the CPS Energy System side of the Point of Delivery.*

2.4.3. **CPS Energy Right to Disconnect Installation/Interconnection at Facility**

CPS Energy shall have the right to disconnect the DG Facility from the CPS Energy System where continuance of service to DG Owner or other Customers will, in CPS Energy’s reasonable determination, endanger persons or property. CPS Energy also reserves the right to disconnect for other cases as described in Appendix A.

3. **Technical, Operational, and Maintenance Requirements**

The detailed technical, operational, and maintenance requirements are found in Appendix A - Installation/Interconnection Requirements for Distributed Generation. This section of the Manual summarizes some of those key requirements. In general the DG System and associated facilities must be designed in accordance with, but not limited to, UL (Underwriters Laboratories) Standards, IEEE (Institute of Electrical and Electronic Engineers) Standards, NEC (National Electrical Code), NESC (National Electrical Safety Code), PUCT (Public Utility Commission of Texas), ERCOT (Electric Reliability Council of Texas) Operating Guides and Protocols, CPS Energy Electric Service Standards and any other applicable local, state, or federal codes or standards. Particular attention should be paid to UL 1741, IEEE 519 and IEEE 1547.
3.1. **DG Maximum Capability and Limitations**

3.1.1. **Secondary Voltages**

DG Facilities connected at secondary voltages cannot have a maximum capacity rating that exceeds the size of the transformer serving the secondary.

3.1.2. **Radial Distribution System**

Grid-Tied DG Facilities connected to the radial distribution system at distribution voltage cannot have a combined maximum capacity rating connected on an individual feeder that exceeds $5\, \text{MW}_{\text{ac}}$ for 13 kV and $9\, \text{MW}$ for 35 kV feeders. In no case will the DG feed power back through the CPS Energy substation transformer.

For aggregated small DG systems where the summation of the aggregated DG on a distribution circuit exceeds 20% of minimum circuit peak, will require a feasibility study before adding additional generation.

Combinations of Grid-Tied and small DG will be reviewed on a case by case basis.

Clustering of solar can create system issues and will be reviewed at the time application is submitted.

3.1.3. **Downtown Network System**

Approximately 0.68 square mile of the San Antonio Central Business District (CBD) is served by the network electrical distribution system. Four substations located on the perimeter of the CBD are the sources of power to the nine isolated CPS Energy networks that feed power to the CBD. Each of the nine isolated networks consists of four (4) parallel dedicated feeders that feed power to nine areas of the downtown CBD. Depending upon the customer’s load, up to four feeders enter a customer vault and connect to transformers which are designed to carry the load to a reliable N-1 redundancy. Network Protectors (NP) play an integral part in the Reliability and are installed on each transformer and protect faulted primary feeders from further damage by preventing back feed from the network system. When a fault on a primary system occurs, the NP will open to isolate the fault from the network system. Each NP in the vault feeds a common bus which feeds the customer’s fuse pad. The fuse pad is the point of delivery and the common connection point between CPS Energy and the customer. The NP’s will prevent any excess DG power not consumed by the
DG Owner from being exported into the CPS Energy network system power grid. In no case will the DG be allowed to feed power back through the CPS Energy network system power grid. Because of these limitations, it is important that any entity proposing a DG system first contact CPS Energy to determine if the area falls with the CBD as additional restrictions and requirements will apply.

3.2. Prevention of Interference for Systems Less than 250 kWac (IEEE Requirements)

The DG System operating requirements are described below and in Appendix A.

3.2.1. Voltage

The DG Owner will operate its DG equipment in such a manner that the voltage levels on CPS Energy are in the same range as if the DG equipment was not connected to CPS Energy's system. The DG Owner shall provide an automatic method of disconnecting the DG System from CPS Energy if a sustained voltage deviation in excess of +10.0% from nominal voltage persists for more than 1 second or –12% from nominal voltage persists for more than 2 seconds, or a deviation in excess of +20% or –50% from nominal voltage persists for more than 10 cycles. The DG Owner may reconnect when CPS Energy voltage and frequency return to normal range and the system is stabilized.

*Note:* For non-inverter installations, the DG Owner shall use 3-phase, 4-wire wye connected PT's for monitoring voltage and the monitoring point shall be at the Point of Common Coupling (PCC).

3.2.2. Flicker

The DG Owner’s equipment shall cause voltage step no greater than 2% with loss of total generation capacity. DG Owner’s equipment shall not cause objectionable flicker for other customers on the Area EPS.

3.2.3. Frequency

The operating frequency of the DG equipment shall not deviate more than +0.5 Hertz (Hz) from a 60 Hz frequency base. The DG Owner shall automatically disconnect the DG System from CPS Energy within 0.16 seconds if this frequency tolerance cannot be maintained. The operating frequency of the DG equipment shall not deviate more than –0.7 Hz from a 60 Hz frequency base for DG systems ≤ 30 kWac. The DG Owner shall automatically disconnect the DG System from CPS Energy within 0.16 seconds if this frequency tolerance cannot be maintained. The operating frequency...
of the DG equipment shall not deviate more than –0.2 Hz to –3 Hz (adjustable set point) from a 60 Hz frequency base for DG systems > 30 kW_{ac}. The DG Owner shall automatically disconnect the DG System from CPS Energy within 0.16 seconds to 300 seconds (adjustable) if this frequency tolerance cannot be maintained. The operating frequency of the DG equipment shall not decrease less than –3 Hz from a 60 Hz frequency base for DG systems > 30 kW_{ac}. The DG Owner shall automatically disconnect the DG System from CPS Energy within 0.16 seconds if this frequency tolerance cannot be maintained. The DG Owner may reconnect when CPS Energy voltage and frequency return to normal range and the system is stabilized.

3.2.4. **Harmonics**

In accordance with IEEE 519, the total harmonic distortion (THD) voltage shall not exceed 5.0% of the fundamental 60 Hz frequency or 3.0% of the fundamental frequency for any individual harmonic, when measured at the PCC.

3.2.5. **Fault and Line Clearing**

The DG Owner shall automatically disconnect from CPS Energy within 10 cycles if the voltage on one or more phases falls below -30% of nominal voltage on CPS Energy serving the DG Owner premises. This disconnect timing also ensures that the DG System is disconnected from CPS Energy prior to automatic re-close of breakers. The DG System may reconnect when CPS Energy voltage and frequency return to normal range and the system is stabilized.

*Note: For non-inverter installations, the DG Owner shall use 3-phase, 4-wire wye connected PT’s for monitoring voltage and the monitoring point shall be at the PCC.*

3.2.6. **Direct Current Injection**

The DG System should not inject direct current (DC) greater than 0.5% of rated output current into the CPS Energy System.

### 3.3. **Prevention of Interference for Systems 250 kW_{ac} and Greater (CPS Energy Requirements)**

The DG System operating requirements are described below and in Appendix A.

3.3.1. **Voltage**

The DG Owner will operate its DG equipment in such a manner that the voltage levels on CPS Energy are in the same range as if the DG equipment was not connected to CPS Energy’s system. The DG
Owner shall provide an automatic method of disconnecting the DG System from CPS Energy if a sustained voltage deviation in excess of +5.0% or −10% from nominal voltage persists for more than 2 seconds, or a deviation in excess of +10% or −30% from nominal voltage persists for more than 10 cycles. The DG Owner may reconnect when CPS Energy voltage and frequency return to normal range and the system is stabilized.

**Note:** For non-inverter installations, the DG Owner shall use 3-phase, 4-wire wye connected PT’s for monitoring voltage and the monitoring point shall be at the Point of Common Coupling (PCC).

3.3.2. **Flicker**

The DG Owner's equipment shall not cause excessive voltage flicker on CPS Energy’s distribution system. This flicker shall not exceed 3.0% voltage dip, in accordance with CPS Energy, PUCT, & IEEE 519 as measured at the PCC. (Refer to Table 1)

3.3.3. **Frequency**

The operating frequency of the DG equipment shall not deviate more than +0.5 Hz or −0.7 Hz from a 60 Hz frequency base. The DG Owner shall automatically disconnect the DG System from CPS Energy within 15 cycles if this frequency tolerance cannot be maintained. The DG Owner may reconnect when CPS Energy voltage and frequency return to normal range and the system is stabilized.

3.3.4. **Harmonics**

In accordance with IEEE 519, the total harmonic distortion (THD) voltage shall not exceed 5.0% of the fundamental 60 Hz frequency or 3.0% of the fundamental frequency for any individual harmonic, when measured at the PCC.

3.3.5. **Fault and Line Clearing**

The DG Owner shall automatically disconnect from CPS Energy within 10 cycles if the voltage on one or more phases falls below −30% of nominal voltage on CPS Energy serving the DG Owner premises. This disconnect timing also ensures that the DG System is disconnected from CPS Energy prior to automatic re-close of breakers. The DG System may reconnect when CPS Energy voltage and frequency return to normal range and the system is stabilized.

**Note:** For non-inverter installations, the DG Owner shall use 3-phase, 4-wire wye connected PT’s for monitoring voltage and the monitoring point shall be at the PCC.
3.3.6. Direct Current Injection

The DG System should not inject direct current (DC) greater than 0.5% of rated output current into the CPS Energy System.

4. CPS Energy DG Application Review and Evaluation

4.1. Introduction

This section describes a structured approach by CPS Energy for the engineering review process of a typical DG installation/interconnection study. It includes the steps that must be taken to account for site-specific concerns and address the technical and operational requirements of CPS Energy.

The goal of CPS Energy is that the installation/interconnection analyses of the impacts of DG are conducted in a clear and consistent manner. However, certain Applications may require minor deviations while they are being reviewed by CPS Energy. Such minor modifications to a pending Application shall require additional documentation and/or modification to existing documentation, and clear communications between CPS Energy and the DG Owner. Once the installation/interconnection study is complete and all required information and submittals have been reviewed, CPS Energy will either approve or reject the Application and provide notification to the DG Owner.

4.2. CPS Energy Processing of DG Applications

In general, any installation/interconnection study performed by CPS Energy shall follow these guidelines:

1. Study scope shall be based on characteristics of the DG System at the proposed location.
2. Study shall consider cost incurred as a result of DG installation/interconnection.
3. CPS Energy shall provide a study fee cost to the DG Owner prior to initiation of study. Refer to Appendix B “Feasibility Study and Installation/Interconnection Study Fees.
4. CPS Energy shall make written reports and study results available to the DG Owner for grid-tied systems, if requested.
5. CPS Energy may reject applications for demonstrable reliability or safety issues.
6. CPS Energy shall use reasonable efforts to meet the Application processing schedule, or will notify the DG Owner why it cannot meet the schedule and provide estimated dates for Application processing and installation/interconnection study completion.
7. No DG Facilities shall be constructed within the CPS Energy Downtown Underground Network Distribution area without prior written authorization and approval. CPS Energy shall advise the DG
Owner of potential secondary network-related problems prior to initiation of a study.

4.3. Application Initial Requirements

4.3.1. Existing DG Systems

Anyone owning or operating a DG Facility or Facilities in parallel with CPS Energy’s electric distribution system even for a short time frame, must immediately notify CPS Energy of the existence, location and category of the DG Facility or Facilities. If the DG Owner has not previously properly registered the DG with CPS Energy, CPS Energy personnel will assist the DG Owner in completing the process in this Manual. If a DG Owner refuses to work through the Application process with CPS Energy, then the DG Facility or Facilities must disconnect immediately.

4.3.2. Feasibility Study Request

A Feasibility Study shall be performed on all Grid-Tied DG Systems before interconnecting to the CPS Energy system for the purpose of conducting a study on safety, load analysis, feeder limitations. Before interconnecting to the CPS Energy system, a Feasibility Study may or may not be required for Net-Metered DG Systems equal to or greater than 50kW_{ac}. A Feasibility Study is required if solar penetrations approach circuit capacity limits or create a clustering effect. This study requirement will be determined by CPS Energy on a case-by-case basis. Applications for a Feasibility Study of Distributed Generation (see Appendix C) must be filled out and returned with the non-refundable fee. An application and fee must be submitted for each site requested. See Appendix B for the actual fee schedule. If requestor does not submit complete packet and does not pay study fees, then feasibility study request will be denied.

For DG Systems of 50kW_{ac} to less than 1 MW_{ac} including clustered and aggregated groups, CPS Energy will require a feasibility study.

A Feasibility Study shall be performed on all DG Systems or aggregated groups of 1 MW or more before interconnecting to the CPS Energy system.

DG penetration levels will be monitored by CPS Energy and are subject to feasibility studies as outlined in section 3.1.2.
4.3.3. **Installation/Interconnection Request**

In advance of an installation/interconnection, the DG Owner must contact the CPS Energy Distributed Generation Section and complete the Application for Installation/Interconnection of Distributed Generation (see Appendix D). A separate form and Application fee must be submitted for each DG Facility or facilities and each location. The fees are found in Appendix B.

4.3.4. **Submittal of a DG System Plan**

As a part of the Application, the DG Owner shall submit a plan detailing the electrical design, installation/interconnection requirements, size, and operational plans for the DG System (the “DG Plan”) in accord with this Manual, the Application in Appendix D, and Appendix A “Installation/Interconnection Requirements for Distributed Generation”.

For facilities with total capacity (including aggregate) ≥ 25 kWAC in a single parcel of property with single or multiple meters, the DG Plan shall be prepared and sealed by a Professional Engineer registered in the State of Texas.

Either at the time of submission or at any time during the review process, CPS Energy may require additional information. CPS Energy may request an additional engineering fee depending on the extent of any analysis needed. A basic fee will be charged initially in anticipation that there will be charges required for installation/interconnection facilities and for potential system modifications to CPS Energy’s system. The fee will be adjusted accordingly depending on the extent of installation/interconnection facilities or system modifications deemed necessary by CPS Energy.

4.3.5. **Waiver of Application Fees**

CPS Energy may, at its sole discretion, waive the Application fee in the case of DG Facilities (i) that will not be operated in parallel with CPS Energy’s electric distribution system, (ii) with no chance to ever export power to CPS Energy, (iii) that are of standard manufacture and design and intended entirely as emergency or back-up power supply for the Facility, or (iv) are part of a net-meter rebate program.

4.4. **CPS Energy Review Process**

4.4.1. **Feasibility Study Review Process**

CPS Energy will review any requests related to the feasibility of sites. CPS Energy will provide a “Letter of Availability” (LOA) to the DG Owner within 30 business days of the receipt of an approved
“Application for Feasibility Study of Distributed Generation” (Appendix C). This LOA will include the availability of installation/interconnection utility services.

If corrections or changes to the plans, specifications and other information are made, or to be made, by the DG Owner, the 30-day period may be reinitialized when such changes or corrections are provided to CPS Energy.

20% of the original fee will be charged if DG Owner requests a study in the same location with an increase in DG system size. Any changes to the site or project requiring new analysis by CPS Energy shall require a new fee and a new DG Plan.

**Note:** If the new DG size is greater than the DG size bracket, the full amount of the next DG size bracket will be charged.

**Note:** DG Owner has 48 hours to notify the DG Section via email from the day of received payment confirmation to cancel review of updated DG system.

**Note:** See Appendix B for a complete list of associated fees and respective DG size brackets.

### 4.4.2. Installation/Interconnection Request and DG Plan Review Process

CPS Energy will review the Application and accompanying documents, plans, specifications, and other information provided and will return an installation/interconnection analysis to the DG Owner within 30 business days of receipt of final plans and specifications.

1. Technical review will be consistent with guidelines established by the “Installation/Interconnection Requirements for Distributed Generation” (Appendix A).

2. If corrections or changes to the plans, specifications and other information are made, or to be made, by the DG Owner, the 30 business day period may be reinitialized when such changes or corrections are provided to CPS Energy. In addition, any changes to the site or project requiring new analysis by CPS Energy shall require an additional fee and a new DG Plan.

**Note:** DG Owner has 48 hours to notify the DG Section via email from the day of received payment confirmation to cancel review of updated DG system.

**Note:** See Appendix B for a complete list of associated fees and respective DG size brackets.

**When a decrease in DG system size is requested in the same parcel of location:**

If DG Owner requests a decrease in DG system size within the first
48 hour after receiving payment confirmation, no extra fee will be charged and the difference between the old bracket minus the new bracket of study fees will be refunded.

If DG Owner requests a decrease in DG system size after the first 48 hour after receiving payment confirmation but before the completion of DG Study Report, no extra fee will be charged and 25% of the difference between the old bracket minus the new bracket of study fees will be refunded.

If DG Owner requests a decrease in DG system size after completion of DG Study Report, a new study fee will be charged and no study fee will be refunded.

**When an increase in DG system size is requested in the same address;**

If DG Owner requests an increase in DG system size within the first 48 hour after receiving payment, the difference between the new system size bracket minus the old system size bracket will be charge as an additional fee.

If DG Owner requests increase in DG system size after the first 48 after receiving payment confirmation but before the completion of DG Study Report, a new fee will be charged using the *Additional-Fee formula* described below.

If DG Owner requests an increase in DG system size after completion of DG Study Report, a new study fee will be charged.

**When cancellation of DG system study is requested;**

If DG Owner requests a cancellation of DG system study within the first 48 hour after receiving payment, the study fee will be refunded and no installation/interconnection study report will be provided.

If DG Owner requests a cancellation of DG system study after the first 48 after receiving payment but before the completion of DG Study Report, the prorated study fee will be refunded. Prorated fee is calculated as follows. No installation/interconnection study report will be provided:

\[
F_{prorate} = F_{original} \times \left( 30 - \frac{Day_{study}}{30} \right), \text{ where;}
\]

- \(F_{prorate}\) is the prorated study fee to be refunded
- \(F_{original}\) is the original installation/interconnection study fee
- \(Day_{study}\) is the number of business days spent in the installation/interconnection study request

If DG Owner requests a cancellation of DG system size after completion of DG Study Report, no study fee will be refunded.
(3) Additional fee is calculated using the Additional Fee Formula as follows:

The original installation/interconnection study fee, multiplied by the ratio of the absolute value of the difference between the original DG size and the new DG size, divided by the difference between the maximum DG size and the minimum DG size.

\[ F_{\text{additional}} = F_{\text{original}} \times \left( \frac{|\text{DER}_{\text{original}} - \text{DER}_{\text{new}}|}{\text{DER}_{\text{max}} - \text{DER}_{\text{min}}} \right) \]

Where:

- \( F_{\text{additional}} \) is the additional installation/interconnection study fee
- \( F_{\text{original}} \) is the original installation/interconnection study fee
- \( \text{DG}_{\text{original}} \) is the original DG size on the first installation/interconnection study request
- \( \text{DG}_{\text{new}} \) is the new DG size that the DG Owner has requested to perform for a new installation/interconnection study
- \( \text{DG}_{\text{max}} \) is the maximum DG size for each respective DG size bracket (See Appendix B)
- \( \text{DG}_{\text{min}} \) is the minimum DG size for each respective DG size bracket (See Appendix B)

Note: If the new DG size is greater than the DG size bracket, the full amount of the next DG size bracket will be charged.

(4) In the event it is necessary at the time of initial installation/interconnection or at some future time for CPS Energy to modify its electric delivery systems in order to serve the DG Owner’s DG Facilities and/or purchase or continue to purchase the output of the DG Facilities, or because the quality of the power provided by the DG Facility adversely affects CPS Energy’s delivery system, the DG Owner will be responsible to reimburse CPS Energy for all costs of modifications required. Additionally, the DG owner is expected to comply with changes to any of the technical or operational requirements as a result of such modifications.

4.5. Installation/Interconnection in CPS Energy Downtown Network System

(1) No DG Facilities shall be constructed within the CPS Energy Downtown Underground Network Distribution area without prior written authorization and approval. CPS Energy shall advise the DG Owner of potential secondary network-related problems prior to initiation of a study. Certain aspects of secondary network systems
create technical difficulties that may make installation/interconnection more difficult and costly to implement. Applications to connect to the CPS Energy network must be analyzed on a case-by-case basis.

(2) In a network secondary distribution system, service is redundantly provided through multiple transformers as opposed to radial systems where there is only one path for power to flow from the distribution substation to a particular load. The secondary’s of networked transformers are connected together to provide multiple potential paths for power and thus much higher reliability than an equivalent radial feeder. Fault current for vault installations are easily in the 100 kA range. To keep power from inappropriately feeding from one transformer back through another transformer (e.g., feeding a fault on the primary side), devices called network protectors are used to detect such a back feed and open very quickly (within a few cycles). In addition to other industry Standards and Specifications, DG Facilities connected to the CPS Energy Downtown Underground Network Distribution System shall meet the “de minimus” interconnection criteria of IEEE Standard 1547.6-2011. In no case shall the DG feed power back through the CPS Energy Underground Network Submersible Transformers and areas with very little or zero secondary voltage distribution systems. Where allowed, only inverter-based DG Systems are allowed on the network. Only non-export systems will be considered on a case-by-case basis and each application reviewed to ensure the DG Owner’s DG output capacity is less than the verified minimum load per IEEE Std 1547.6-2011. For those approved applications and for the worker safety entering and working in the vault confined spaces during inspections and while performing maintenance activities, CPS Energy shall require the DG Owner to deactivate or shut down the system the entire time while the workers are in the vault. The DG Owner will be responsible for design, installation, testing, and maintenance for the life of the DG equipment.

(3) If the aggregate DG output within a networked secondary exceeds the aggregate load, the excess power will activate one or more network protectors. If such a situation were allowed, the DG Owner and/or adjacent customers can expect to experience a cyclic momentary power outage and the life of the equipment in the vault could suffer long term effects, reliability of the secondary network would be reduced and a costly premature equipment replacement. In such a circumstance, DG could compromise grid reliability.

(4) CPS Energy has nine separate network and isolated distribution systems located in the downtown area. If it is determined that the DG Owner’s DG Facility is planned to be on a network, the DG Owner will be notified and referred to Appendix B for the application fees associated with CPS Energy network systems.
5. **DG System Owner’s Responsibilities**

5.1. **General**

The DG Owner shall provide CPS Energy’s Distributed Generation Section with a fully completed DG Application (Appendix D) and all planning and support materials for CPS Energy to evaluate the installation/interconnection requirements for the DG Facility.

(1) The DG Owner shall have the Facility installed according to documented plans and shall allow CPS Energy to complete its commissioning testing and requirements as outlined in Appendix A. The DG Owner shall correct any shortcomings determined by CPS Energy before the DG Facility or Facilities are released for operation.

(2) On an annual basis, CPS Energy shall have the right to review the operation of the DG Facility or Facilities at the site and conduct any tests it deems necessary to insure that the impact of the DG on the CPS Energy System results in safety and reliability for all parties involved and for all of CPS Energy Customers.

5.2. **Line Extension and Modifications to CPS Energy’s Facilities**

(1) As a part of the installation/interconnection analysis performed by CPS Energy, the DG Owner will be provided with an estimate of any line extension or other cost to be incurred in providing electric facilities to the DG Facility.

(2) Notwithstanding CPS Energy’s line extension policy, the DG Owner shall pay in advance the full cost of the construction of any transmission, substation, distribution, transformation, metering, protective, communication or other facilities or equipment which, at the sole discretion of CPS Energy, is required to serve the DG Facility or Facilities.

(3) In the event it is necessary at the time of initial installation/interconnection or at some future time for CPS Energy to modify its electric delivery systems in order to serve the DG Facilities and/or purchase or continue to purchase the output from the DG Facility or Facilities, or because the quality of the power provided by the DG Facility or Facilities adversely affects CPS Energy’s delivery system, the DG Owner will be responsible to reimburse CPS Energy for all costs of modifications required for the installation/interconnection of the DG Facility or Facilities.

(4) In the event CPS Energy at any time in the future changes primary (or secondary) voltage of distribution facilities serving the DG installation or the DG Owner’s premises or location such that metering equipment, transformers and/or any other DG Owner-
owned equipment must be changed, the full cost of the change will be borne by the DG Owner.

(5) In all cases, the DG Owner shall pay the full cost of the installation of a visible load break disconnect switch by and to the sole specification of CPS Energy. The switch will be readily accessible to CPS Energy personnel and of a type that can be secured in an open position by a CPS Energy padlock.

(6) Appendices A and G of this Manual includes additional detail and operational and safety requirements. The DG Owner will follow all aspects of these requirements prior to and during operation of the DG Facility or Facilities.

5.3. Liability Insurance

5.3.1. For Facilities 50 kW\textsubscript{ac} and Smaller

For installations 50 kW\textsubscript{ac} and smaller the DG Owner is not required to provide a certificate of insurance coverage to CPS Energy. It is recommended, however, that the DG Owner carry liability insurance coverage which insures the DG Owner 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 DG Owner’s generating equipment.

5.3.2. For Facilities Larger than 50 kW\textsubscript{ac}

Prior to installation/interconnection, the DG Owner must provide a certificate of insurance showing satisfactory liability insurance including contractual liability insurance covering indemnity obligations which insures the DG Owner 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 DG Owner’s DG Facility.

(1) The amount of such insurance coverage shall be not less than $2,000,000 per occurrence and name CPS Energy as an additional insured. This amount may be increased at the sole discretion of CPS Energy if the nature of the project so requires.

(2) 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 CPS Energy. 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.
(3) The DG Owner shall provide proof of such insurance to CPS Energy at least annually and on request by CPS Energy.

5.4. Contracts

5.4.1 A Purchase Power Agreement (where the DG Owner desires to deliver power and CPS Energy agrees to purchase power) may be required under the following instances:

(1) $\leq 25$ kW$_{ac}$: As outlined in CPS Energy’s tariffs if applicable.

(2) $\geq 3$ MW$_{ac}$ and $< 10$ MW$_{ac}$: The DG Owner will execute a Power Purchase Agreement with CPS Energy.

(3) $\geq 10$ MW$_{ac}$: DG Facilities of this size are not covered by this Manual and will be considered by CPS Energy on a case-by-case basis.

(4) An exception may be in the case of a special program offered by CPS Energy which may have its own Power Purchase Agreement.

(5) The DG Owner may not assign any of the DG related contracts with CPS Energy to another entity without the written approval of CPS Energy.

5.5. Initial Installation/Interconnection

Upon satisfactory completion of the review process and approval of the Application as outlined in this Manual, CPS Energy will prepare the schedule for the installation/interconnection of the DG Facilities.

(1) The installation/interconnection will be completed as soon as practical after completion of the review process and execution of the necessary contracts.

(2) After completion of installation/interconnection requirements and prior to initiation of service, CPS Energy will conduct a final inspection and commissioning of the facilities and installation/interconnection to CPS Energy’s system.

(3) Upon satisfactory final inspection, CPS Energy will initiate service to the DG Facility or Facilities.

CPS Energy’s review process and final inspection is intended as a means to safeguard CPS Energy’s facilities and personnel. Any review by CPS Energy shall not impose any liability on CPS Energy and does not guarantee the adequacy of the DG Owner’s equipment to perform its intended function. CPS Energy disclaims any expertise or special knowledge relating to the design or performance of generating installations and does not warrant the efficiency, cost-effectiveness, safety, durability, or reliability of such DG installations.
Appendix A

Installation/Interconnection Requirements for DISTRIBUTED GENERATION
Installation/Interconnection Requirements for DISTRIBUTED GENERATION

1. General Requirements

CPS Energy and the Distributed Generation Facility Owner ("DG Owner") recognize the importance of having design, operational, and maintenance requirements to coordinate the installation/interconnection of DG Owner's system with CPS Energy's system. This document addresses typical requirements for installing/interconnecting Distributed Generation ("DG") Facilities to the CPS Energy system.

1.1. Notice to All DG Owner's Personnel

The DG Owner’s contractors, agents, and operating/maintenance personnel shall be informed of and follow the requirements that are applicable to the specific DG Facility. Advanced notice of intent and verification of compliance is required before connecting to CPS Energy system.

1.2. Notifying CPS Energy

Unless otherwise stated in this document any required notification to CPS Energy shall be made to the CPS Energy DG Section.

1.3. Display of Documents

Copies of the IA along with this document shall be posted in the DG Facility and all facilities associated with the operation of the DG Facility.

1.4. Interconnect Study

Specific locations and conditions may require the installation of more sophisticated protective devices and operating schemes. CPS Energy shall make any additional requirements known to the DG Owner at the time the installation/interconnection studies are completed.

1.5. Disconnect

CPS Energy may disconnect the DG Facility from the distribution system in an emergency, or should the DG Owner fail to install, operate, and maintain all wiring and equipment in such condition and/or manner that endangers persons or property, or may cause impairment of CPS Energy's installation/interconnection and service to DG Owner, or any of CPS Energy's distribution DG Owners.
2. **Technical and Design Requirements**

To help ensure the protection and safety of DG Owner’s and CPS Energy’s personnel and property, the continued provision of electric service to DG Owner, the continued maintenance of an installation/interconnection between DG Owner and CPS Energy, and the reliable functioning of CPS Energy's overall system operations, the following requirements relevant to the type of DG Facility shall be observed.

2.1. **Design Considerations**

2.1.1. **Standards**

The DG Owner’s equipment shall be designed in accordance with but not limited to UL (Underwriters Laboratories) Standards, IEEE (Institute of Electrical and Electronics Engineers) Standards, NEC (National Electrical Code), NESC (National Electrical Safety Code), PUCT (Public Utility Commission of Texas), ERCOT (Electric Reliability Council of Texas) Operating Guides, CPS Energy Electric Service Standards and any other applicable local, state or federal codes or standards.

2.1.2. **Safety**

2.1.2.1. **Visual Disconnect**

DG Owner shall furnish and install a manual disconnect device that has a visual break that is appropriate to the voltage level (a disconnect switch, a draw-out breaker, or fuse block), and is accessible to CPS Energy personnel, and capable of being locked in the open position. The DG Owner shall follow CPS Energy's switching, clearance, tagging, and locking procedures, which CPS Energy shall provide for the DG Owner.

2.1.2.2. **Reconnect Protection**

The DG Owner's DG shall be equipped with protective hardware and software designed to prevent the DG from being connected to CPS Energy’s distribution system unless the CPS Energy voltage and frequency is within the accepted range on all phases.

2.1.3. **Listed or Certified Equipment**

For DG Systems up to 50 kW_{ac}, certified equipment and equipment listed with an approved test label may be installed on CPS Energy’s distribution system in accordance with CPS Energy approved installation/interconnection control and protection scheme without further review of the DG Owner’s design by CPS Energy. When
the DG Owner is exporting to CPS Energy using certified equipment, the protective settings and operations shall be those specified by CPS Energy. For a list of the certified equipment go to:

http://www.gosolarcalifornia.ca.gov/equipment/inverters.php or
http://www.gosolarcalifornia.ca.gov/equipment/pv_modules.php

2.1.4. *Protection of DG Owner’s Equipment*

The DG Owner shall be responsible for protecting its DG equipment in such a manner that CPS Energy system outages, short circuits or other disturbances including zero sequence currents and ferro-resonant over-voltages do not damage the DG Owner's DG equipment. The DG Owner's protective equipment shall also prevent unnecessary tripping of CPS Energy breakers that would affect CPS Energy's capability of providing reliable service to other customers.

2.1.5. *Remote Disconnect Control*

If the DG is 2 MW$_{ac}$ or larger or CPS Energy determines (based on studies or reviewing test results) that a DG may not trip properly when isolated from CPS Energy’s system, CPS Energy shall provide (at the DG Owner’s expense) a communication channel to support communication between CPS Energy and the DG Owner's Facility. The channel may be a leased data circuit or other mutually agreed upon medium.

2.1.6. *Bi-directional Disconnect Breaker*

Circuit breakers or other interrupting devices at the Point of Interconnection must be capable of interrupting maximum available fault current from either direction. Facilities larger than 2 MW$_{ac}$ and exporting to CPS Energy shall have a redundant circuit breaker unless a listed device suitable for the rated application is used.

2.1.7. *Exporting Power to CPS Energy*

Exporting to CPS Energy may require additional operational or protection devices and will require coordination of operations with CPS Energy.
2.1.8. *Power Purchase Agreements (PPA)*

Exporting power to CPS Energy will require communication link to the inverters for remote disconnect and setting modification as directed by CPS Energy.

### 2.2. Prevention of Interference

#### 2.2.1. Automatic Disconnect

The DG Owner shall provide an automatic method of disconnecting the DG equipment from CPS Energy if any of the parameters in the Interference Table below are violated. The DG Owner may reconnect with CPS Energy after all parameters return to an acceptable range and the system is stabilized for 2 continuous minutes.

#### 2.2.2. Interference Monitor

Interference is most often measured at the POI. The monitor may be placed at a practical location and best practices calculations may be utilized to determine expected level of interference for compliance. CPS Energy reserves the right to measure these parameters at the most practical point of connection, the POI, POCC, or POD.

#### 2.2.3. Test Current Injection

Test method shall conform to current IEEE Anti-Islanding standards. Direct current (DC) pulse tests must be no greater than 0.5% of rated output current.

#### 2.2.4. Interference Table

The following table lists the key electrical parameters and their acceptable limits in order to prevent interference on the CPS Energy System.

For less than 250 kWac, refer to the IEEE 1547 requirements column on Table 1.

For 250 kWac and greater, refer to the CPS Energy requirements column on Table 1.
## Table 1 Interference Limits for DG Systems Applied by Different Entities

### Prevention of Interference Limits for CPS Energy, PUCT and IEEE 1547 DG Requirements

<table>
<thead>
<tr>
<th>Installation/Interconnection</th>
<th>CPS Energy</th>
<th>Public Utilities Commission of Texas</th>
<th>IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-Phase</td>
<td></td>
<td>Single-Phase</td>
<td></td>
</tr>
<tr>
<td>≤ 50 kW</td>
<td>&lt;25 kW</td>
<td>25 kW - 500 kW</td>
<td>0 kW - 500 kW</td>
</tr>
<tr>
<td>25 kW - 2000 kW</td>
<td></td>
<td>2000 kW - 10000 kW</td>
<td>500 kW - 1500 kW</td>
</tr>
<tr>
<td>2000 kW - 10000 kW</td>
<td></td>
<td></td>
<td>1500 kW - 10000 kW</td>
</tr>
</tbody>
</table>

- **Interrupting Devices (capable of interrupting maximum available fault current)**
  - CPS Energy: x x x x x
  - Public Utilities Commission of Texas: x x x x x
  - IEEE 1547 Standard: x x x
- **Interconnect Disconnect Device at the POD**
  - CPS Energy: x x x x
  - Public Utilities Commission of Texas: x x x x
  - IEEE 1547 Standard: x x x
- **Over/Under Voltage Trip**
  - CPS Energy: x x x x x
  - Public Utilities Commission of Texas: x x x x x
  - IEEE 1547 Standard: x x x
- **Ground over-voltage trip or ground over-current trip depending on the grounding system if required by CPS Energy**
  - CPS Energy: x x x
  - Public Utilities Commission of Texas: 2 2 2
  - IEEE 1547 Standard: x x x
- **Reverse/under power sensing if the Facility is not exporting the DG is less than the minimum load of the DG Owner’s facilities**
  - CPS Energy: x x x
  - Public Utilities Commission of Texas: 2 2 2
  - IEEE 1547 Standard: x x x
- **Synchronizing Check (for facilities with stand alone capability)**
  - CPS Energy: A/M1 A/M1 A/M1 A1 A1
  - Public Utilities Commission of Texas: A/M1 A/M1 A/M1 A1 A1
  - IEEE 1547 Standard: x x x
- **If the Facility is exporting power, the power direction protective function may be used to block or delay the under frequency trip with the agreement of CPS Energy**
  - CPS Energy: x x
  - Public Utilities Commission of Texas: x x
  - IEEE 1547 Standard: x x
- **Telemetry/transfer trip may also be required by CPS Energy as a part of a transfer tripping or blocking protective scheme.**
  - CPS Energy: x
  - Public Utilities Commission of Texas: x
  - IEEE 1547 Standard: x x x
- **Automatic Voltage Regulator**
  - CPS Energy: x
  - Public Utilities Commission of Texas: x
  - IEEE 1547 Standard: x x
- **Three phase circuit breakers with electronic or electromechanical control for synchronous machines**
  - CPS Energy: x x x x
  - Public Utilities Commission of Texas: x x x x
  - IEEE 1547 Standard: Paralleling limits of 0.3 Hz Δf, 10% ΔV and 20° ΔΦ
- **DG Owner solely responsible for proper synchronization for synchronous machines**
  - CPS Energy: x x x x
  - Public Utilities Commission of Texas: x x x x
  - IEEE 1547 Standard: Paralleling limits of 0.2 Hz Δf, 5% ΔV and 15° ΔΦ
- **Excitation response ratio shall not be less than 0.5 for synchronous machines**
  - CPS Energy: x x x x
  - Public Utilities Commission of Texas: x x x x
  - IEEE 1547 Standard: Paralleling limits of 0.1 Hz Δf, 3% ΔV and 10° ΔΦ
- **Excitation system shall conform with ANSI C50.13-1989 for synchronous machines**
  - CPS Energy: x x x x
  - Public Utilities Commission of Texas: x x x x
  - IEEE 1547 Standard: x x x x
- **May "motor" up to speed if initial voltage drop at the PCC is within the Flicker limits for induction machines**
  - CPS Energy: x x x x
  - Public Utilities Commission of Texas: x x x x
  - IEEE 1547 Standard: x x x x
- **Line-commutated inverters do not require synchronizing equipment**
  - CPS Energy: x x x x
  - Public Utilities Commission of Texas: x x x x
  - IEEE 1547 Standard: x x x x
- **Self-commutated inverters require synchronizing equipment**
  - CPS Energy: x x x x
  - Public Utilities Commission of Texas: x x x x
  - IEEE 1547 Standard: x x x x
### Table 1 Interference Limits for DG Systems Applied by Different Entities (Cont’d)

<table>
<thead>
<tr>
<th></th>
<th>Trigger Point for Disconnect</th>
<th>Trip Time</th>
<th>Trigger Point for Disconnect</th>
<th>Trip Time</th>
<th>Trigger Point for Disconnect&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Trip Time&lt;sup&gt;2&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over Voltage Set Point 1</td>
<td>+ 5% of nominal voltage</td>
<td>2 s</td>
<td>+ 5% of nominal voltage</td>
<td>30 s delay; 0.167 s trip</td>
<td>+ 10% of nominal voltage</td>
<td>1 s</td>
</tr>
<tr>
<td>Over Voltage Set Point 2</td>
<td>+ 10% of nominal voltage</td>
<td>0.167 s</td>
<td>+ 10% of nominal voltage</td>
<td>0.167 s delay &amp; trip</td>
<td>+ 20% of nominal voltage</td>
<td>0.16 s</td>
</tr>
<tr>
<td>Under Voltage Set Point 1</td>
<td>- 10% of nominal voltage</td>
<td>2 s</td>
<td>- 10% of nominal voltage</td>
<td>30 s delay; 0.167 s trip</td>
<td>- 12% of nominal voltage</td>
<td>2 s</td>
</tr>
<tr>
<td>Under Voltage Set Point 2</td>
<td>- 30% of nominal voltage</td>
<td>0.167 s</td>
<td>- 30% of nominal voltage</td>
<td>0.167 s delay &amp; trip</td>
<td>- 50% of nominal voltage</td>
<td>0.16 s</td>
</tr>
<tr>
<td>Over Frequency Set Point</td>
<td>+ 0.5 Hz from base frequency</td>
<td>0.25 s</td>
<td>+ 0.5 Hz from base frequency</td>
<td>0.25 s</td>
<td>+ 0.5 Hz from base frequency for DG ≤ 30 kW&lt;sub&gt;ac&lt;/sub&gt;</td>
<td>0.16 s</td>
</tr>
<tr>
<td>Under Frequency Set Point</td>
<td>- 0.7 Hz from base frequency</td>
<td>0.25 s</td>
<td>- 0.7 Hz from base frequency</td>
<td>0.25 s</td>
<td>- 0.2 Hz to 0.3 Hz (adjustable set point) for DG &gt; 30 kW&lt;sub&gt;ac&lt;/sub&gt;</td>
<td>0.16 s to 300 s (adjustable)</td>
</tr>
<tr>
<td>Flicker</td>
<td>Voltage at POI must be less than 3% voltage dip</td>
<td></td>
<td>Voltage at POI must be less than 3% voltage dip</td>
<td></td>
<td>DG shall not create objectionable flicker for other customers on the Area EPS</td>
<td></td>
</tr>
<tr>
<td>Total Harmonic Distortion</td>
<td>&lt; 5.0% of fundamental frequency</td>
<td></td>
<td>&lt; 5.0% of fundamental frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual Harmonic Distortion</td>
<td>&lt; 3.0% of fundamental frequency</td>
<td></td>
<td>&lt; 3.0% of fundamental frequency</td>
<td></td>
<td>&lt; 11th order, 4%; between 11th and 17th, 2%; between 17th and 23rd, 1.5%; between 23rd and 35th, 0.6%; ≤35th, 0.3% (all based on % of current).</td>
<td></td>
</tr>
<tr>
<td>Fault and Line Clearing for Loss of Voltage on any Phase of CPS Energy Circuit</td>
<td>- 30% of nominal voltage</td>
<td>0.167 s</td>
<td>- 30% of nominal voltage</td>
<td>0.167 s</td>
<td>&lt; 0.5% of DG Facility rated output current</td>
<td></td>
</tr>
<tr>
<td>Direct Current Injection</td>
<td>&lt; 0.5% of DG Facility rated output current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

M - Manual
A - Automatic
X - Required feature

1 Required for facilities with stand-alone capability

2 May be required by TDU; selection based on grounding system

3 Required, unless generator is less than DG Owner minimum load, to verify non-export

4 System exporting shall have either redundant or listed devices

5 DG ≤ 30 kW<sub>ac</sub> Maximum clearing times; DG > 30 kW<sub>ac</sub> Default clearing times
2.3. **Emergency Power Systems Over 250 kW<sub>ac</sub>**

Emergency electric generators (backup generators) or auxiliary power supplies owned by Customer shall serve the purpose of providing backup generation to the customer’s load only. Customer's equipment must be wired to prevent the possibility of paralleling operation with CPS Energy’s distribution system. Any parallel operation, including momentary paralleling, must be approved by the CPS Energy DG Section.

2.4. **Non-Paralleling Emergency Electric Generators or Auxiliary Power Supplies**

For non-paralleling emergency electric generators or auxiliary power supplies, the transfer scheme shall operate as a “break before make” during the transfer of the load from normal and emergency power and from emergency to normal power. The transfer scheme shall be interlocked to prevent paralleling during normal, test and maintenance conditions. Customer with non-paralleling emergency electric generators or auxiliary power supplies shall provide to the DG Section the following for review:

2.4.1. **For systems with total capacity (including aggregate) less than 25 kW<sub>ac</sub> in a single parcel of property with single or multiple meters**

- Detailed operational one-line diagram
- Site plan
- Meter loop drawing (elevation view)/ Proposed Equipment Layout
- “Visible” disconnect device or breaker and include the following ratings as applicable: Full Load Rating, Momentary Rating, Interrupting rating
- Show all protective devices and include as applicable size, rating, manufacturer, type, style, model, settings

2.4.2. **For systems with total capacity (including aggregate) greater than or equals to 25 kW<sub>ac</sub> in a single parcel of property with single or multiple meters**

- **Sealed and signed** (Texas P.E.) detailed operational one-line diagram
- **Sealed and signed** (Texas P.E.) site plan
- Meter loop drawing (elevation view) / Proposed Equipment Layout
- “Visible” disconnect device or breaker and include the following ratings as applicable: Full Load Rating, Momentary Rating, Interrupting rating
2.5. Momentarily Paralleling

2.5.1. Less than One Second

For paralleling electric generators or auxiliary power supplies, including customers with emergency electric generators or auxiliary power supplies of 250 kW ac the transfer scheme shall parallel no more than one (1) second with CPS Energy’s distribution system during the transfer of the load from emergency power to normal power. Customers shall provide the DG Section the following for review:

- Transfer scheme control schematics
- Operating logic
- Relay one-line diagrams.
- Interconnect disconnect device
- DG disconnect device
- Synchronizing Check (for facilities with standalone capability)
- Over-voltage trip
- Under-voltage trip
- Over/under frequency trip
- Either a ground over-voltage trip or a ground over-current trip depending on the grounding system, if required by CPS Energy.

If customer’s load is connected to CPS Energy's redundant service, customers shall determine the sequence of events between the normal circuit, redundant circuit, and backup generation as well as time delay for the backup generator. This information shall be included in the transfer scheme control schematic and operation logic.

2.5.2. Greater Than One Second

Customers paralleling longer than one (1) second but not continuously, in addition to the above, a reverse-power or under-power function is required. Customers shall be required to have a function to limit the amount of time to no more than 5 minutes the emergency electric generators or auxiliary power supplies can stay in parallel with CPS Energy.
2.6. Single Phase DG Control, Protection and Safety Equipment

Equipment required for control, protection and safety specific to single phase DG, typically of 50 kW\textsubscript{ac} or less.

- interconnect disconnect device at the POD and at the DG Facility when required
- an over/under voltage trip
- an over/under frequency trip
- adjustable reactive output modification capability
- Synchronizing Check (for facilities with standalone capability)

2.7. Three-Phase DG Control, Protection and Safety Equipment

This section specifies the control, protection, and safety equipment requirements specific to these listed generation systems. Exporting to CPS Energy may require additional operational or protection devices and will require coordination of operations with CPS Energy.

2.7.1. Three-phase Synchronous Generators

- Breakers shall be 3-phase devices with electronic or electromechanical control.
- The DG Owner is solely responsible for properly synchronizing its generator with CPS Energy.
- The excitation system response ratio shall not be less than 0.5.
- The generator's excitation system(s) shall conform, as near as reasonably achievable, to the field voltage versus time criteria specified in the appropriate American National Standards Institute Standard in order to permit adequate field forcing during transient conditions.
- For generating systems greater than 2 MW\textsubscript{ac} the DG Owner shall maintain the Automatic Voltage Regulator (AVR) of each generating unit in service and operable at all times. If the AVR is removed from service for maintenance or repair, CPS Energy's System Operator shall be notified at 210-353-4362.

2.7.2. Three-Phase Induction Generators

Induction generation may be connected and brought up to synchronous speed (as an induction motor) if it can be demonstrated that the initial voltage drop measured on CPS Energy side at the PCC is within the visible flicker stated in Section 3.3.2 of the DG Manual Overview or Table 1. Otherwise, the DG Owner may be
required to install hardware or employ other techniques to bring voltage fluctuations to acceptable levels.

2.7.3. **Line-Commutated Inverters**

Line-commutated inverters do not require synchronizing equipment.

2.7.4. **Self-Commutated Inverters**

Self-commutated inverters whether of interactive or stand-alone type shall be used in parallel with CPS Energy only with synchronizing equipment.

2.7.5. **Protective Function Requirements**

The protective function requirements for 3-phase facilities of different size and technology are listed below.

2.7.5.1. **All DG Installations**

All DG installations shall have:
- Interconnect disconnect device
- DG disconnect device
- Over-voltage trip
- Under-voltage trip
- Over/under frequency trip
- Synchronizing Check (for facilities with standalone capability)

2.7.5.2. **For 25 kW\textsubscript{ac} but no more than 500 kW\textsubscript{ac}**

The installation for these size generators, in addition to the above requirements, shall also have:
- Either a ground over-voltage trip or a ground over-current trip depending on the grounding system if required by CPS Energy;
- Reverse/under power sensing if the Facility is not exporting (the DG is less than the minimum load of the DG Owner’s facilities).

2.7.5.3. **For 500 kW\textsubscript{ac} but no more than 2,000 kW\textsubscript{ac}**

The installation for these size generators, in addition to the above requirements, shall also have:
- Synchronizing Check (for facilities with standalone capability)
- If the Facility is exporting power, the power direction protective function may be used to block or delay the under frequency trip with the agreement of CPS Energy.

2.7.5.4.  **For 2,000 kW\textsubscript{ac} up to 10,000 kW\textsubscript{ac}**

The installation for these size generators, in addition to the above requirements, shall also have:
- Telemetry/transfer trip may also be required by CPS Energy as part of a transfer tripping or blocking protective scheme.

2.7.6.  **Exporting Power**

If the three phase generator is greater than 50 kW\textsubscript{ac} and is exporting power to CPS Energy, the generator power factor must be remotely adjustable from +/- 0.95 and conform to SCADA RTU communication requirements.

*All generation resources shall meet the Electric Reliability Council of Texas (ERCOT) operating guide requirements with wind powered resources or Intermittent Renewable resources meeting the 9 cycle voltage ride through requirements as shown in the figure below:*

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**2.8. System Acceptance and Commissioning**

2.8.1.  **Inspection and Start-up Testing**

2.8.1.1.  **Startup Notice**

For those authorized and approved systems, the DG Owner shall provide CPS Energy with notice at least
two weeks before the initial energizing and start-up testing of the DG Owner's DG equipment and CPS Energy may witness the testing of any equipment and protective systems associated with the installation/interconnection.

For all other unauthorized and unapproved systems, CPS Energy is not responsible for delays in startups or costs associated with denials of the system.

2.8.1.2. For 500 kWac and Greater, before Initial Paralleling Operations

- Operability test of the isolation devices
- Unintentional-islanding functionality test (IEEE 5.4.1) and cease to energize functionality (IEEE 5.4.2) must be passed; open each phase at the POI and system should shut down.
- For design modifications that may affect the safe and reliable operation of the CPS Energy distribution system, the DG Owner shall revise and re-submit the Installation/Interconnection DG Application with information reflecting the modifications.

2.8.1.3. For 500 kWac and Greater, during Start-up Tests on All DGs

Set AC Power Quality monitoring at the POI to verify conformance with the interference table.

2.8.1.4. For 500 kWac and Greater, Provide a Commissioning Report

DG Owner shall submit a summary report containing the test procedures used and the results of the tests within thirty (30) days of testing. The report shall be submitted to the CPS Energy DG Section. Thereafter, DG Owner may be required to retest the system protection elements upon any reasonable request by CPS Energy.

2.8.2. Site Testing and Commissioning

- Testing of protection systems shall include procedures to functionally test all protective elements of the system up to and including tripping of the DG and installation/interconnection point disconnects. All wiring diagrams, material specifications, testing equipment list and setup diagrams, testing procedures, and all other pertinent
information shall be submitted to CPS Energy DG Section for review and approval. All certification verification results shall be provided to CPS Energy DG Section.

- Visual inspection shall be made to ensure grounding coordination requirement of IEEE 1547-2000 section 4.1.2 has been implemented.
- Testing will verify all protective and power quality set points and relay/breaker trip timing. CPS Energy may witness the testing of installed switchgear, protection systems, and DG controls.

2.8.3. Final Setup Information

For DG 500 kW\textsubscript{ac} and over, the DG Owner shall provide a list of set points for all protection equipment and regulation equipment to CPS Energy DG Section at the time of acceptance. This may be a picture, screen shot, printout or other form of verification acceptable to the CPS Energy DG Section.

2.9. Metering

2.9.1. General

Metering design shall be based on CPS Energy Tariff(s), ERCOT Protocol Section 10 (Metering), and any special requirements identified during project review. CPS Energy shall design, supply, own, and maintain all necessary meters and associated equipment. Metering design, equipment, and installation will be at the DG Owner’s expense. ERCOT metered installations will require DG Owner registration as a Resource Entity with ERCOT, and will utilize CPS Energy as the “Qualifying Scheduling Entity” for scheduling the market resource. In general the metering requirements are as follows:

- For DG Facilities up to a 50 kW\textsubscript{ac} designed output, a CPS Energy revenue meter shall be installed at the inverter output, in addition to any premises metering. This is not an ERCOT meter point.
- For DG Facilities greater than 50 kW\textsubscript{ac} and up to the registration threshold, which is presently 1 MW\textsubscript{ac} output (as per ERCOT Protocol Section 10.2.2), metering is required to capture the power delivered to the bulk CPS Energy distribution system for ERCOT reporting as described in ERCOT Protocol 10.2.2. Meter data for settlement is not required to be submitted to ERCOT.
- DG Facilities greater than 1 MW\textsubscript{ac} (the current registration threshold) and less than 10 MW\textsubscript{ac} output, will require a
Transmission and/or Distribution Service Provider (TDSP) ERCOT meter to provide settlement meter data. DG must be registered with ERCOT and CPS Energy must read, validate, edit, and submit meter data to ERCOT. This data must be validated and edited in accordance with the Texas Standard Electronic Transaction (SET) Protocols found on the ERCOT website. At CPS Energy’s discretion, this meter point may be made an ERCOT Polled Settlement (EPS) meter point and ERCOT will directly poll the meter. CPS Energy will supply and maintain an uninterruptible power source (UPS). DG Owner will be responsible for the cost of the UPS.

- All DG Facilities 10 MW_{ac} and greater will be EPS metered. Multiple DG Facilities connected at one meter point with a combined capability of 10 MW_{ac} or greater may require gross real-time MW and MVAR telemetry from each DG Facility.

2.9.2. Meter Location

The DG Owner shall provide CPS Energy a suitable location on its premises for the installation of CPS Energy's meters and associated equipment. Metering shall be located at the POD or as determined in the Application approval process. Typical meter locations are as follows:

- Meter enclosure(s) or meter sockets shall be located adjacent to respective DG switchgear and not attached to or inside switchgear.

- CPS Energy metering instrument transformers located in the DG switchgear shall meet the requirements outlined in the CPS Energy Electric Service Standards. Instrument transformers shall meet CPS Energy requirements for potential and current transformers.

- Meter enclosures associated with Utility pole mounted instrument transformers shall be located adjacent to the Utility pole. Utility pole mounted instrument transformers will be provided and installed by CPS Energy.

2.9.3. Installation

CPS Energy shall supply, specify, own, and maintain all meters and associated equipment to measure energy flow of the DG. The DG Owner shall provide for material, installation and maintenance in accordance with NESC and CPS Energy specification as follows:
• The DG Owner shall install, own, and maintain all conduit raceway(s) required for site installation metering, relaying, and communications.
• The DG Owner shall provide support structure for meter socket or meter enclosure(s), and meter enclosure foundations. Details for these requirements will be on a project by project basis, and will be provided to the DG Owner during the design phase of the project.

2.9.4. *Meter Capability and Telemetry Requirements*

In general all CPS Energy/DG Owner agreements as part of the Application approval process, CPS Energy Tariff(s), and ERCOT Protocol Section 10 shall govern the minimum meter requirements. Specific communication and telemetry requirements are as follows:

• Telemetry to the CPS Energy Generation Management System must be provided for DG Facilities greater than 1 MWac. The DG must be registered with ERCOT as a Resource Entity.
• DG Facilities delivering 250 kWac or more shall have a meter capable of monitoring, real power output, reactive power output and voltage at the POI, POD, or other reasonable location (see IEEE 1547 4.1.6).

2.9.5. *Metering Auxiliary Power and Communication Requirements*

The DG Owner shall provide for communications and auxiliary power requirements identified during the design and review phase of the project. Meter points for DG Facilities 1 MW (or the DG registration threshold, as determined in ERCOT Protocol Section 16.5) and greater will require the following:

• Meter communications will be required at the meter point for remote meter access. An internet connection and dialup telephone service shall be provided at the DG Owner’s expense with termination at the metering equipment metering enclosure. Please note internet access and telephone service may be available as part of CPS Energy’s communication system.
• A single 120 Vac, 20 Amp circuit shall be provided for meter equipment from an uninterruptable power supply (UPS). CPS Energy to supply and maintain the UPS with DG Owner responsible for the cost.

2.10. **SCADA**

CPS Energy shall supply, own, and maintain all RTU (remote terminal unit) and associated equipment to remotely control and/or monitor status and analog
data deemed necessary by CPS Energy. All serially connected devices providing these reads to the RTU must be capable of communicating DNP 3.0 protocol.

The DG Owner shall supply at no cost to CPS Energy the following:

- A mutually agreed upon location on its premises for the installation of CPS Energy's SCADA equipment. Communication equipment will reside with the SCADA equipment and Power Quality equipment in the Cabinet co-located with metering.
- DG Owner to provide adequate general space for the metering, RTU, SCADA, and communications equipment.
- A 120 V ac 20 Amp circuit shall be provided for SCADA equipment from an uninterruptable power supply by the DG Owner.
- An uninterruptible power source. (CPS energy to supply and maintain the UPS with DG Owner responsible for the cost.)
- All communication connections to meters, relays, and other Intelligent Electronic Devices (IEDs) interfacing with CPS Energy SCADA equipment. Any communication connections to SCADA in excess of 50 feet shall be fiber with a fiber to serial transceiver.
- Unrestricted access to all CPS Energy SCADA equipment.
- A drivable surface for accessing the SCADA equipment.

2.11. Monitoring Power Quality

CPS Energy may supply, own, and maintain a permanent power quality monitor on site if deemed necessary. The purpose of the monitor is to ensure compliance with installation/interconnection parameters and to prevent interference with CPS Energy as described in Section 2.2.

- Permanent monitors are integral to the metering, therefore communications are provided by the CPS Energy Metering Department at the site.
- Temporary monitors may be installed at any time by CPS Energy.

CPS Energy shall have the right to disconnect its system from the DG Owner system. CPS Energy will determine the timing and duration of the interruption. CPS Energy will consider reconnecting its system to the DG Owner when CPS Energy has evidence that the electric energy of the DG Owner meets the Installation/Interconnection Terms and Interconnection Requirements. CPS Energy will determine the timing, conditions and details of the reconnection on a case-by-case basis.

2.12. Communication

CPS Energy shall supply, own, and maintain all necessary communication equipment and associated equipment for use of providing communication path to SCADA, Metering, System protection and Power Quality. Communication equipment will reside with the SCADA equipment and Power Quality
equipment in the Cabinet co-located with metering. Cabinet will be provided by CPS Energy Communication Services with DG Owner responsible for the cost. Details for these requirements will be on a project by project basis, and will be provided to the DG Owner during the design phase of the project. CPS Energy Communication Services Department will provide the specification of the fiber optics cable and copper cable.

The DG Owner shall supply at no cost to CPS Energy the following:

- A conduit raceway, fiber optics and/or copper cable from the Data circuit demark to the Meter/Communication/SCADA Cabinet.
- A conduit raceway, fiber optics cable and/or copper cable for communication from the communication equipment to each metering enclosure (this includes CPS Energy meter and DG owned meter), relays, and other IED.
- A duplex 120 V_ac circuit rated no less than 15 Amps for CPS Energy Communication equipment (Typical circuit load < 5 Amp).
- An uninterruptible power source. (CPS energy to supply and maintain the UPS with DG Owner responsible for the cost.)
- A leased Data circuit or other mutually agreed upon communication medium from the DG site to a determined CPS Energy Substation. Communication circuit requirements will be on a project by project basis, and will be provided to the DG Owner during the design phase of the project.
- Foundation/Concrete slab: Details for these requirements will be on a project by project basis, and will be provided to the DG Owner during the design phase of the project.
- A paved road or CPS Energy approved road for drive-up access to and around the Meter/SCADA/Communication Cabinet. Details for these requirements will be on a project by project basis, and will be provided to the DG Owner during the design phase of the project.
- Unrestricted access to all CPS Energy Communication equipment and path. If unrestricted access is not available, DG Owner shall provide contact information and escalation list for 24 hours a day, 7 days a week.

If CPS Energy determines that a leased circuit is required, DG Owner shall lease, at DG Owner’s expense, the leased circuit with any available provider.

2.13. Downtown Network

DG Owner may knowingly or unknowingly propose a DG system that will be connected to one of CPS Energy’s downtown underground network distribution systems. In these cases special consideration and caution must be applied to the installation/interconnection of the DG Facility on the Network System. (See also sections 3 and 4.5 of the “CPS Energy DG Manual Overview” for additional information.) Many of the requirements listed here were developed for non-export systems, e.g., those that do not intentionally
send power to the utility power system across the POCC, such as spot network vaults and areas with little to zero secondary voltage distribution systems. The non-export condition can be met either implicitly by establishing that the DG output capacity is less than the DG Owner’s verifiable minimum load (i.e., meeting the “de minimus” criteria of IEEE Std 1547-2011, or where the DG never generates more than the DG Owner will consume), or explicitly through the use of a reverse power or under power relay (devices that disconnect the DG from the utility if it attempts to export power). DG systems that export power can place additional burden on the distribution system, especially a networked secondary where it exists, but may provide benefits as well for non-networked secondary as determined by CPS Energy. CPS Energy shall study these system requests and all applications that may present a safety or operational hazard, especially within the downtown network system, to the distribution system. The results of the study may be a requirement for more sophisticated protective devices and operating schemes that will be the responsibility of the DG Owner to design, purchase, install, test, and maintain.

In addition to all other requirements stated in this document and unless otherwise directed, all DG Owners shall provide a Texas Engineer Sealed one-line diagram showing the location and placement of the reverse current protection device, trip setting specifications, trip settings, a test report proving the system’s successful operation, and yearly tests will be scheduled for the life of the PV system with those results to be mailed to the DG Section. The yearly tests shall show the unit is operating as intended and will prevent any current from flowing back into the CPS Energy system and will shut the PV system if the PV current reaches a level where it is becoming greater than the incoming CPS Energy current. The DG Owner shall have full responsibility for the design and operation of the PV system. CPS Energy will review the documents provided but only to the extent that the documents are provided. CPS Energy shall not be held liable for deficiencies in the DG Owner’s PV system design or for losses incurred, by the DG Owner, if CPS Energy deems the PV System is impacting the reliability of the CPS Energy System and needs to be deactivated temporarily or permanently.
CPS Energy Downtown Network service boundary subject to change without notice.

1 CPS Energy Downtown Network service boundary subject to change without notice.
2.14. **Phase Over Voltages Additional Design Review**

If the DG is single-phase connected line-to-neutral, it is incapable of contributing to phase-to-neutral over voltages given the over-voltage trip requirements.

If a DG is located on a three-phase four-wire feeder, the DG installation/interconnection should be reviewed to confirm that it will not cause phase over voltages in the event that the feeder is disconnected from the rest of the distribution system. (A DG of sufficient size could provide brief phase-to-neutral over voltages that could damage customer’s equipment on the local distribution system in the event of a system outage.) There are several ways that a DG can be integrated with such a feeder without the potential for causing harmful voltages:

- If the DG is small enough relative to the feeder size (e.g., 10% or less of the feeder peak load), it may not contribute enough voltage support to raise the voltage to hazardous levels.
- If the DG has a way of regulating phase-to-neutral voltage, it can ensure that this will not happen.
- If the DG installation does not comply with one of the options above for limiting voltage overloads, it may require additional study to determine what can be done to mitigate this issue.

3. **Operation and Maintenance**

To help ensure the protection and safety of DG Owner’s and CPS Energy’s personnel and property, the continued provision of electric service to DG Owner, the continued maintenance of an installation/interconnection between DG Owner and CPS Energy, and the reliable functioning of CPS Energy's overall system operations, the following operational and maintenance procedures shall be observed.

3.1. **Operating Authority and Personnel**

- CPS Energy System Operator (SO) will have the ultimate responsibility for carrying out the operating procedures described herein.
- CPS Energy maintains the Energy Management Center (EMC) on a 24-hour basis for the purpose of coordinating the operation of all Transmission, Distribution, and Generation facilities connected to CPS Energy.
- The DG Owner may be required to have an on-site or on-call person that will take operating instructions from the CPS Energy SO any time the DG is on line and generating energy or reactive power on the CPS Energy system.

3.2. **Voice Communication**

DG Owner will provide telephone numbers for normal and emergency situations. These should be listed on the DG application and CPS Energy shall be notified immediately of any changes. DG Owner shall provide and maintain
a telephone in its Facility connected to an outside telephone line independent from DG Owner's internal telephone system (if there is one). This ensures telephone communications should DG Owner's internal switchboard become inoperable.

3.3. Energizing the Connection between CPS Energy and the DG Facility

Only authorized employees of CPS Energy are permitted to make and energize the connections between CPS Energy's system and the DG Owners facilities.

3.4. Emergency Conditions

3.4.1. CPS Energy Emergency

If in CPS Energy's sole judgment, an emergency poses a threat to the area power supply and service interruption and/or generation disconnect may prevent or alleviate the emergency condition, DG Owner may be called upon by CPS Energy’s System Operator to operate necessary switches, breakers, reduce generation, change reactive output, etc. in order to prevent or alleviate an emergency condition.

3.4.2. ERCOT Emergency

CPS Energy is a member of ERCOT and operates its system in accordance with the operating criteria, guidelines, and protocols of ERCOT. As a result, CPS Energy may interrupt service to the DG in the event of an ERCOT declared emergency or as directed by ERCOT Operations.

3.5. DG Owner Operating and Maintenance Responsibility

3.5.1. Equipment Responsibility

DG Owner assumes all responsibility for the electrical system on the DG Owner’s side of the Point of Delivery (POD).

- DG Owner will operate and maintain all wiring and apparatus in such condition and/or manner as not to endanger persons or property, or to cause impairment of CPS Energy's installation/interconnection and service to DG Owner, or any of CPS Energy's customers.

- DG Owner shall inspect and maintain all Facility structures and equipment provided by DG Owner on an industry or manufacturer's recommended basis.

3.5.2. Control and Protective Equipment

The DG Owner is responsible for routine maintenance of any DG control and protective equipment at the POI not owned by CPS.
Energy. If CPS Energy does not do the periodic breaker trip testing
by mutual agreement with the DG Owner, DG Owner will conduct
periodic breaker trip testing and notify CPS Energy in advance of
such testing so that CPS Energy may witness such tests.

3.5.3. Planned Maintenance

If DG Owner schedules a planned maintenance, CPS Energy
requests that the DG Facility shall be taken off-line between the
dates of March 1st to April 30th and October 1st to November 30th of
each year unless otherwise agreed to in writing.

3.5.4. Maintenance and Operational Records

The DG Owner will maintain installation/interconnection and
service equipment records as follows:
- Log of maintenance activities for interconnect equipment.
- Protection functionality and associated battery maintenance
  logs must be maintained (IEEE 1547 5.5).
- Operation log for DG systems greater than 500 kWac. As a
  minimum the log shall include the date, DG time on, and DG
  time off, and MW and MVAR output.
- Facility one-line must be maintained and a correct one-line
diagram of DG Owner’s Facility must be provided to the
CPS Energy EMC SO after any change.
- CPS Energy may review such documents at reasonable
times.

3.5.5. DG Owner Switching Request

The DG Owner shall:
- Make a reasonable attempt to notify CPS Energy System
  Operations at least 48 hours in advance of any scheduled
  switching the DG Owner wishes CPS Energy to execute.
- Follow all switching instructions provided by CPS Energy’s
  System Operator.
- Coordinate operation of its system with CPS Energy to
  ensure that the overall CPS Energy system operation will be
  consistent with ERCOT operating criteria and guidelines to
  the extent applicable to this transaction.

3.5.6. Five Megawatt Power Availability Notice

For a Grid-Tied DG Systems of 5 MWac and greater, DG Owner
shall notify CPS Energy’s Energy Development Department by
email at gencoenergycontrol@cpsenergy.com by 12:00 noon
Central Time on Friday of the on-line availability and, if available,
the hourly projected generation for the next week. If planned availability or projected generation changes during the week, DG Owner shall immediately notify CPS Energy’s Energy Development Department.

3.5.7. Notification of Disruption

DG Owner shall promptly notify CPS Energy's System Operator of all internal system conditions that could affect CPS Energy's distribution system. All communications with the CPS Energy's SO shall reference the DG Owner's Facility two character mnemonic name (if applicable) and applicable equipment numbers as designated by CPS Energy on the approved one-line diagram.

3.5.8. Reasonable Access

- DG Owner shall provide CPS Energy’s authorized representative access to DG Owner's premises at all reasonable hours for the purpose of inspecting CPS Energy's wiring and apparatus, erecting, removing or replacing CPS Energy's facilities at the POI, reading CPS Energy's meters and for all other purposes connected herewith.
- For ERCOT meter equipment failure, Communication equipment failure or SCADA equipment failure. CPS Energy authorized representatives shall have access 24 hrs. a day, 365 days a year.

3.5.9. Correction of Interference

DG Owner shall, repair, replace or disconnect equipment which violates the Prevention of Interference Section 2.2 in a reasonable time.

3.5.9.1. DG Owner Disclosure

If the DG Owner becomes aware of interference, DG Owner will notify CPS Energy as soon as practical and propose a schedule for correcting the interference.

3.5.9.2. CPS Energy Response

CPS Energy will investigate the interference effect on supply of electric service to other customers. Should the equipment interfere with CPS Energy's service to other customers, CPS Energy will notify the DG Owner of disconnect, unless an acceptable agreement is negotiated.
3.5.10. Equipment Compatibility

DG Owner is responsible for providing all Facility equipment in accordance with CPS Energy’s applicable specifications, both initially and from time to time thereafter, whenever changes in the CPS Energy's distribution system (including the distribution system's monitoring and protection devices) requires such changes in the Facility in order to maintain its compatibility with the CPS Energy's distribution system. Prior to the replacement or modification of any equipment, DG Owner shall first notify CPS Energy of the replacement or modification, submit specifications to CPS Energy and obtain CPS Energy's approval of compatibility with CPS Energy's distribution system.

3.5.11. Batteries

DG Owner will visually inspect and conduct periodic maintenance on any Facility batteries as recommended by manufacturer. DG Owner will provide CPS Energy copies of test reports and any corrective action taken.

3.6. CPS Energy Operating and Maintenance Responsibility

3.6.1. CPS Energy SCADA

CPS Energy will operate and maintain any CPS Energy SCADA (Supervisory Control and Data Acquisition) equipment installed at the DG Owner's Facility to communicate with the CPS Energy’s EMC and GENCO (Energy Development Department).

3.6.2. CPS Energy Disconnect Notice

CPS Energy will use reasonable efforts to provide DG Owner with seven calendar days advanced notice of any scheduled switching for distribution lines connecting the DG. CPS Energy shall have the right and authority to disconnect DG at CPS Energy’s reasonable discretion if CPS Energy believes (in each case, as determined in a non-discriminatory manner) that:

- Continued installation/interconnection of the DG Facility with CPS Energy’s electric system creates or contributes (or will create or contribute) to a system emergency on CPS Energy’s electric system.

- The DG Facility is not in compliance with the Installation/Interconnection Terms and Interconnection Requirements, and the non-compliance adversely affects the safety, reliability or power quality of CPS Energy’s electric system.
The DG Owner is in violation any of the DG Installation/Interconnection Terms and Interconnection Requirements.

In non-emergency situations, CPS Energy shall give DG Owner notice of noncompliance including a description of the specific noncompliance condition and allow DG Owner a 45 day cure period to correct the noncompliance prior to disconnecting the DG Facility.

3.6.3. **CPS Energy Disconnect due to Interference**

CPS Energy shall have the right to disconnect its system from the DG Owners system. CPS Energy will determine the timing and duration of the interruption. CPS Energy will consider reconnecting its power system to the DG Owner when CPS Energy has evidence that the electric energy of the DG Owner meets the Standards and Requirements of Section 2.2 - Prevention of Interference and Table 1 - Interference Limits for DG Systems Applied by Difference Entities. CPS Energy will determine the timing, conditions and details of the reconnection on a case-by-case basis.

3.6.4. **Annual Maintenance Outage**

CPS Energy performs periodic maintenance on its equipment. Such maintenance on CPS Energy equipment at the POD or any of the Installation/Interconnection Facilities may require scheduling approximately an eight hour outage annually during normal working hours. Such outage of DG Owner's equipment will typically be coordinated to coincide with DG Owner’s annual maintenance schedule. The DG Owner’s maintenance schedule shall be on file in the CPS Energy System Operator’s office and must be updated at least annually. Any changes to such schedule shall be reviewed and approved by CPS Energy.

CPS Energy shall inspect the following devices, instruments, and systems (if installed):

- Revenue metering equipment owned by CPS Energy - This equipment shall be inspected on a reasonable basis, but not more often than every two months. CPS Energy will maintain and replace this equipment as necessary.
- CPS Energy owned metering instrument transformers and associated equipment - A power outage to DG Owner's equipment is required for the maintenance of the revenue metering or control instrument transformers at the POI.
- All SCADA and Communication equipment at the POI - CPS Energy will maintain this equipment as necessary and must have access to this equipment 24 hours a day 7 days a week.
• Protective relays as specified on CPS Energy's relay test sheets - CPS Energy will set and maintain these relays as necessary. This will include out-of-case testing. Breaker trip testing will be performed at the same time if CPS Energy and the DG Owner agree. CPS Energy will provide DG Owner copies of the results of the annual relay tests upon request and notify DG Owner of any protective relay equipment requiring repair or replacement.

• All communication equipment used with distribution line protective relaying including periodic performance testing - DG Owner will be notified of any problems or irregularities found.

3.7. **Switching Guidelines**

Switching of CPS Energy equipment is required at times for equipment outages to allow both CPS Energy and DG Owner to perform maintenance and construction. CPS Energy and DG Owner activities should be coordinated whenever possible to reduce switching requirements. DG Owner and CPS Energy shall abide by each other's isolation procedures, including but not limited to abiding by the intent of isolation tags, locks or written notices of both parties. To facilitate this process, the following requirements have been included for guidance:

• **Planned Outages.** When switching CPS Energy equipment is desired for maintenance or operation of DG Owner's system, DG Owner shall contact CPS Energy's System Operator at (210) 353-4962 and selecting option 4 during CPS Energy's regular business hours at least 48 hours in advance, but not later than 2:00 P.M. Central Time on the day preceding such planned switching and explain the nature of the request. If CPS Energy's System Operator approves the switching, DG Owner must notify CPS Energy's System Operator at the scheduled time immediately prior to proceeding with the planned switching.

• **Equipment Failure.** In addition to outages for scheduled maintenance by DG Owner or CPS Energy, switching may be required at the POI or POD as a result of defective equipment being found, failed equipment and emergency situations. In these situations, both CPS Energy and DG Owner agree to provide any required switching as promptly as reasonably possible.

• To remove a transformer from service, all loads should be removed first.

• To remove line equipment from service, switching at remote CPS Energy or other customer facilities is required. DG Owner must request an outage as previously described. CPS Energy will provide all switching on the CPS Energy side of the POD.
3.8. **Equipment Identification**

CPS Energy may display and mount signs, stickers, drawings, telephone numbers, and instructions pertaining to the scheduled maintenance or emergency operation of DG Owner’s system on outside equipment and inside.

3.9. **Clearance Procedures**

It is CPS Energy's practice that DG Owner must obtain clearance from CPS Energy SO for any maintenance activities requiring the outage of CPS Energy's distribution lines at the POI or POD in accordance with Section 3.7. When an outage of distribution line apparatus is desired, the following procedure for securing a clearance will apply:

- A clearance request is made to CPS Energy's System Operator in accordance with Section 3.7. CPS Energy's SO shall give switching instructions to CPS Energy personnel to accomplish switching at DG Owner's Facility and contact any other CPS Energy operators or crews necessary to accomplish switching at remote terminals.
- DG Owner and/or CPS Energy personnel shall place safety or "hold" tag on switches when they are opened. Tagging of equipment remote from DG Owner's system shall be done by CPS Energy personnel.
- CPS Energy’s SO shall give the clearance in the name of the party requesting it. CPS Energy will use designated CPS Energy personnel to check that the procedures of the clearance are completed by the DG Owner prior to final approval. In the event more than one crew is working on a line, each crew shall secure clearance. CPS Energy is responsible for placing grounds on CPS Energy’s equipment.
- When a switch in DG Owner's system is tagged mutually by DG Owner and CPS Energy personnel, the first operator desiring to remove his tag shall notify CPS Energy's SO that he is removing his tag and that there is still a tag on the switch. Neither CPS Energy nor DG Owner shall operate the switch until the operator whose tag is still on the switch has notified CPS Energy's SO that he is removing his tag.
- Release of all clearances and removal of all grounds are required before "hold" tags are removed and any switches closed. "Hold" tags are removed only after the clearance is released by the individual who secured the clearance and switching instructions are received from CPS Energy's SO.

3.10. **Grounding Procedures**

- CPS Energy shall place safety grounds on CPS Energy equipment when required for maintenance procedures.
- All grounding on the DG Owner’s side will be performed by the DG Owner’s personnel.
• The operator providing maintenance is responsible for placing safety grounds around the equipment to be maintained.

• No safety grounds should be placed where a switching device could be opened, removing the protection of a safety ground(s).

• The number and locations of all grounds should be provided to CPS Energy's SO.

• All grounds must be removed before "hold" tags are removed from switches.

3.11. **Fault Initiated Outages**

After automatic tripping of the DG Owner due to an interruption of CPS Energy service at the POI or POD (due to a fault or other system disturbance);

• DG Owner shall notify CPS Energy's SO.

• Important to report as soon as possible;
  o Present position of circuit breakers or switches (open or closed)
  o Time of outage
  o Any information which might be helpful in determining the cause of the outage

• Report as soon as the information is available;
  o Indication flags of any relays which initiate trips to the CPS Energy circuit breaker at the POI or POD (if applicable). DG Owner shall make a notation of the relay flags and will not reset flags without permission from CPS Energy's SO. CPS Energy reserves the right to reset relay flags.
  o Circuit breaker operations counter reading on CPS Energy circuit breaker at the POI or POD (if applicable).

3.12. **DG Owner Operations**

3.12.1. **Forced Outages**

As soon as practical, DG Owner shall notify CPS Energy of any potential problems or of any forced outages and the expected duration thereof.

3.12.2. **DG Owner Reconnect Notice**

In the event DG Owner's system is isolated from the CPS Energy's system, DG Owner shall notify CPS Energy's SO before attempting to resynchronize with CPS Energy's system.
3.12.3. Operations Log Request Timing

Any records maintained or accessible to the DG Owner concerning an operating log with records of real and reactive power production, changes in operating status, scheduled and forced outages, and any unusual conditions found during any inspections shall be provided to CPS Energy upon request within thirty (30) days of CPS Energy's request.

3.12.4. Voltage Regulator Failure

In the event a generating unit's voltage regulator is out of service, DG Owner shall immediately notify CPS Energy's SO.

3.13. DG Owner's Operational Reactive Support Responsibility

If CPS Energy studies determine DG Owner should be operated to support the distribution system voltage by regulating volt-amps reactive output, this regulation shall be accomplished in accordance with the following:

- CPS Energy shall be responsible for monitoring overall system conditions and DG Owner shall take such corrective action as CPS Energy may require.
- DG Owner shall maintain the distribution voltage level provided by CPS Energy up to the reactive levels stated by the CPS Energy.
- If the DG Owner is categorized by ERCOT as subject to ERCOT reactive supply requirements, CPS Energy shall require the DG Owner to meet the minimum requirements for reactive VAR support as outlined in the ERCOT reactive support requirements for all connected generators.
- DG Owner must submit all reactive support tests as required by the ERCOT compliance templates to the CPS Energy EMC for submission to ERCOT.
- The DG Owner’s voltage regulators must have characteristics acceptable to CPS Energy and must be in service at all times.

3.14. Speed Governor Maintenance and Notification (if applicable)

- DG Owner shall maintain its speed governor settings as required by CPS Energy.
- Yearly testing must be done and the test results submitted to the CPS Energy DG Section.
- DG Owner shall maintain its speed governor in service (if applicable) when operating synchronous to CPS Energy unless blocked due to a temporary operating problem.
- DG Owner shall immediately notify CPS Energy's System Operator when blocked.
3.15. Amendments

These Installation/Interconnection Requirements may be amended from time to time by CPS Energy to account for significant modifications in the manner in which DG Owner is connected to CPS Energy's system or to reflect subsequent changes in CPS Energy's Rate Structure for Electric Service approved by the San Antonio City Council. Notice of such amendment(s) will be communicated to DG Owner.
Appendix B

Feasibility Study Fees and Installation/Interconnection Study Fees
FEASIBILITY STUDY FEES AND INSTALLATION/INTERCONNECTION STUDY FEES

Feasibility Study Fees
Should a potential DG Owner desire a site feasibility study or studies from CPS Energy, the form in Appendix C (“Application for Feasibility Study for Distributed Generation”) must be filled out and returned with the non-refundable fee. An application and fee must be submitted for each site requested. (If the project progresses to the Installation/Interconnection Request below, this fee will be deducted from the fees below.) The current fees are as follows (Fees subject to change without notification):

<table>
<thead>
<tr>
<th>DG Size Bracket</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kW_{ac} to less than 50 kW_{ac}</td>
<td>$0</td>
</tr>
<tr>
<td>50 kW_{ac} to less than 1 MW_{ac}</td>
<td>$450</td>
</tr>
<tr>
<td>1 MW_{ac} to less than 5 MW_{ac}</td>
<td>$750</td>
</tr>
<tr>
<td>5 MW_{ac} to less than 10 MW_{ac}</td>
<td>$1,951</td>
</tr>
</tbody>
</table>

Installation/Interconnection Study Fees
Distribution System
In advance of an installation/interconnection, the DG Owner must contact CPS Energy and complete the “Application for Installation/Interconnection of Distributed Generation” (see Appendix D). A separate form and application fee must be submitted for each DG Facility and each location. The current fees are as follows for a DG planned to be connected to the CPS Energy radial distribution system (Fees subject to change without notification):

<table>
<thead>
<tr>
<th>DG Size Bracket</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kW_{ac} to less than 50 kW_{ac}</td>
<td>$0</td>
</tr>
<tr>
<td>50 kW_{ac} to less than 500 kW_{ac}</td>
<td>$6,303</td>
</tr>
<tr>
<td>500 kW_{ac} to less than 1 MW_{ac}</td>
<td>$19,059</td>
</tr>
<tr>
<td>1 MW_{ac} to less than 5 MW_{ac}</td>
<td>$38,118</td>
</tr>
<tr>
<td>5 MW_{ac} to less than 10 MW_{ac}</td>
<td>$63,480</td>
</tr>
</tbody>
</table>

2 For any change to system size after fees have been processed by CPS Energy, a percentage of the original fee will be invoiced to the DG Owner. Refer to DG Manual Overview, Section 4.4.2 for further explanation.
Downtown Network Distribution System

In advance of an installation/interconnection, the DG Owner must contact CPS Energy and complete the “Application for Installation/Interconnection of Distributed Generation” (see Appendix D). A separate form and application fee must be submitted for each DG Facility and each location. The current fees are as follows for a DG planned to be connected to the CPS Energy network distribution system (Fees subject to change without notification):

<table>
<thead>
<tr>
<th>DG Size Bracket</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kW_{ac} to less than 25 kW_{ac}</td>
<td>$0</td>
</tr>
<tr>
<td>25 kW_{ac} to less than 50 kW_{ac}</td>
<td>$600</td>
</tr>
<tr>
<td>50 kW_{ac} to less than 500 kW_{ac}</td>
<td>$7,654</td>
</tr>
<tr>
<td>500 kW_{ac} to less than 1 MW_{ac}</td>
<td>$20,410</td>
</tr>
<tr>
<td>1 MW_{ac} to less than 5 MW_{ac}</td>
<td>$42,020</td>
</tr>
<tr>
<td>5 MW_{ac} to less than 10 MW_{ac}</td>
<td>$69,933</td>
</tr>
</tbody>
</table>

Back-Up Generators (Commercial and Industrial Installations Only)

Should a potential DG Owner desire to install (a) back-up generator(s) at the site, fees must be submitted for back-up generators. Fees apply to total kW_{ac} per site for commercial and industrial installations. The current fees are as follows (Fees subject to change without notification):

<table>
<thead>
<tr>
<th>DG Size Bracket</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kW_{ac} to less than 50 kW_{ac}</td>
<td>$0</td>
</tr>
<tr>
<td>50 kW_{ac} to less than 1 MW_{ac}</td>
<td>$300</td>
</tr>
<tr>
<td>1 MW_{ac} to less than 5 MW_{ac}</td>
<td>$525</td>
</tr>
<tr>
<td>5 MW_{ac} to less than 10 MW_{ac}</td>
<td>$1,275</td>
</tr>
</tbody>
</table>
Appendix C

Application for Feasibility Study of DG
APPLICATION FOR FEASIBILITY STUDY OF
DISTRIBUTED GENERATION
(One application per site)

DG OWNER
Name of Project: __________________________________ Date: ________________________________
DG Site Address (include zip code): ______________________________________________________
DG Owner’s Name: _________________________________________________________________
DG Owner’s Address: _________________________________________________________________
DG Owner’s Phone Number(s): __________________________________________________________
DG Owner’s Email: ___________________________________________________________________
DG Owner’s Signature (required): _______________________________________________________

DG
Size of proposed system (in ac power): _________________________________________________
Type (Solar, Generator, Wind, etc.): ___________________________________________________
Do you plan to export power: ☐ Yes  ☐ No
If yes, maximum amount expected (in AC power): ______________________________________
Expected Start-up Date: _______________________________________________________________

Submit the following in PDF format only:
➢ Site Plan (with nearest adjacent intersecting streets) to DG@cpsenergy.com.

If additional information would be beneficial for this study, please attach on separate sheet(s). Please
note there will be a Non-Refundable charge\(^3\) for each application based on the size of the system as
follows (Fees subject to change without notification).

Refer to Appendix B for Feasibility Study Fees - DG size bracket & fee.

Make checks payable to CPS Energy and send to:

CPS Energy
DISTRIBUTED GENERATION Section
10th Floor - Navarro MD#111007
145 Navarro St. 
San Antonio, TX  78205

\(^3\) If the project proceeds to our Installation/Interconnection Study phase, this fee will be deducted from construction costs.
Appendix D

Application for Installation/Interconnection of DG
APPLICATION FOR INSTALLATION/INTERCONNECTION OF DISTRIBUTED GENERATION (DG Application)

Must be completed for any size or type of DG

1. **All DG Owners must complete this Section regardless of size or type**

   DG Owner’s Name(s): ____________________________________________________________

   DG Owner’s Mailing Address (including zip code): _________________________________

   DG Site Address (include zip code): _____________________________________________

   DG Owner’s Email Address: _____________________________________________________

   Account Number (if applicable): ________________________________________________

   Telephone (normal): ___________ (emergency): ________________________________

   Information Prepared and Submitted By:

   Name: ________________________________

   Address: ________________________________

   Contact Number (24hrs. / 7days a wk.): ________________________________

   Email: ________________________________

   Signature (required): __________________ Date: __________________

   Name of DG Owner or DG Owner’s designated representative who can be contacted by CPS Energy at any time throughout ownership of DG system in case of emergency or important issues concerning the DG System.

   | DG Owner or DG Owner’s designated representative (if not same as above): |
   | Contact Number (24hrs. / 7days a wk.): |
   | Email: |
   | Installer/Contractor (if not same as above): |
   | Contact Number (24hrs. / 7days a wk.): |
   | Email: |
The following information shall be supplied by the DG Owner or DG Owner’s designated representative and/or contractor. All applicable items must be accurately completed in order that the DG Owner’s generating facilities may be effectively evaluated by CPS ENERGY for installation/interconnection.

**Is this DG System an upgrade to the existing DG System installed?** □ Yes □ No

Number of units/Configuration of modules: ________________________________

Module manufacturer: ________________________________

Type (Synchronous, Induction, Backup or Inverter): ________________________________

Fuel Source Type (Solar, Natural Gas, Wind, etc.): ________________________________

Kilowatt rating for this installation (95° F): ________________________________ kW_{ac}

Kilowatt rating for existing installation (95° F) (if applicable): ________________________________ kW_{ac}

Total aggregated Kilowatt Rating for DG installation (95° F): ________________________________ kW_{ac}

Kilovolt-Ampere Rating (95° F): ________________________________ kVA_{ac}  Power Factor: ________________________________

Voltage Rating: ________________________________ V_{ac}  Amperage Rating: ________________________________ A_{ac}

Frequency: ________________________________ Hz  Number of Phases: ________________________________

If DG is a Grid-Tied system, amount expected to be exported to grid: ________________________________ kW_{ac}

**Instructions:**

For **DG Systems with total capacity (including aggregate) less than 25 kW_{ac} in a single parcel of property with single or multiple meters**, complete section 2 and initial, sign, and date the last page of the application.

For **DG Systems with total capacity (including aggregate) of 25 kW_{ac} and greater in a single parcel of property with single or multiple meters, or DG Systems of any size within the Downtown Network Area**, complete sections 3 to 6 and initial, sign, and date the last page of the application.

2. **DG Systems with Total Capacity (Including Aggregate) Less Than 25 kW_{ac} in a Single Parcel of Property with Single or Multiple Meters**
   - Submit the following information:
   - Detailed operational one-line diagram
   - Site plan
• Meter loop drawing (elevation view)/ Proposed Equipment Layout
• “Visible” disconnect device or breaker and include the following ratings as applicable: Full Load Rating, Momentary Rating, Interrupting rating
• Show all protective devices and include as applicable size, rating, manufacturer, type, style, model, settings

**Note:** All drawings to scale – email in PDF format to cpsesolar@cpsenergy.com

Expected Start-up Date: __________________________

Please describe the Normal Operation of Installation/Interconnection, provide operating procedure: (examples: provide power to meet base load, demand management, standby, back-up, other)

Also, will the DG parallel continuously with CPS Energy? If only paralleling momentarily, for how long?

If the type is not an Inverter, provide RMS Symmetrical Short Circuit Current and X/R Ratio at Rated Voltage at point of common coupling for:

Line-to Ground Fault: ___________________________ X/R: ___________________________

3-Phase Fault: ___________________________ X/R: ___________________________

**Wiring Configuration**

<table>
<thead>
<tr>
<th>Single or 3-Phase Winding Configuration (Choose One)</th>
<th>Neutral Grounding System Used: (Choose One)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ 3 Wire Delta</td>
<td>□ Ungrounded</td>
</tr>
<tr>
<td>□ 3 Wire Wye</td>
<td>□ Solidly Grounded</td>
</tr>
<tr>
<td>□ 4 Wire Wye</td>
<td>□ Ground Resistor = ________ Ohms</td>
</tr>
<tr>
<td>□ Single Phase 2 wire</td>
<td>Provide Grounding Transformer Data as well if applicable</td>
</tr>
<tr>
<td>□ Single Phase 3 wire</td>
<td></td>
</tr>
</tbody>
</table>

Ground Resistor = ________ Ohms
STOP: For DG systems less than 25kW, proceed to Section 6 of the application. For all other systems equal to/greater than 25kW, proceed to Section 3.

3. **DG Systems with Total Capacity (Including Aggregate) of 25 kW\(_{ac}\) and Greater in a Single Parcel of Property with Single or Multiple Meters, or DG Systems of any Size within the Downtown Network Area.**

Submit the following information:

- **Sealed and signed** (Texas P.E.) detailed operational one-line diagram
- **Sealed and signed** (Texas P.E.) site plan
- Meter loop drawing (elevation view) / Proposed Equipment Layout
- Provide a certificate of insurance showing satisfactory liability insurance including contractual liability insurance covering indemnity obligations for DG Systems greater than 50kW\(_{ac}\).
- For installations using discrete relays, provide a relay one-line diagram and indicate the location and ratings of all instrument transformers
- “Visible” disconnect device or breaker and include the following ratings as applicable: Full Load Rating, Momentary Rating, Interrupting rating
- Show all protective devices and include as applicable size, rating, manufacturer, type, style, model, settings

**Note:** All sheet drawings to scale – send in PDF format to DG@cpsenergy.com.

Expected Start-up Date: ________________________________

Please describe the Normal Operation of Installation/Interconnection, provide operating procedure: (examples: provide power to meet base load, demand management, standby, back-up, other)

Also, will the DG parallel continuously with CPS Energy? If only paralleling momentarily, for how long?

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

4. **Supplemental Information**
For installations that connect through an inverter, please provide the following information:

Inverter Manufacturer (Name): ________________________________

Inverter Model (Name/Number): ________________________________

Inverter Software Version (Number): ____________________________

If this System’s control and/or protective functions are dependent on a “software” program supplied by the manufacturer of the equipment, please provide the version or release number for the software that will be used: ________________________________

For non-inverter installations that plan to parallel continuously, please provide the following information for each generator:

Manufacturer: ______________________________________________

Type: ______________________________________________________

Kilowatt Rating: ____________________________ kW_{ac}

Kilovolt-Ampere Rating: ______________________ kVA_{ac}

Power Factor: _____________________________________________

R.P.M.: ________________________________________________

Operating Voltage: ________________ V_{ac} Output Ampere: ________________ A_{ac}

Frequency: __________________ No. of Phases: __________________

Field Amps: ___________________ Field Volts: __________________

Motoring Power: __________________________________________

Serial Number: ___________________________________________
Provide RMS Symmetrical Short Circuit Current and X/R Ratio at Rated Voltage at point of common coupling for:

Line-to Ground Fault: _________________________  X/R: _________________________

3-Phase Fault: _________________________  X/R: _________________________

**Wiring Configuration**

<table>
<thead>
<tr>
<th>Single or 3-Phase Winding Configuration</th>
<th>Neutral Grounding System Used: (Choose One)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ 3 Wire Delta</td>
<td>□ Ungrounded</td>
</tr>
<tr>
<td>□ 3 Wire Wye</td>
<td>□ Solidly Grounded</td>
</tr>
<tr>
<td>□ 4 Wire Wye</td>
<td>□ Ground Resistor = ______ Ohms</td>
</tr>
<tr>
<td>□ Single Phase 2 wire</td>
<td>Provide Grounding Transformer Data as well, if applicable</td>
</tr>
<tr>
<td>□ Single Phase 3 wire</td>
<td></td>
</tr>
</tbody>
</table>

**For Synchronous Generators Only:**

Synchronous Reactance: _________________________ % on _________________________ base

Transient Reactance: _________________________ % on _________________________ base

Sub-transient Reactance: _________________________ % on _________________________ base

Negative Sequence Reactance: _________________________ % on _________________________ base

Zero Sequence Reactance: _________________________ % on _________________________ base

**For Induction Generators Only:**

Locked Rotor Current: _________________________ Amps

-OR-

Stator Resistance: _________________________ Amps

Stator Leakage Reactance: _________________________ %

Rotor Resistance: _________________________ %

Rotor Leakage Reactance: _________________________ %

Short Circuit Current Produced by Generator: _________ Amps
For Generators that are Started as a “Motor” Only:

In-Rush Current: ____________________________Amps

Host DG Owner’s Service Entrance Panel (Main Panel) Continuous Current Rating: _____ Amps

For DG Owners supplying an interconnecting transformer, please provide the following:

Transformer Connection and Grounding Information

Load Loss_____________________________W

Percent Impedance:_____________________%

Base kVA:_____________________________kVA

Voltage Ratings:_________________________V

Tap Ratings: __________________________

5. CPS Energy DG Installation/Interconnection Settings Form

Instructions to DG Owner: A list of CPS Energy installation/interconnection protection requirements for voltage and frequency are given below. Please fill in the project name and requested information in Columns A and B, and the anti-islanding features in Section 3. This form needs to be signed by the DG Owner.

Note: If the DG system cannot be set to meet the listed requirement, fill in the closest available value (or fixed value) so that CPS Energy can evaluate the settings.

DG Project Name: __________________________________________________________

Refer to Installation/interconnection Requirements Section 2.2.4 Table 1 for the lists of key electrical parameters including voltage, frequency, flicker, harmonics, and their acceptable limits on the CPS Energy System.
## Prevention of Interference for DG Systems Less than 250 kW_{ac}

### Voltage

<table>
<thead>
<tr>
<th>CPS Energy Requirement Descriptor</th>
<th>CPS Energy Requirement</th>
<th>Column A: Setting Name</th>
<th>Column B: Setting Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over Voltage Regulation Set point #1</td>
<td>≤ +10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over Voltage Time Delay #1</td>
<td>≤ 1 sec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under Voltage Regulation Set point #1</td>
<td>≤ -12%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under Voltage Time Delay #1</td>
<td>≤ 2 sec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over Voltage Regulation Set point #2</td>
<td>≤ +20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over Voltage Time Delay #2</td>
<td>≤ 0.16 sec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under Voltage Regulation Set point #2</td>
<td>≤ -50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under Voltage Time Delay #2</td>
<td>≤ 0.16 sec</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Frequency

<table>
<thead>
<tr>
<th>CPS Energy Requirement Descriptor</th>
<th>CPS Energy Requirement</th>
<th>Column A: Setting Name</th>
<th>Column B: Setting Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over Frequency Set point</td>
<td>≤ +0.5 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over Frequency Time Delay</td>
<td>≤ 0.16 sec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under Frequency Set point</td>
<td>≤ -0.7 Hz for DG ≤30 kW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.2 Hz to -3 Hz (adjustable) for DG &gt;30 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤-3 Hz for DG &gt;30 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under Frequency Time Delay</td>
<td>0.16 s for DG ≤30 kW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.16 s to 300 s (adjustable) for DG &gt;30 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.16 s for DG &gt;30 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Above set points are based on a nominal frequency of 60 Hz.
## Prevention of Interference for DG Systems 250 kW_{ac} or Greater

### Voltage

<table>
<thead>
<tr>
<th>CPS Energy Requirement Descriptor</th>
<th>CPS Energy Requirement</th>
<th>Column A: Setting Name</th>
<th>Column B: Setting Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over Voltage Regulation Set point #1</td>
<td>( \leq +5% )</td>
<td></td>
<td>( _________% )</td>
</tr>
<tr>
<td>Over Voltage Time Delay #1</td>
<td>( \leq 2 \text{ sec} )</td>
<td></td>
<td>( _________\text{sec} )</td>
</tr>
<tr>
<td>Under Voltage Regulation Set point #1</td>
<td>( \leq -10% )</td>
<td></td>
<td>( _________% )</td>
</tr>
<tr>
<td>Under Voltage Time Delay #1</td>
<td>( \leq 2 \text{ sec} )</td>
<td></td>
<td>( _________\text{sec} )</td>
</tr>
<tr>
<td>Over Voltage Regulation Set point #2</td>
<td>( \leq +10% )</td>
<td></td>
<td>( _________% )</td>
</tr>
<tr>
<td>Over Voltage Time Delay #2</td>
<td>( \leq 0.167 \text{ sec} )</td>
<td></td>
<td>( _________\text{sec} )</td>
</tr>
<tr>
<td>Under Voltage Regulation Set point #2</td>
<td>( \leq -30% )</td>
<td></td>
<td>( _________% )</td>
</tr>
<tr>
<td>Under Voltage Time Delay #2</td>
<td>( \leq 0.167 \text{ sec} )</td>
<td></td>
<td>( _________\text{sec} )</td>
</tr>
</tbody>
</table>

### Frequency

<table>
<thead>
<tr>
<th>CPS Energy Requirement Descriptor</th>
<th>CPS Energy Requirement</th>
<th>Column A: Setting Name</th>
<th>Column B: Setting Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over Frequency Set point</td>
<td>( \leq +0.5 \text{ Hz} )</td>
<td></td>
<td>( _________\text{Hz} )</td>
</tr>
<tr>
<td>Over Frequency Time Delay</td>
<td>( \leq 0.25 \text{ sec} )</td>
<td></td>
<td>( _________\text{sec} )</td>
</tr>
<tr>
<td>Under Frequency Set point</td>
<td>( \leq -0.7 \text{ Hz} )</td>
<td></td>
<td>( _________\text{Hz} )</td>
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<tr>
<td>Under Frequency Time Delay</td>
<td>( \leq 0.25 \text{ sec} )</td>
<td></td>
<td>( _________\text{sec} )</td>
</tr>
</tbody>
</table>

**Note:** Above set points are based on a nominal frequency of 60 Hz.
6. Anti-Islanding Protection

CPS Energy Instructions: Please describe in detail the anti-islanding protection scheme, as well as, the worst-case time delay for shutting down the DG system. Indicate how long it takes the DG system to disconnect from the grid. Anti-islanding sensing must meet the NEC, IEEE 1547-2005, and UL 1741.

DG Owner Response:__________________________________________________________

__________________________________________________________

__________________________________________________________

Specify the type of DG system you are applying for below:

I am applying for a DG Systems with total capacity (including aggregate) of less than ______ 25 kW_{ac} in a single parcel of property with single or multiple meters

I am applying for a DG Systems with total capacity (including aggregate) of 25 kW_{ac} or greater in a single parcel of property with single or multiple meters

Is the DG system on the Downtown Distribution Network system? □ Yes □ No

CPS Energy internal use only

CPS Energy Reviewer Comments:
By executing this Application, the DG Owner, or its authorized representative, certifies that the information in the Application is true and accurate and DG Owner certifies that they have read, understand and agree to comply with all CPS Energy terms and conditions as stated or incorporated in the current DG Manual, including the Installation/Interconnection Requirements and the Installation/Interconnection Terms, applicable CPS Energy Rates and Riders, Rules and Regulations and Service Standards, which shall prevail over any inconsistent provisions in any form or acknowledgement submitted by the DG Owner. Any additional terms or different terms proposed by DG Owner are rejected unless expressly agreed to in writing by CPS Energy.

DG Owner or authorized representative printed name, Title/Position:

_____________________________________________________

Signature: ____________________________ Date: ______________________________
Appendix E

DISTRIBUTED GENERATION
Installation/Interconnection Terms
1. **Scope of Terms.** These “Terms” set forth the conditions under which the DG Owner and CPS Energy agree that a DG Facility, eligible for installation/interconnection to CPS Energy's System, may be installed/interconnected to CPS Energy’s System, in accordance with the “Terms” found herein and the Installation/Interconnection Requirements for Distributed Generation.

   (“Installation/Interconnection Requirements”) found on the [www.cpsenergy.com](http://www.cpsenergy.com) website. Any energy supplied by CPS Energy and purchased by DG Owner shall be in accordance with the terms of CPS Energy’s Rules and Regulations for Electric and Gas Service (“Rules and Regulations”), CPS Energy's applicable Rate Schedules (“Rates”), the Installation/Interconnection Requirements and the Terms.

2. **Installation/Interconnection of DG Facility**

   DG Owner or its contractor shall design and install the DG Facility, as necessary for the installation/interconnection of DG Owner’s DG Facility to CPS Energy’s System at the Point of Interconnection as located and described in the Installation/Interconnection Requirements for Distributed Generation. The Point of Interconnection (POI) is defined as the point where the DG Facility is electrically connected, either directly to the CPS Energy System or directly to the load-side (metered) of DG Owner-owned equipment, for the applicable DG Facility. DG Owner will own, operate, maintain and be responsible for the DG Facility, and for the costs of any other protective facilities which, in CPS Energy’s commercially reasonable opinion, are required or prudent in order to protect CPS Energy’s System from disruption or damage caused by the DG Facility. The Installation/interconnection Facilities shall measure both the energy produced by the DG Facility and any energy provided by CPS Energy for DG Owner’s use at the DG Site. The “Installation/Interconnection Facilities” are defined as all facilities required by CPS Energy as a result of installation/interconnection to the DG to allow the safe, reliable installation/interconnection and operation of the DG. CPS Energy will design the Installation/Interconnection Facilities such that the Installation/Interconnection Facilities are sufficient to enable DG Owner to supply electric energy across the Point of Interconnection and Point of Delivery to CPS Energy's System. The Point of Delivery/Point of Demarcation (POD) is defined as the point where the electric energy first leaves the conductors or devices owned by CPS Energy, and enters the service-entrance, other conductors or devices owned by the DG Owner. DG Owner agrees to promptly provide information and engineering drawings requested by CPS Energy to assist in the design and installation of the Interconnection Facilities. Any electrical energy to be supplied by CPS Energy shall be delivered to DG Owner at the Point of Delivery in the manner described within the Installation/Interconnection Requirements.
3. **Inspection of DG Facility**

Prior to connection of the DG Facility to the Installation/Interconnection Facilities, CPS Energy may send a representative to the DG Site to inspect and perform acceptance tests on the DG Facility to determine if the DG Facility complies with the Installation/Interconnection Requirements and that all metering, telemetry, communications equipment, etc., associated with the Point of Interconnection is properly functioning and receiving and transmitting accurate information. DG Owner shall not commence operation of the DG Facility until written approval has been given by CPS Energy.

CPS Energy shall notify DG Owner as to whether or not approval is granted within ten (10) working days from CPS Energy’s inspection of the DG Facility. In the event the DG Facility does not comply, CPS Energy shall promptly notify DG Owner in writing, specifying with reasonable specificity the reason(s) for rejection of approval, and shall provide DG Owner a reasonable period of time to bring the DG Facility into compliance. CPS Energy shall have reasonable access to the DG Site at all times and shall provide advance notice to DG Owner of the need for CPS Energy presence at the DG Site, except that no advance notice is necessary in the case of an emergency, or if necessary to meet CPS Energy’s legal obligation to provide service to CPS Energy’s Customers.

4. **Charges for Installation/Interconnection Facilities**

Following approval of the Application and prior to commencement of construction of the Installation/Interconnection Facilities, CPS Energy shall invoice DG Owner for the estimated cost, if any, for the work which is required to interconnect the DG Facility to CPS Energy’s System in accordance with the Installation/Interconnection Requirements (“Installation/Interconnection Costs”). DG Owner shall pay CPS Energy the Installation/Interconnection Costs within thirty (30) days from the date of the postmark or electronic mail (e-mail) of such invoice, the Installation/Interconnection Costs. Any amount not paid within such time shall bear interest at the legal rate calculated from the due date. CPS Energy shall have the right to terminate this Agreement pursuant to Section 9 upon Notice to DG Owner if the Installation/interconnection Costs remain unpaid by DG Owner 60 days from the date of the invoice postmark or email. In the event the actual cost of the work exceeds the initial estimated Installation/Interconnection Cost, invoiced by CPS Energy and paid by DG Owner, through no fault of CPS ENERGY, CPS Energy shall invoice DG Owner for the additional cost and DG Owner shall pay such additional cost to CPS Energy within thirty (30) days from the date of the postmark or email of the invoice. Within sixty (60) days following completion of the make-ready work, if the amount paid by DG Owner to CPS Energy exceeds the final actual cost of the construction, CPS Energy shall promptly reimburse DG Owner for the amount by which the amount that was paid by DG Owner exceeds the final actual cost of the construction.

5. **Charges/Payment for Energy**

If DG Owner is a net-metered Customer, DG Owner’s monthly energy bill, and Net Electric Generation (NEG) credits to which DG Owner is entitled, will be calculated in accordance with the corresponding CPS Energy applicable Rate(s) and Rider under which the DG Owner is served less any NEG credit computed under CPS Energy applicable Rate(s) and Rider. NEG, in terms of kWh, is deemed to exist only if an amount equal to the difference between the current month’s
CPS Energy meter read less the previous month’s CPS Energy meter read is negative. DG Owner agrees to pay its energy bill on or before the due date set forth on the bill in accordance with applicable provisions in the Rules and Regulations and Rider.

If DG Owner who is not a net-metered Customer shall pay for full service energy requirements provided by CPS Energy in accordance with applicable Rate(s) and Rider(s) for their installation in an approved location within the CPS Energy Service Area.

If DG Owner has a DG Facility installed outside the Downtown Network and has a Power Purchase Agreement (“PPA”) with CPS Energy to sell any excess energy produced by DG Facility, CPS Energy will buy excess energy and pay in accordance with the provisions of the PPA Agreement negotiated between DG Owner and CPS Energy. Also, DG Owner who is party to a PPA with CPS Energy shall pay for energy provided by CPS Energy. If DG Owner has a DG Facility installed inside the Downtown Network, CPS Energy shall not purchase any energy produced by DG Facility.

6. **Operation of Installation/Interconnection**

DG Owner will maintain and operate the DG Facility in strict accordance with these Terms and the Installation/Interconnection Requirements. CPS Energy’s operation and maintenance of the Installation/Interconnection Facilities shall be excused for the duration of any outage which materially prevents or impairs CPS Energy’s ability to operate and control the provision of energy through the Point of Interconnection. CPS Energy shall resume operation and maintenance as soon as possible after the outage.

Unless otherwise provided for in the Installation/Interconnection Requirements, each Party shall install, operate and maintain all apparatus and necessary protective devices on the Party’s respective side of the Point of Delivery which are reasonably necessary, or reasonably required by CPS Energy, to comply with good operating practices and applicable ERCOT Protocols and Operating Guides, at its own cost and expense. In nearly all cases this most nearly represents the point where the ownership changes between CPS Energy facilities and the DG Owner’s facilities.

CPS Energy and DG Owner shall each be responsible for the safe installation, maintenance, repair and condition of their respective lines and appurtenances on the Party’s respective side of the Point of Interconnection. For the mutual protection of DG Owner and CPS Energy, only with CPS Energy’s prior authorization and approval are the connections between the CPS Energy’s distribution service wires and DG Owner’s service entrance conductors to be energized.

7. **Construction, Operation and Maintenance of DG Facility**

DG Owner shall be responsible for the design, installation, operation, and maintenance of the DG Facility and shall obtain and maintain any required governmental authorizations and/or permits. DG Owner shall conduct operations of its DG Facility in compliance with all aspects of such authorizations or permits and shall construct the DG Facility in accordance with specifications equal to or greater than those provided by the National Electrical Safety Code, approved by the American National Standards Institute, and other applicable standards in effect at the time of construction. DG Owner shall perform maintenance of the DG Facility in accordance with the applicable manufacturer’s recommended maintenance schedule and shall provide CPS Energy with a copy upon request. If required, DG Owner shall schedule planned maintenance on the DG Facility to be taken between the dates of March 1st to April 30th and October 1st to November 30th.
of each year unless otherwise agreed to in writing. DG Owner has provided CPS Energy with two phone numbers for contact during “normal” business hours and for emergency events. These contact numbers are found in the DG Application and Provider is responsible for promptly monitoring and updating the contact information when it changes.

8. **Disconnection at the Point of Interconnection**

DG Owner shall be required to install their own switch on their side of the Point of Interconnection for their use in disconnecting the DG Facility. DG Owner may, at their option, disconnect from the Point of Interconnection by operation of their switch. No notice is required for DG Facility’s less than 500 kWac. **For DG systems 500 kWac and larger, notice to CPS Energy is required as outlined in the Installation/Interconnection Requirements.** DG Owner shall have no right to operate any of CPS Energy’s facilities. DG Owner’s disconnection shall not constitute a reason for CPS Energy’s termination of the Interconnection unless DG Owner exercises its rights under Section 9. Should CPS Energy schedule planned maintenance and repairs on CPS Energy’s System requiring disconnection or other service interruption, CPS Energy will use reasonable efforts to provide DG Owner with seven calendar days advance notice of such disconnection.

CPS Energy shall have the right to disconnect its System from the DG Facility in cases where continuance of connection will, in CPS Energy’s reasonable determination, i) endanger persons or the public with physical harm or pose potential damage to property of CPS Energy, its customers or members of the public or ii) if there is evidence that the DG Facility operation causes disruption or deterioration of service to other DG Owners or other customers served from the same grid; or (iii) where CPS Energy reasonably determines that DG Owner has failed to comply with the Terms or the Installation/Interconnection Requirements. During the forced outage of any portion of CPS Energy’s System serving and/or receiving energy from DG Owner, CPS Energy shall have the right to suspend service to effect immediate repairs on CPS Energy’s System, but CPS Energy shall use its reasonable efforts to provide DG Owner with prior notice.

9. **Term and Termination Rights**

The Terms found **herein** become effective when the Application is approved by CPS Energy, and shall continue in effect until terminated by either Party with sixty (60) days prior written notice to the other Party. CPS Energy may terminate if (i) CPS Energy reasonably determines that DG Owner has failed to comply with the Terms or upon CPS Energy’s determination that the DG Facility does not comply with the Installation/Interconnection Requirements provided CPS Energy provides notice of default to the DG Owner and DG Owner is given a forty–five (45) day period in which to bring the DG Facility into compliance, which may be extended upon mutual agreement, and the DG Facility continues to be noncompliant after such cure period; (ii) upon failure by DG Owner to generate energy from the DG Facility within twelve months after completion of the Installation/interconnection Facilities; (iii) if any representation made by DG Owner in the DG Application proves to be false or deliberately misleading in any material respect; or (iv) if CPS Energy costs of constructing the Installation/Interconnection Facilities, are not paid by DG Owner as provided for Section 4 of this Agreement, after notice and a reasonable opportunity for DG Owner to remedy such nonpayment. The Parties shall disconnect the DG Facility from the Point of Interconnection upon the effective date of any termination under this Section.

10. **Limitation of Liability and Indemnification**
Notwithstanding any other provision in these Terms, with respect to CPS Energy’s provision of service to DG Owner, CPS Energy’s liability to DG Owner shall be limited as set forth in the Rules and Regulations. **DG Owner shall assume all liability for and shall indemnify CPS Energy against any claims, losses, costs, penalties, and expenses of any kind or character made by any person to the extent caused by DG Owner’s negligence or wrongful act in connection with the design, construction, or operation of the DG Facility.**

In no event shall CPS Energy be liable for consequential, special, or incidental damages, including, without limitation, loss of profits, loss of revenue or disruption of business, or loss of production by or on behalf of DG Owner. CPS Energy does not assume liability for any costs or damages arising from the disruption of the business or for DG Owner's costs and expenses of prosecuting or defending an action or claim against CPS Energy. The limitations of liability provided in this paragraph do not apply in actionable cases of gross negligence or intentional wrongdoing on the part of CPS Energy, if any.

11. **Insurance**

For facilities larger than 50 kWac and prior to installation/interconnection, the DG Owner must provide a certificate of insurance showing satisfactory liability insurance including contractual liability insurance covering indemnity obligations which insures the DG Owner 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 DG Owner’s DG Facility prior to CPS Energy’s approval of the Application. The amount of such insurance coverage shall be not less than $2,000,000 per occurrence and name CPS Energy as an additional insured. This amount may be increased at the sole discretion of CPS Energy if the nature of the project so requires. Insurance as specified hereunder shall be in conjunction with insurance obligations stipulated within the executed Power Purchase Agreement (PPA), if applicable. 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 CPS Energy. The insurance coverage shall be in place for so long as the DG Facility is operational. The DG Owner shall provide proof of such insurance to CPS Energy at least annually and upon request by CPS Energy.

For installations 50 kWac and smaller the DG Owner is not required to provide a certificate of insurance coverage to CPS Energy. It is recommended, however, that the DG Owner carry liability insurance coverage which insures the DG Owner 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 DG Owner’s generating equipment.

12. **Easements**

The DG Owner shall execute and deliver to CPS Energy one or more grants of easement or rights-of-way over, on, under and adjacent to the DG Facility Site, in form and content reasonably acceptable to CPS Energy, containing such commercially reasonable terms and conditions for the construction, operation, maintenance and/or relocation of CPS Energy’s gas and electric facilities and the Installation/Interconnection Facilities. CPS Energy may locate its equipment or facilities within such easement or right-of-way in the location of its choosing, after obtaining the prior written consent for such location from DG Owner, which may not be unreasonably withheld,
conditioned or delayed. The agreement, execution and delivery of such easements shall be a prerequisite to issuance of the approval provided for in Section 3. DG Owner agrees that CPS Energy’s representatives, employees and assignee are hereby granted rights of ingress and egress to the DG Facility Site at all reasonable times for the purpose of inspection of equipment and facilities providing service and to determine compliance with the Terms.

13. **Dispute Resolution**
The Parties agree to make a good faith effort to resolve any disputes arising between them by non-binding mediation. The Parties hereby agree that, in the event that any dispute between them has not been resolved by non-binding mediation, a Party will have any and all remedies in any court of competent jurisdiction.

14. **Governing Law and Regulatory Authority**
The State of Texas will in all respects govern, interpret, construe, and enforce, in accordance with the laws of the State of Texas, the Terms and the relationship established between the parties.

15. **Amendment and Changes**
The Installation/Interconnection Requirements may be amended by CPS Energy at any time, in their sole discretion, and DG Owner will receive notice of such changes prior to the effective date of such changes. Failure by DG Owner to adhere to the revised Installation/Interconnection Requirements shall be deemed a breach of this Agreement and be subject to the termination remedies under Section 9.

DG Owner agrees that the Rates and the Rules and Regulations are expressly subject to change by the Board of Trustees of CPS Energy or any governmental body having jurisdiction over the provision of gas and electric service by CPS Energy. DG Owner agrees to be bound by the Rates and the Rules and Regulations as they may change from time to time. Any such change shall affect only that portion of this Agreement specifically changed and all other portions shall remain in full force and effect.

16. **Prior Agreements Superseded**
The Parties are not bound by or liable for any statement, representation, promise, inducement, understanding, or undertaking of any kind or nature (whether written or oral) with regard to the subject matter hereof not set forth or provided for in these terms.

17. **Assignment**
CPS Energy or DG Owner may assign their rights and obligations to an affiliated entity, or to a successor entity of either party that is owned, directly or indirectly, by a company or entity that is in the direct chain of corporate DG Ownership of such Party. DG Owner shall not assign the
approved Application or any of its rights, duties or obligations arising there from unless and until the DG Owner obtains CPS Energy’s consent in writing.

18. **No Third-Party Beneficiaries**

These Terms are not intended to and do not create rights, remedies, or benefits of any character whatsoever in favor of any persons, corporations, associations, or entities other than the Parties, and the obligations assumed in this agreement are solely for the use and benefit of the DG Owner and CPS Energy, their successors in interest and, where permitted, their assigns.

19. **Confidentiality Agreement**

Should DG Owner request ERCOT Polled Settlement (EPS) meter information or the ability to retrieve meter data from the EPS, DG Owner shall be required to execute a Confidentiality Agreement.

20. **No Waiver**

The failure by CPS Energy to insist, on any occasion, upon strict performance of any term found in this Installation/Interconnection Term sheet will not be considered to waive the obligations, rights, or duties imposed upon the Parties.
Appendix F

Definitions
DEFINITIONS

The following words, terms and acronyms, when used in this Manual and its attachments shall have the following meanings, unless the context clearly indicates otherwise.

ac - alternating current

Aggregate – Sum of all DG hosts by circuit or substation.

Application for Installation/Interconnection of Distributed Generation (DG Application) - The standard form of Application for Installation/Interconnection of Distributed Generation projects approved by CPS Energy as shown in Appendix D.

Cluster - A group of neighboring DG installations

Company - CPS Energy

CPS Energy System/CPS Energy Electric Distribution System - CPS Energy’s distribution system 35kV and below to which the DG equipment may be interconnected.

DG Owner – Any entity that intends to apply or has applied to CPS Energy for installation/interconnection of a Distributed Generation system or any entity interconnected to the CPS Energy's system for the purpose of receiving or exporting electric power from or to the CPS Energy’s system.

DG Facilities/System - All facilities installed, including the DG itself, to connect the DG to the Point of Interconnection.

Distributed Generation (DG) - An electrical generating facility located within the CPS Energy service territory of less than 10 MW_{ac} and connected at a voltage of 35kV and below, which may be connected in parallel operation to the CPS Energy system. The facility may include energy storage technologies as well as conventional generation technologies.

Distribution Feeder - An electric line operated at voltages 35 kV and below that serves to deliver power from a utility substation or other supply point to customers.

Electric Reliability Council of Texas (ERCOT) - The area in Texas served by electric utilities, municipally owned utilities, and electric cooperatives that are not synchronously connected with electric utilities outside the state. ERCOT manages the flow of electric power to the customers, schedules power on the grid that connects transmission lines and generation units, and manages financial settlement for the competitive wholesale bulk-power market.

EMC – CPS Energy’s Management Center

Energy Development Department/GENCO/Generation Management System - The department within CPS Energy that has the daily responsibility for generating unit commitments and operational load forecasting.
**Grid Tied** - A DG connected to the CPS Energy System that does not offset any DG Owner electrical requirements (other than consumed by the generation auxiliaries). CPS Energy purchases all the net generation produced by the DG. This arrangement requires the execution of a Power Purchase Agreement (PPA) between the DG Owner and CPS Energy.

**IEEE** - The Institute of Electrical and Electronics Engineers

**Installation/Interconnection Terms (IT)** - The standard form of terms which have been approved by CPS Energy. The Installation/Interconnection Terms set forth the contractual conditions under which CPS Energy and a DG Owner agree that one or more facilities may be interconnected with the CPS Energy distribution system.

**Installation/Interconnection Facilities** - All facilities required by CPS Energy as a result of the DG installation/interconnection, to allow the safe and reliable installation/interconnection and parallel operation of the DG.

**Installation/Interconnection Study** - A study or studies that may be undertaken by CPS Energy in response to its receipt of a completed application for installation/interconnection and parallel operation with the utility system. Installation/interconnection studies may include, but are not limited to, service studies, coordination studies and utility system impact studies.

**Inverter** - A machine, device or system that changes direct-current power to alternating-current power.

**Inverter-Based Protective Function** - A function of an inverter system, carried out using hardware and software that is designed to prevent unsafe operating conditions from occurring before, during, and after the installation/interconnection of an inverter-based static power converter unit with a utility system. For purposes of this definition, unsafe operating conditions are conditions that, if left uncorrected would result in harm to personnel, damage to equipment, unacceptable system instability or operation outside legally established parameters affecting the quality of service to other customers connected to the utility system.

**KV** - Kilovolt, an amount of voltage equal to one thousand volts.

**KW** - Kilowatt, an amount of power equal to one thousand watts.

**MW** - Megawatt, an amount of power equal to one million watts.

**Net-Meter** - Service to a DG Owner under which electric energy generated by that DG Owner’s DG and delivered to the CPS Energy System may be used to offset electric energy provided by CPS Energy to the DG Owner during a specified billing period.

**Network Service/Underground Network** - Network Service consists of two or more utility primary distribution feeder sources electrically tied together on the secondary (or low voltage) side to form one power source for one or more customers. Network Service is designed to maintain service to the customers even after the loss of one of these primary distribution feeder sources.
Parallel Operation - The operation of Distributed Generation while the DG is connected to the CPS Energy distribution system.

Parcel – Any part or portion of land with legal description and has been surveyed and platted as a single piece of property, with boundaries on all sides, i.e. Lot, Block, New City Block Number; or Track of Land out of a Survey, Abstract and County Block Number.

Plain Old Telephone Service (POTS) – Land line telephone service per Newton’s Telecom Dictionary

Point of Common Coupling (POCC) - From the perspective of the DG, this is the nearest point on the CPS Energy System where other customers can be connected. This is generally the point where system voltages and harmonics are metered, as it best represents the DG’s impact on other customers connected to the CPS Energy System.

Point of Delivery/Point of Demarcation (POD) - The point where the electric energy first leaves the conductors or devices owned by CPS Energy and enters the DG Owner’s installation, unless otherwise specified in a separate CPS Energy agreement, such as the IT or the DG Owner’s Service Agreement. In nearly all cases this most nearly represents the point where the ownership changes between CPS Energy facilities and the Customer/DG Owner’s facilities.

Point of Interconnection (POI) - The point where the DG itself is electrically connected, either directly to the CPS Energy System or directly to the load-side (metered) of the DG Owner’s owned equipment for the applicable DG System.

Radial Distribution System - Radial service consisting of one primary distribution feeder source forming a single power source for one or more customers.

RTU – Remote Terminal Unit

SCADA – Supervisory Control and Data Acquisition

Site Feasibility Study - A site specific study that may be undertaken by CPS Energy in response to its receipt of a completed application from a potential DG Owner.

Stabilized - A utility system is considered stabilized when, following a disturbance, the system returns to the normal range of voltage and frequency for a duration of two minutes or a shorter time as mutually agreed to by the utility and DG Owner.

Switchgear - An enclosed metal assembly containing components for switching, protecting, monitoring and controlling electric power systems.
POCC, POD, & POI LOCATIONS ILLUSTRATION

Figure 2 POCC, POD, POI locations illustrations for grid-tied only\(^4\),\(^5\)

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\(^4\) For illustrative purposes only. NOT intended for design and/or construction

\(^5\) For additional examples refer to the CPS Energy Electric Service Standards, Section 2000
Appendix G

Additional Safety and Performance References
ADDITIONAL SAFETY AND PERFORMANCE REFERENCES

The following standards may be useful in the specification, design, and evaluation of a DG system. Many of these documents are the standards used by utilities to design and operate the distribution system. While most are not necessary for designing the typical DG installation/interconnection, any of them may be relevant for a particular application. One or more of these documents will likely provide the basis of a utility’s application rejection or claim for additional requirements. In such cases, specific sections of applicable documents should be referenced. Many of these documents have been updated and the updated version should be used.

Secondary Safety and Performance standards for DG:
ANSI/IEEE Std. 1159-1995 IEEE Recommended Practice for Monitoring Electric Power Quality
ANSI/IEEE Std. C37.06 ANSI/IEEE Standard for AC High-voltage Circuit Breakers Rated on Symmetrical Current Basis – Preferred Ratings and Related Required Capabilities
ANSI/IEEE Std. C37.50 ANSI Standard Test Procedures for Low-voltage AC Circuit Breakers Use in Enclosures

ANSI/IEEE Std. C37.52 ANSI Standard Test Procedures for Low-voltage AC Power Circuit Protectors Used in Enclosures


ANSI/IEEE Std. C57.12 IEEE Standard General Requirements for Liquid Immersed Distribution, Power and Regulating Transformers

ANSI/IEEE Std. C57.12.13 Conformance Requirements for Liquid Filled Transformers Used in Unit Installations including Unit Substations


IEC 1000-3-3 Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current less than 16A

IEC1000-3-5 Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current greater than 16A

UL 1008 Transfer Switch Equipment

Other UL standards apply to Distributed Generation systems but do not directly address installation/interconnection safety. UL 2200 is the Standard for Safety for Stationary Engine Generator Assemblies. These requirements cover stationary engine generator assemblies rated 600 volts or less that are intended for installation and use in non-hazardous locations in accordance with NEC. These requirements do not cover generators for use in hazardous locations, which is covered by the Standard for Electric Motors and Generators for Hazardous (Classified) Locations, UL 674. These requirements also do not cover uninterruptible power system (UPS) equipment, which are covered by the Standard for Uninterruptible Power Supply Equipment, UL 1778.
Table 2 Standards Organizations

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<tr>
<td>National Fire Protection Association (NFPA)</td>
<td>1 Batterymarch Park</td>
<td>(617) 770-3000</td>
<td>(617) 770-0700</td>
<td><a href="http://www.nfpa.org">http://www.nfpa.org</a></td>
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<tr>
<td></td>
<td>Quincy, MA 02269-9101</td>
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<td></td>
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<tr>
<td>Underwriters Laboratories (UL)</td>
<td>333 Pfingsten Road</td>
<td>(847) 272-8800</td>
<td>(847) 272-8129</td>
<td><a href="http://www.ul.com/">http://www.ul.com/</a></td>
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<tr>
<td></td>
<td>Northbrook, IL 60062-2096</td>
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<tr>
<td>Wyle Laboratories, Inc.</td>
<td>7800 Highway 20 West</td>
<td>(256) 837-4411</td>
<td>(256) 721-0144</td>
<td><a href="http://www.wylelabs.com">http://www.wylelabs.com</a></td>
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<tr>
<td></td>
<td>Huntsville, AL 35806</td>
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<tr>
<td>Institute of Electrical and Electronics Engineers (IEEE)</td>
<td>445 Hoes Lane, PO Box 459</td>
<td>(800) 678-4333</td>
<td></td>
<td><a href="http://www.ieee.org">http://www.ieee.org</a></td>
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<tr>
<td></td>
<td>Piscataway, NJ 08855-0459</td>
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<td></td>
<td>Golden, CO 80401</td>
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<tr>
<td>Sandia National Laboratories, Photovoltaic Systems Assistance Center</td>
<td>P.O. Box 5800, Division 6218</td>
<td>(505) 844-8161</td>
<td>(505) 844-6541</td>
<td><a href="http://www.sandia.gov/Renewable_Energy/photovoltaic/pv.html">http://www.sandia.gov/Renewable_Energy/photovoltaic/pv.html</a></td>
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Revisions to DG Manual

- November 15, 2012: DG – IA, Section 10; Added Indemnification clause (in bold)
- March 15, 2013: DG Manual Overview & DG Application; DG email updated
- March 15, 2013: DG Manual Overview, Section 4.3.4, Installation/Interconnection Requirements for DG, Section 2.4, & DG Application; Added aggregate and parcel requirements
- March 15, 2013: DG Manual Overview, Section 4.3.2; Added Feasibility Study Request information
- March 15, 2013: DG Manual Overview, Section 4.4.2; Added Interconnection Study Fees Refund information
- March 15, 2013: Installation/Interconnection Requirements for DG; Updated Feasibility & Interconnection Study Fees in Appendix B
- February 1, 2014: Installation/Interconnection Requirements for DG; Revised application and removed Exhibits. Application for Installation/Interconnection of DG; Updated agreement to reflect “Terms” in place of “Agreement”, revised signature page.
- January 15, 2016: DG Manual Overview, Section 3.1.2; Added solar penetration trigger which initiates a feasibility study requirement.
- January 15, 2016: DG Manual Overview, Section 3.2.2; Added clarification on flicker requirement.
- January 15, 2016: DG Manual Overview, Section 4.3.2; Added Feasibility Study requirement for solar installations approaching penetration limits, or create a cluster effect.
- January 15, 2016: Installation/Interconnection Requirements for DG; Section 2.6; Added adjustable reactive output capability
- January 15, 2016: Installation/Interconnection Requirements for DG; Section 2.7.6; Added ERCOT operating guide for voltage ride through and diagram.
- January 15, 2016: Installation/Interconnection Requirements for DG; Section 2.10; removed option to provide (4) 20mA input to the RTU.
- January 15, 2016: Installation/Interconnection Requirements for DG; Section 2.10; added language clarifying where communication equipment will reside.
- January 15, 2016: Installation/Interconnection Requirements for DG; Section 2.10; modified multimode fiber connection to a fiber to serial transceiver requirement.
- January 15, 2016: Installation/Interconnection Requirements for DG; Section 2.10; added drivable surface requirement for accessing SCADA equipment.
- January 15, 2016: Operation and Maintenance; Appendix F; Added definition for Aggregate and Cluster.