



Memorandum

To: Interconnecting Entities (IEs)

Date: 5/21/2024

Re: Distributed Generation (DG) Manual

Please note that the CPS Energy Distributed Generation (DG) Manual is currently undergoing revisions to include Battery Energy Storage Systems (BESS), Microgrid, other DG Resources (DGRs), and ERCOT DGR interconnection requirements. These revisions may include technical requirements, procedures, timelines, interconnection study fees, and any other updates to the manual that CPS Energy deems necessary to facilitate the interconnection of a BESS and other DG Resources.

In the interim, please reach out to CPS Energy directly for any questions related to BESS and DGR interconnections pursuant to ERCOT provisional interconnection requirements.

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

This DG Manual is located on the CPS Energy website at:

<https://www.cpsenergy.com/content/dam/corporate/en/Documents/Distributed%20Generation%20Manual.pdf>



Distributed Generation (DG) Manual

May 1, 2024 (9th Edition)
Revision 1.0



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DISTRIBUTED GENERATION MANUAL

1. Introduction

The purpose of this manual is to provide guidance to interconnect and operate Distributed Generation (DG) facilities in parallel with the CPS Energy distribution system. This manual defines the basic interconnection process along with minimum technical requirements for safe interconnection of customer-owned power production facilities to the CPS Energy distribution system of less than ten (10) MW_{ac}. This manual specifically referenced the Inverter based DGs (such as Solar PV and Energy Storage) and Synchronous or Induction generator based DGs (such as Wind generation, standard fossil fueled motor generators). Other types of DGs may be reviewed as encountered.

All DG Systems and associated facilities must be designed in accordance with, but not limited to:

- Underwriters Laboratories (UL) Standards,
- Institute of Electrical and Electronics Engineers (IEEE) Standards,
- National Electrical Code (NEC),
- Public Utility Commission of Texas (PUCT),
- Electric Reliability Council of Texas (ERCOT) Operating Guides and Protocols,
- CPS Energy Electric Service Standards and Design Criteria, and
- Current versions of IEEE Standard 1547-2018 and UL 1741.
- Any other applicable Local, State, or Federal code or standards.

1.1. Goals and Perspective of CPS Energy and Future Distributed Generation (DG)

CPS Energy is committed to working with DG Owners to allow interconnection. One of the goals of our Flexible Path is to work toward a future power supply mix that is flexible and renewable with sources to include renewables, battery storage, energy efficiency, and demand-response programs.

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

- | | |
|---------------------|---|
| <i>Safety First</i> | The first, most important goal for CPS Energy is the safety of the public and of the employees working on the electrical systems. |
| <i>Reliability</i> | The second goal is 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. |
| <i>Economics</i> | The third goal is the utility interconnection should be designed in a cost-effective manner for our customers and the installer. |



1.2. DG Applications

Distributed Generation is normally installed for the following business purposes:

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.

Energy storage systems installed as part of a net-metered installation are not permitted to export power to the grid but can be used for powering essential loads in loss of power situations.

Note 1:

Additional information for Net-Metered system can be obtained from 'Electric Service Standard Manual' available online.

https://www.cpsenergy.com/content/dam/corporate/en/Documents/Electric_Service_Standards.pdf

Note 2:

DG > 1 MW which is capable of exporting energy into the CPS Energy's distribution grid must be registered in accordance with Public Utility Commission of Texas (PUC) and at the Electric Reliability Council of Texas (ERCOT). Refer to ERCOT Nodal Protocols Section 16.5, the PUC rules, and following website for more information.

<http://www.ercot.com/services/rq/re/dgresource>

<https://www.puc.texas.gov/industry/electric/business/dg/Dg.aspx>

1.2.2. Grid-Tied

The DG System is designed with the sole purpose to sell part or all generated power to CPS Energy under a power purchase agreement or tariff or that is a pure merchant generator and does not directly provide power to any other entity or customer.

DG owner wishing to do business with CPS Energy must register as a supplier on our website.

<https://www.cpsenergy.com/en/work-with-us/procurement-and-suppliers/new-supplier-registration.html>

1.2.3. Micro-Grid

Microgrids are sections of electric power systems that contain distributed generation systems enabling them to operate in parallel with the CPS Energy grid or disconnect from the grid and operate independently.

1.2.4. Batteries and Other Storage System with Inverter

Battery storage often stores energy by charging from the local utility as well as providing services to the local area and the transmission system. Modern inverters with storage can serve four-quadrant operation by providing a combination of bidirectional real and reactive power. These four-quadrant inverters have wide ride through requirements.



Although energy storage can serve a variety of purposes, they are called limited duration resources because total charging and discharging time depends on the size of the resource.

1.3. DG Services

1.3.1. Ancillary Services

ERCOT proposes (November 2019) that a Resource Entity shall register an inverter-based Energy Storage System that desires to participate in SCED and Ancillary Services markets as an Energy Storage Resource (ESR).

1.3.2. Distribution Infrastructure Services

Voltage support and upgrade deferral for the local distribution system are typically energy storage systems or back generation made available to the local distribution system.

1.3.3. Customer Energy Management Services

Power Quality and Reliability, Electric Energy Time-Shift (arbitrage) and, Demand Management systems are most often installed to reduce demand charges.

1.4. DG Manual

This Manual will help the owner understand the CPS Energy interconnection process and typical requirements. The DG System owner must conduct their own analysis and conform to CPS Energy interconnection requirements as described in the manual and directed by CPS Energy in any study reports provided to the owner/installer.

CPS Energy reserves the right to amend this DG Manual at any time. Since these standards change regularly because of the latest practices, it is the user's responsibility to verify that the latest version of this DG Manual is being used.

This DG Manual is located on the CPS Energy website at:

<https://www.cpsenergy.com/content/dam/corporate/en/Documents/Distributed%20Generation%20Manual.pdf>

Contact information for the DG Section:

Phone and fax number: 210-353-2700

Email: DG@cpsenergy.com



2. DG Interconnection Process

Depending upon the size, features, and regulatory mandates, DG interconnection requests may go through all or some of the following stages before receiving permission to operate.

- Pre-Application Review
- Screening Study
- Interconnection Application Submittal
- System Impact Study (Technical Review)
- Facility Study
- Design Conditional Approval
- Interconnection Agreement (IA)
- Construction
- Inspection/Commissioning
- Testing
- Qualified Scheduling Entity (QSE) Agreement (if applicable)
- Permission to Operate

2.1. Pre-Application Review

This stage is optional. CPS Energy will review for business intent and proper rate structure to ensure design intent can be supported. This is to determine the type and class of the generation proposed.

DG owner should have an address, meter number, or site plan that will allow CPS Energy to locate the site. Also know the services in which the facility is planning to participate. Typical time required to complete a pre-application review is 15 business days. A clear, definitive understanding of the customer's intent is needed for the Strategic Pricing team to determine the appropriate rate solution.

2.2. Screening Study

A Screening study is required for all Grid-Tied system and on case by case basis on Net-Metered system. This study is performed on the CPS Energy Distribution system for the proposed site to determine if the distribution grid will require upgrades to accommodate the proposed generation and services. Fees apply and are assessed based on the size of the proposed DG (Appendix B - Fees) and the level of Interconnection Study required.

A meeting with various internal teams can be coordinated upon request to do an evaluation of the circuit capacity at a specified site and any medium and low voltage equipment that may be impacted. Screening study, on its own, will not provide any approval to start site development nor it will reserve capacity on the distribution system.



The screening study application request should be completed by the DG owner and submitted with general site plans, indicating size and type of proposed DG. Typical time required to complete a screening evaluation is 25 business days however, this may be extended up to 60 business days dependent on how well the submitted plan matches the existing utility capacity (See Appendix C “Application for Screening Study of Distributed Generation”).

2.3. Interconnection Application Submittal

In advance of an interconnection, the DG Owner must complete an application. A separate form and any study fee must be submitted for each DG Facility or facilities and each location.

Initial review of all interconnection requests is performed by the Electric Metering & Service Standards Department and distributed to other departments for review based on size, communication needed, protection requirements and metering class. DG site plans and design drawings are required with the application to allow a technical review of the interaction of the DG with utility customers and the utility system.

2.4. System Impact Study (Technical Review) and Interconnection Studies

CPS Energy’s technical review determines requirements for the interconnection of the proposed generation relative to the local electric distribution facilities and is not a design review of the generation system.

Upon completion of the submitted application and payment of associated fees (Appendix B - Fees), a review of each interconnection application is made to ensure that the operation of each proposed DG system is consistent with the technical requirements of the power delivery system and does not adversely impact other customers.

The review process determines site service, metering, telemetry requirements (for *ERCOT, DSP, and TSP*) and the level of study that will be required. Three types of interconnection studies may be performed. All three may not be needed depending on generation type, size and the proposed generation services. The levels of study required will be determined during the Screening evaluation, these are Steady State, Transient and Transmission evaluations described in Table 1.

Table 1 - Interconnection Study Descriptions

<i>Type of Study (level)</i>	<i>Study considerations</i>
<i>Steady State</i>	<i>Circuit capacity, voltage profile, power factor, reverse power flow, regulation tap movement, flicker, short circuit, protection, islanding probability, intermittent sources voltage step, device ratings, equipment coordination and disturbance ride-through.</i>



<i>Transient</i>	<i>Load rejection overvoltage, ground fault overvoltage, transformer inrush and resonance.</i>
<i>Transmission</i>	<i>Generation Stability and synchronism with the bulk power system in Summer and winter, with various system configurations.</i>

The standard review will require 90 business days after receiving full application package and study fee. However, this may be extended up to 120 business days or more dependent on how well the submitted plan matches the existing utility capacity and should the interconnection be complex, or the selected site require a more detailed system model. CPS Energy will provide estimated delivery dates should application processing require more time. CPS Energy will make written reports and study results available to the DG Owner for grid-tied systems. This report will contain:

- 1) Expected owner costs
- 2) Schedule of CPS Energy System modifications
- 3) Date expected the utility interconnection may begin
- 4) And any options that may influence interconnection

CPS Energy may reject applications for demonstrable reliability or safety issues however will inform the DG owner of the reason for the rejection and alternate options that may be available.

The DG Owner will be responsible for the expenses associated with Interconnection Facilities determined necessary or prudent to protect CPS Energy’s System from disruption or damage caused by the DG System (See definitions of “Interconnection Facilities” and “Distributed Generation Facilities” in Appendix F).

2.5. Facility Study and Design

CPS Energy designs distribution system up to the point of delivery (POD) as located and approved by CPS Energy (See definition of “Point of Delivery” in Appendix F). Total estimated cost to bring distribution system to the POD will be provided to the DG owner after design.

2.6. Interconnection Agreement

A contract between CPS Energy and one or more parties that outlines and governs the interconnection requirements of a generation facility.

2.7. Construction

The DG Owner is responsible for design and installation of the DG System up to POD as located and approved by CPS Energy. CPS Energy is responsible for design and installation of CPS Energy’s Distribution System up to the POD.

The interconnection of DG Systems may require construction of new facilities on CPS Energy’s side of the POD or modifications to existing supply facilities to accommodate



distributed generation. The determination of the need for system modifications is made by CPS Energy in the context of system studies conducted during the interconnection application and review process.

Cost of new construction or modifications on CPS Energy's distribution facilities associated with interconnection will be the responsibility for the DG Owner and must be paid before CPS Energy will begin construction of these distribution facilities. Cost will be provided based on completed Facility Construction Study. See DG System Owners Responsibilities.

2.8. Inspection/Commissioning

CPS Energy will coordinate with contractor to verify installation meets proper code and standard compliances including inverter testing. In addition, SCADA, Communications, System Protection, and Advanced Metering teams will confirm installation complies with applicable standards.

CPS Energy may, at its discretion, require a witness test of an installed DG facility before granting permission to operate the facility in parallel with the utility distribution system. CPS Energy will provide a list of tests needed to be witnessed.

The DG Owner is responsible for ensuring that all circuit breakers, controls, relays and other protective devices are adjusted and functioning correctly. The DG Owner shall provide test equipment and qualified personnel to perform the required tests.

A general description of set points that must be tested and verified are in the table - Prevention of Interference for DG Systems (Appendix D). More information on the commissioning process can be found in Appendix A.

2.9. Testing

CPS Energy will review and approve the general design of the protection scheme for a proposed DG interconnection. Review of the protective scheme will include all functions which directly affect protection of the utility system and all functions which, determined by CPS Energy, must operate to minimize the impact of the DG system on the CPS Energy system. The DG Owner is responsible for the facility protection design.

The designer must furnish, proposed settings for relays specified on the Relay Functional Requirement Specifications (RFRS) form. If requested, CPS Energy will provide system data needed to determine the relay settings.

Frequency and Voltage Ride-through is expected, and the boundaries may be requested within the ERCOT, NERC and IEEE 1547 – 2018 requirements for adjustability.

A dated verifiable document must be provided for non-interference settings of DG greater than 300 kW_{ac} capacity (typical is the test report with screenshot or printout of the setpoint).

For DG of 1 MW_{ac} and greater, power quality will be monitored for output voltage and harmonic content during ramp up and for up to 30 days after permission to operate.



2.10. Permission to Operate

Once CPS Energy determines that the DG facility is suitable to operate in parallel with the CPS Energy Distribution System, both the DG Owner and the CPS Energy representative will sign and date the “Approval for Operation” document (Certificate of Completion). Once completed, the generation facility is authorized to operate in parallel with the CPS Energy System.



3. DG Design Requirements

The detailed technical, operational, and maintenance requirements are found in Appendix A – “Interconnection Requirements for Distributed Generation”. This section of the Manual summarizes some of those key requirements.

3.1. DG Size, Location and Purpose Limitations

3.1.1. Secondary Voltages Interconnection

DG Facilities connected at secondary voltages cannot have a maximum capacity rating that exceeds the size of the transformer serving the secondary. Service upgrades will be designed and installed by CPS Energy at the owner’s expense.

3.1.2. Radial Distribution System

Combinations of Grid-Tied with existing DG or clustering small DG of 30% or greater of the minimum circuit peak may require an interconnection study. Operation of distributed generation clustered on the same circuit will require cooperation between all owners, operators and CPS Energy. Since there are often existing DG the most recent application is when the cooperative agreements must be pursued. Interconnection costs are paid by the owner.

Typically, any DG of 2 MW and greater require an interconnection study. DG greater than 3 MW on 13 kV and 8 MW on 35kV will require some level of cooperation with CPS Energy and other operators including an automated limit or trip. DG greater than or equal to 10 MW are referred to CPS Energy Power Generation Group.

3.1.3. Downtown Network System

The Network Protector 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. On-site generation facility should be less than minimum local load where total DG (including the new facility) should not be greater than 25% of the total load of the network.

3.2. Prevention of Interference and Ride-Through

The range of adjustment for voltage and frequency ride through (VRT and FRT) shall be consistent with the IEEE 1547-2018. The owner must fill in the “Prevention of Interference” Column A: Setting Name and Column B: Settings value (expected at ramp up) in this table on the application, Appendix D. However, Settings Value may be modified by CPS Energy as a Distribution System Provider (DSP) to improve system resiliency based on analysis of the interconnection study.

If the customer using an inverter for parallel generating facilities causes any reduction in the quality of service provided to other utility customers due to harmonics, the customer shall install filtering devices to cause the harmonic output of the customer's inverter to an acceptable level.



4. DG Owner's Responsibilities

4.1. DG Design Submission

The DG owner shall provide CPS Energy's DG Section at DG@cpsenergy.com with a fully completed DG Application (Appendix D) and all planning and support materials for CPS Energy to evaluate the interconnection requirements for the DG Facility. It is DG owner's responsibility to obtain all necessary permits, including environmental, from an authority having jurisdiction.

4.2. Facility Installation and Operation

The DG Owner shall have the Facility (upto POI) 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. On an annual basis, CPS Energy shall have the right to review the operation of the DG facility and conduct any tests it deems necessary to ensure 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.

4.3. Cost of Line Extension

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. As a part of the 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.

4.4. DG Registration

DG > 1 MW (or \leq 1 MW that chooses to register) where CPS determines it is capable of injecting energy into the CPS Energy's distribution grid, must be registered in accordance with the Electric Reliability Council of Texas (ERCOT) and Public Utility Commission of Texas (PUC). Interconnecting Entities (IE's) must provide proof of registration with ERCOT and PUC. Generation Resource Interconnection or Change Request (GINR) is the registration process with ERCOT. As per ERCOT, Interconnecting Entities (IE's) wishing to submit or modify a GINR application must do so through the online Resource Integration and Ongoing Operations – Interconnection Services (RIOO – IS) application, following the processes described in Planning Guide, Section 5 and the RIOO–IS IE User Guide. Please refer to the following websites for more information.

<https://www.ercot.com/services/rq/integration>



<http://www.ercot.com/services/rq/re/dgresource>

<https://www.puc.texas.gov/industry/electric/business/dg/Dg.aspx>

4.5. Costs of Modifications

In the event it is necessary at the time of initial 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 interconnection of the DG Facility or Facilities.

4.6. Cost of the Changes to Owner Facilities

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 equipment must be changed, the full cost of the change will be borne by the DG Owner.

4.7. Installation of a Visible Load Break Disconnect Switch

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.

4.8. Operation of the Generation

The DG Owner will follow all aspects of these requirements prior to and during operation of the DG Facility or Facilities. DG owner and operator will follow all applicable laws, customer terms and conditions as defined by CPS Energy, ERCOT and the PUC.

4.9. Liability Insurance

For Facilities 50 kWac and Smaller

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.

For Facilities Larger than 50 kWac



Prior to 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 per occurrence shall be not less than defined in the table below 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.

System Size	Insurance Requirement
≤ 50 kW	N/A
> 50 kW ≤ 100 kW	\$500K
> 100 kW ≤ 500 kW	\$1M
> 500 kW	\$2M

- (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 interconnection contract or shall be specified to renew throughout the length of the Interconnection Contract.
- (3) The DG Owner shall provide proof of such insurance to CPS Energy at least annually and on request by CPS Energy

4.10. Emergency Operations Plan for Battery

It is the responsibility of Customer to establish a Emergency Operations Plan (the “Plan”) prior to Commercial Operation. The Plan shall establish protocols with applicable local jurisdictions and CPS Energy to coordinate with first responders an appropriate response to a fire or other hazardous incident at the Facility. The Plan shall identify designated actions that the local jurisdiction first responders must take to protect private and public property from fire damage, ensure general public safety, prevent harmful environmental impacts, and other potential hazards related to an emergencies. Customer will ensure and provide documentation that the Facility and overall site are compliant with the latest Authority Having Jurisdiction (AHJ) requirements/permits and the latest version of the national fire code and applicable environmental code, and provide first responders any training on the proper procedures to address a fire or hazardous incident at the Facility site, as well as site cleanup.

4.11. Owner Contracts and Purchase Power Agreements (PPA)

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.

Where the DG Owner desires to deliver power and CPS Energy agrees to purchase power, a Purchase Power Agreement (PPA) is required.



Exceptions:

- (1) Output is $\leq 25 \text{ kW}_{ac}$ and expected to match customer use as a net-metered DG installation. These are outlined in CPS Energy's tariffs under Rider #5.
- (2) CPS Energy offered a special program which includes a Power Purchase Agreement.
- (3) Output is $\geq 10 \text{ MW}_{ac}$ in which cases the DG Facilities application must be submitted to CPS Energy Power Generation Group and ERCOT for a purchase agreement.



5. Initial Interconnection

CPS Energy's review process and final inspection is intended 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.

5.1. Schedule

Upon satisfactory completion of the review process and approval of the Application as outlined in this Manual, CPS Energy will agree upon an expected schedule for the interconnection of the DG Facilities with the installer.

The interconnection will be completed as soon as practical after completion of the review process and execution of the necessary contracts.

5.2. Final Inspection and Commissioning

After completion of interconnection requirements and prior to initiation of service, CPS Energy will conduct a final commissioning of the facilities and interconnection to CPS Energy's system. Upon satisfactory final commissioning, CPS Energy will initiate service to the DG Facility or Facilities.



Appendix A

Interconnection Requirements for DISTRIBUTED GENERATION



Interconnection Requirements for DISTRIBUTED GENERATION

6. General Requirements

CPS Energy is a Distribution System Provider (DSP) in the San Antonio area.

The Distributed Generation (DG) Facility Owner (Owner) shall design, operate, and maintain the DG as required for interconnection of the Owner's DG system with CPS Energy's system.

This Appendix describes typical requirements for installing/interconnecting DG Facilities to the CPS Energy system.

The introduction describes the process that must be followed to study the specific sites and determine specific requirements for interconnection. Each site may have different requirements.

6.1. 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.

6.2. Notifying CPS Energy

Unless otherwise stated in this document any required notification to CPS Energy shall be made to the DG Section at DG@cpsenergy.com or through CPS Energy's DG Review Portal

6.3. Display of Documents

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

6.4. Complete Interconnection Study Requirements

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 interconnection studies are completed.



6.5. Disconnection and Reconnection

The DG Owner may disconnect from CPS Energy's System by operating its own switch, in accordance with Appendix A - "Interconnection Requirements for Distributed Generation" of this Manual. 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 POD.

CPS Energy shall 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, does not comply with Interconnection Agreement or may cause impairment of CPS Energy's interconnection and service to DG Owner. CPS Energy also reserves the right to disconnect for other cases as described in Appendix A. Once the reason for service disconnection resolves, CPS Energy will reconnect the customer as quickly as reasonably possible.

7. 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 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.

7.1. Design Consideration

7.1.1. 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) Nodal Operating Guides, CPS Energy Electric Service Standards, IEEE Standard 1547, and any other applicable local, state or federal codes or standards.

7.1.2. Safety

7.1.2.1. 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



7.1.2.2. 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.

7.1.3. *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 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:

<https://www.energy.ca.gov/programs-and-topics/programs/solar-equipment-lists>

7.1.4. *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 Ferroresonant 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.

7.1.5. *Remote Disconnect Control*

If inverter based DG is 2 MW_{ac} (nameplate capacity) or larger or as determined based on studies, CPS Energy requires a communication channel and separate breaker for transfer tripping of the DG Owner's main breaker or generator breaker for separating the generation from the distribution grid. For rotating machine based DG, transfer tripping is required for 1 MW_{ac} or larger or as determined based on studies. This equipment is to be installed at the Owner's expense. The channel shall be a part of the relay protection scheme and shall be from the Owner's site to the CPS Energy designated substation.

7.1.6. *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} (inverter based) or 1 MW_{ac} (rotating machine based), and exporting to CPS Energy shall have a redundant circuit breaker unless a listed device suitable for the rated application is used.

7.1.7. *Exporting Power to CPS Energy*

Exporting power to CPS Energy may require:



- Additional operational or protection devices,
- Communication link to the DG control for remote disconnect and setting modification,
- Coordination of operations with CPS Energy and possibly other DG Owners,

7.2. Prevention of Interference

7.2.1. 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 (Appendix D) are violated. The DG Owner may reconnect with CPS Energy when the system voltage and frequency return normal range and is stabilized.

7.2.2. Interference Monitoring Location

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.

7.2.3. Interference Form

DG owner must fill in the 'Prevention of Interference for DG Systems' form in the Appendix D. This form lists some key electrical parameter descriptions and what level these limits require. CPS Energy may request adjustment to prevent interference on the distribution system based on the interconnection studies.

For all locations should CPS Energy determine the distribution system operation requires different settings, the owner should prepare to adjust and verify the settings before beginning production.

7.2.4. Rapid Voltage changes and Flicker

In accordance with IEEE 1547, DG should not cause step or ramp changes in the RMS voltage at the PCC exceeding 3% of nominal and exceeding 3% per second averaged over a period of one second for direct grid tied applications. Similarly, DG shall not cause step or ramp changes in the RMS voltage exceeding 5% of nominal and exceeding 5% per second averaged over a period of one second for net metered application.

DG contribution to the flicker, measured at the PCC, shall not exceed the greater of the limits listed in the IEEE 1547, Table 25 and the individual emission limits defined by IEC/TR 61000-3-7. If high or low voltage complaints or flicker complaints result from the operation of the customer's electrical generation, the customer's generating system shall be disconnected until the problem is resolved.



7.3. Emergency Power Systems

Emergency electric generators (backup generators) or auxiliary power supplies owned by Customer that serve the purpose of providing backup generation to the customer's load shall not operate in parallel with CPS energy distribution without written approval from CPS Energy and installed in accordance with the requirement outlined below.

7.4. 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. Review of non-paralleling emergency electric generators or auxiliary power supplies shall provide to the DG Section the following for review:

For system that intended to backup the entire load of the structure or building, the following information shall be required to be submitted to the DG Team through CPS Energy's DG Review Portal.

- 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

When system is over 600 Amps at 150V to ground or less and/or 400 Amps at 150V to ground or greater, the drawings shall be signed and sealed by licensed engineer.

7.5. Momentarily Paralleling (closed transition)

7.5.1. *Less than One Second*

For paralleling electric generators or auxiliary power supplies, including customers with emergency electric generators or auxiliary power supplies 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:

- 1) Transfer scheme control schematics
- 2) Operating logic
- 3) Relay one-line diagrams.
- 4) Interconnect disconnect device



- 5) DG disconnect device
- 6) Synchronizing Check (for facilities with standalone capability)
- 7) Over-voltage trip
- 8) Under-voltage trip
- 9) Over/under frequency trip
- 10) 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 for a 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 submitted for review.

7.5.2. *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.

7.6. Protective Function Requirements

The protective function requirements for DG facilities vary based on size and technology as listed below.

- 1) Interconnect disconnect device
- 2) DG disconnect device
- 3) Over-voltage trip
- 4) Under-voltage trip
- 5) Over/under frequency trip
- 6) Synchronizing Check (for facilities with standalone capability)
- 7) Either a ground over-voltage trip or a ground over-current trip depending on the grounding system if required by CPS Energy;
- 8) Reverse/under power sensing if the Facility is not exporting (the DG is less than the minimum load of the DG Owner's facilities).
- 9) 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.

In addition to the other requirements, DG systems of 2 MW and greater for inverted based and 1 MW or greater for rotating machine based shall have:

- 10) Telemetry Transfer Trip (TTT) as part of a transfer tripping or blocking protective scheme.
- 11) An ION power quality monitor/meter



7.7. Exporting Power

Exporting to CPS Energy may require additional operational or protection devices and will require coordination of operations with CPS Energy. Generator output shall be adjustable at the generating facilities' terminals as required by IEEE 1547-2018.

7.7.1. Voltage Ride-through (VRT) requirements for DG

For any short-circuit fault or open-phase condition that occurs on the circuit section to which the DG is connected, the DG will cease to energize and trip offline, and will take priority over the DG ride-through function.

DGs utilizing synchronous generation must have over-/under-voltage relays set to ride through the following operating conditions as per ERCOT Nodal Operating Guide Sections 2.9.2:

Voltage (p.u. of nominal)	Minimum Ride-Through Time (s)
$0.88 \leq V \leq 1.10$	continuous
$0.70 \leq V < 0.88$	Linear slope of 4 s/1 p.u. voltage starting at 0.7 s @ 0.7 p.u.

DGs utilizing inverter-based generation must be designed and relays must be set to ride through the following operating conditions as per ERCOT Nodal Operating Guide Sections 2.6.2.1:

Voltage (p.u. of nominal)	Ride Through Mode	Minimum Ride-Through Time (s)
$1.10 < V \leq 1.20$	Momentary Cessation	12
$0.88 \leq V \leq 1.10$	Continuous Operation	continuous
$0.70 \leq V < 0.88$	Mandatory Operation	20
$0.50 \leq V < 0.70$	Mandatory Operation	10
$V < 0.50$	Momentary Cessation	1

7.7.2. Frequency Ride-through (FRT) requirements for DG

For any short-circuit fault or open-phase condition that occurs on the circuit section to which the DG is connected, the DG will cease to energize and trip offline, and will take priority over the DG ride-through function. DGs must have over-/under-frequency relays set to ride through frequency conditions as specified in the following table:



Frequency (Hz)	Ride Through Mode	Minimum Ride-through Time (s)
$f > 61.8$	No ride-through requirements	
$61.2 < f \leq 61.8$	Mandatory Operation	299
$58.8 \leq f \leq 61.2$	Continuous Operation	continuous
$57.0 \leq f < 58.8$	Mandatory Operation	299
$f < 57$	No ride-through requirements	

7.7.3. Notice of Commissioning for 500 kW_{ac} and Greater

Inspection and Start-up Testing requires a startup notice. 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 interconnection.

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

7.7.4. Before Initial Paralleling Operations

All setup parameters must conform to the minimum non-interference parameters or as required by the interconnection study. Verification documents may be images or printouts of the software used to set the parameters and must be provided to the Metering and Service Standards Group.

Inspection of the POI and Metering is required before initial paralleling operations.

CPS will assist in performing an operability test of the isolation devices. Unintentional-islanding functionality test (IEEE 5.4.1), cease to energize functionality (IEEE 5.4.2) must be passed by opening each phase at the POI and system should shut down.

7.7.5. Monitoring DG output

CPS Energy may set AC Power Quality monitoring at the POI to verify conformance with the interference table and any adjustable set points.

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 Interconnection DG Application with information reflecting the modifications.



7.8. Commissioning Report for large systems

DG Owners or their agent with systems or aggregated grouped DG of 2000 kW or more shall submit a report containing the test procedures used and the results of the tests within thirty (30) days of commissioning. The report shall be submitted to the CPS Energy DG Section, DG@cpsenergy.com. Thereafter, DG Owner may be required to retest the system protection elements upon any reasonable request by CPS Energy.

Testing and Commissioning should include;

- 1) Protection systems procedures to functionally test all protective elements of the system up to and including tripping of the DG and interconnection point disconnects.
- 2) 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.
- 3) Control function diagrams,
- 4) Control specifications,
- 5) List special testing equipment and with setup diagrams,
- 6) Testing procedures specific to DG function,
- 7) Final setup parameters,
- 8) Visual inspection shall be made to ensure grounding coordination requirement of IEEE 1547-2018 section 4.1.2 has been implemented.

Modifications that may affect the safe and reliable operation of the CPS Energy distribution system, the DG Owner shall revise and re-submit the Interconnection DG Application with information reflecting the modifications.

All certification and set point verification documents shall be provided to CPS Energy DG Section for approval before parallel operation and included in the commissioning report in the "Certification" Section.

Adjustments in set points agreed on by CPS Energy Distribution Planning during generation ramp up should be included in the report under "Final setup" section.

7.9. Final Design and Setup Information

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 then the commissioning report should have the final setup values with notes justifying any changes from the initial testing values. This list may be a picture, screen shot, printout or other form of verification acceptable to the CPS Energy DG Section at DG@cpsenergy.com.



7.10. Metering

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 described in ERCOT Protocols and PUC Rules. If ERCOT settlements and market interaction is required, DG Owner will give CPS Energy the first option to act as the "Qualifying Scheduling Entity" for scheduling the market resource. In general the metering requirements are as follows:

- 1) For Grid Tied DG Facilities, 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.
- 2) For DG Facilities greater than 50 kW_{ac} and up to 1 MW_{ac} output, metering is required to capture the power delivered to the bulk CPS Energy distribution system for ERCOT reporting. Meter data for settlement is not required to be submitted to ERCOT.
- 3) DG Facilities greater than 1 MW_{ac} (the current registration threshold per ERCOT Nodal Protocols Section 15.5 (5)) and less than 10 MW_{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 the PUC. 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.
- 4) 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_{ac} and MVAR_{ac} telemetry from each DG Facility.

7.10.1. 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:

- 1) Meter enclosure(s) or meter sockets shall be located adjacent to respective DG switchgear and not attached to or inside switchgear.
- 2) 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.



- 3) 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.

7.10.2. *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:

- 1) The DG Owner shall install, own, and maintain all conduit raceway(s) required for site installation metering, relaying, and communications.
- 2) 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.

7.10.3. *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 Protocols shall govern the minimum meter requirements. Specific communication and telemetry requirements are as follows:

- 1) Telemetry to the CPS Energy Generation Management System must be provided for DG Facilities greater than 1 MW_{ac}. The DG must be registered with ERCOT and the PUC.
- 2) DG Facilities delivering 250 kW_{ac} 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 1547-2018 4.1.6).

7.10.4. *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_{ac} (or the DG registration threshold, as determined in ERCOT Protocols) and greater will require the following:

- 1) 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.
- 2) A single 120 V, 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.



7.11. Supervisory Control and Data Acquisition (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:

- 1) 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.
- 2) DG Owner to provide adequate general space for the metering, RTU, SCADA, and communications equipment.
- 3) A 120 V, 20 Amp circuit shall be provided for SCADA equipment from an uninterruptable power supply by the DG Owner.
- 4) An uninterruptible power source. (CPS energy to supply and maintain the UPS with DG Owner responsible for the cost.)
- 5) 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.
- 6) Unrestricted access to all CPS Energy SCADA equipment.
- 7) A drivable surface for accessing the SCADA equipment.

7.12. 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 interconnection parameters and to prevent interference with CPS Energy as described in Section 2.2.

- 1) Permanent monitors are integral to the metering; therefore, communications are provided by the CPS Energy Metering Department at the site.
- 2) 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 Interconnection Terms and Interconnection Requirements. CPS Energy will determine the timing, conditions and details of the reconnection on a case-by-case basis.



7.13. 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:

- 1) A conduit raceway, fiber optics and/or copper cable from the Data circuit demark to the Meter/Communication/SCADA Cabinet.
- 2) 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.
- 3) A duplex 120 V circuit rated no less than 15 Amps for CPS Energy Communication equipment (Typical circuit load < 5 Amp).
- 4) An uninterruptible power source. (CPS energy to supply and maintain the UPS with DG Owner responsible for the cost.)
- 5) 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.
- 6) 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.
- 7) 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.
- 8) 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.
- 9) 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.

7.14. Data Security and Privacy

DG Owner must comply with all applicable CPS Energy's Data Security and Privacy Policies, as published by CPS Energy and as may be modified and in effect from time to time. CPS Energy has Right to Audit and Review Security Controls. Refer to Appendix G for Data Security and Privacy Policies.



8. 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 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.

8.1. 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.

8.2. 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.

8.3. 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.

8.4. Emergency Conditions

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.



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.

8.5. DG Owner Operating and Maintenance Responsibility

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 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.

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.

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.

Maintenance and Operational Records

The DG Owner will maintain 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 1547-2018 5.5).
- Operation log for DG systems greater than 500 kW_{ac}. As a minimum the log shall include the date, DG time on, and DG time off, and MW_{ac} and MVAR_{ac} 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.

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 the current ERCOT Nodal Operating Guides and Protocols.

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.

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 hours a day, 365 days a year.

Correction of Interference

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

8.5.1.1. 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.



8.5.1.2. *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.

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.

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.

8.6. CPS Energy Operating and Maintenance Responsibility

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.

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 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 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 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.

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.

Annual Maintenance Outage

CPS Energy performs periodic maintenance on its equipment. Such maintenance on CPS Energy equipment at the POD or any of the 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:

- 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.

8.7. 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 shall 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.

8.8. 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 the outside and inside of the equipment.

8.9. 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.



8.10. 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.

8.11. Fault Initiated Outages

After automatic tripping of the DG 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;
 - Present position of circuit breakers or switches (open or closed)
 - Time of outage
 - Any information which might be helpful in determining the cause of the outage
- Report as soon as the information is available;
 - 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.
 - Circuit breaker operations counter reading on CPS Energy circuit breaker at the POI or POD (if applicable).

8.12. DG Owner Operations

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.



DG Owner Reconnect Notice

In the event DG 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.

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.

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.

8.13. 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.

8.14. 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.

8.15. Amendments

These 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

Study Fees



STUDY FEES

Screening Study Fees

Should a potential DG Owner desire a site screening study or studies from CPS Energy, the form in Appendix C (“Application for Screening 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. The current fees below applies only to the projects studied by the CPS energy internally (Fees subject to change without notification):

DG Size Bracket	Fee
1 kW _{ac} to less than 50 kW _{ac}	\$0
50 kW _{ac} to less than 1 MW _{ac}	\$500
1 MW _{ac} to less than 5 MW _{ac}	\$830
5 MW _{ac} to less than 10 MW _{ac}	\$2,152

Interconnection Study Fees

In advance of an interconnection, the DG Owner must contact CPS Energy and complete the “Application for 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 and timelines subject to change without notification):

DG Size Bracket	Fee
All	Cost provided after employment of outside engineering firm

Facility Construction Study and Design Fees

DG Size Bracket	Fee
All	Cost provided after analyzing size, type, and location of the facility.



Downtown Network Distribution System

In advance of an interconnection, the DG Owner must contact CPS Energy and complete the “Application for 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):

DG Size Bracket	Fee
All	Cost provided after employment of outside engineering firm

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 kWac per site for commercial and industrial installations. The current fees are as follows (Fees subject to change without notification):

DG Size Bracket	Fee
All	Cost provided after employment of outside engineering firm



Appendix C

Application for Screening Study of DG



**APPLICATION FOR SCREENING 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** charge¹ for each application based on the size of the system as follows (Fees subject to change without notification).

Refer to Appendix B for Screening 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

¹ If the project proceeds to our Interconnection Study phase, this fee will be deducted from construction costs.



Appendix D

Application for Interconnection of DG



APPLICATION FOR 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 (specific 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 interconnection.

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

DG Project Name: _____

Number of units/Configuration of modules: _____

Module manufacturer: _____

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

(Provide detailed information in the Section 4)

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 – upload in PDF format to [CPS Energy’s DG Review Portal](#).

Expected Start-up Date: _____

Please describe the Normal Operation of 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

Single or 3-Phase Winding Configuration
(Choose One)

- 3 Wire Delta
- 3 Wire Wye
- 4 Wire Wye
- Single Phase 2 wire
- Single Phase 3 wire

Neutral Grounding System Used: (Choose One)

- Ungrounded
 - Solidly Grounded
 - Ground Resistor = _____ Ohms
- Provide Grounding Transformer Data as well if applicable



STOP: For DG systems less than 25kW_{ac}, proceed to Section 6 of the application. For all other systems equal to/greater than 25kW_{ac}, proceed to Section 3.

3. DG Systems with Total Capacity (Including Aggregate) of 25kW_{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 – upload in PDF format [to](#) CPS Energy’s DG Review Portal.

Expected Start-up Date: _____

Please describe the Normal Operation of 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): _____

Primary type of application (frequency regulation, spinning reserve, load shifting, demand response etc.): _____

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: _____

- Four quadrant operation? (Yes/No):
- Maximum ac current output (kA):
- Rated ac coupling voltage (kV):

For installations that include a storage medium, please provide the following information:

- Storage type (battery, flywheel, supercapacitors etc.):
- Battery type (if applicable):
- Manufacturer:
- DC Voltage range (V):

Discharge characteristics:

- Rated active power discharge (kW):
- Maximum discharge duration at rated active power (hours):
- Maximum power output/overload capacity (kW):
- Highest C-rate during discharging:
- Maximum power export to the grid in kW (if applicable):

Charge characteristics:

- Rated active power during charge (kW):
- Maximum charge rate (kW/hr):
- Will the resource be charged from the utility grid? (Yes/No):



- Specific charging time period of the day (if fixed and applicable):

Other information:

- Protection settings for the generation resource:
- Power factor capability range at rated active power output:
- Attach capability curve of the resource/inverter (if applicable):
- Maximum short circuit current contribution (p.u):
- Maximum rate of charge/discharge response (ramp up/ramp down limits):
- Maximum auxiliary power requirement (if applicable):
- Expected number of cycles over the asset life span:
- Asset life span:

Model information:

Power Flow model in PSS/E software:

- Load flow files (*.sav, *.raw) of the asset with the resource modeled up to the Point of Interconnection.
- Dynamic model files (*.dyr, *.lib, *.obj) of the asset including all the equipment up to the Point of Interconnection.
- Supporting documentation for the inverter model setup and simulations indicating capability in all the applicable modes of operation.

Electromagnetic Transient Model in PSCAD or related software:

- All the relevant project files, libraries along with a workspace file that loads all the necessary project files for simulation.
- Documentation with information on the required compiler, required simulation time step range, basic model setup, list of tunable parameters, and any limitations.
- Instructions to update the user settable parameters to change the active and reactive power output of the resource, protection limits etc.

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: _____

Gross Nameplate Rating: _____ kVA_{ac}

Gross Nameplate Rating: _____ kW_{ac}

Net Nameplate Rating: _____ kW_{ac}

Power Factor Rating: _____ %

PF Adjustment Range: _____ %

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

Single or 3-Phase Winding Configuration
(Choose One)

- 3 Wire Delta
- 3 Wire Wye
- 4 Wire Wye
- Single Phase 2 wire
- Single Phase 3 wire

Neutral Grounding System Used: (Choose One)

- Ungrounded
- Solidly Grounded
- Ground Resistor = _____ Ohms

Provide Grounding Transformer Data as well, if applicable

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_{ac}: _____ kVA_{ac}

Voltage Ratings: _____ V_{ac}

Tap Ratings: _____

5. CPS Energy DG Interconnection Settings Form

Instructions to DG Owner: A list of CPS Energy 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 filled in and application needs to be signed by the DG Owner.**

Notes:

- *Settings must be either 'Default CPS Value' or within the 'Allowable Range'. 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.*
- *If applying for an inverter-based system (PV, Battery, etc.) please fill in the following voltage and frequency settings in section 5 (a). If applying for rotational machines systems, please fill the voltage and frequency settings in section 5 (b).*

5 (a) Settings for Inverter Based Systems

Prevention of Interference for DG Systems				
Inverter Based				
Voltage				
CPS Energy Requirement Descriptor	Allowable Range	CPS Default Value	Column A: Setting Name	Column B: Setting Value (Required)
Over Voltage Regulation Set point 2 (OV2)	1.2 pu	1.2 pu		_____pu
Over Voltage Time Delay #2	0.16 sec	0.16 sec		_____sec
Over Voltage Regulation Set point 1 (OV1)	$1.10 < V \leq 1.20$ pu	1.1 pu		_____pu
Over Voltage Time Delay #1	1 – 13 sec	13 sec		_____sec
Under Voltage Regulation Set point 1 (UV1)	< 0.88 pu	0.88 pu		_____pu
Under Voltage Time Delay #1	21 – 50 sec	21 sec		_____sec
Under Voltage Regulation Set point 2 (UV2)	< 0.5 pu	0.5 pu		_____pu
Under Voltage Time Delay #2	2 – 21 sec	2 sec		_____ sec



Frequency				
CPS Energy Requirement Descriptor	Allowable Range	CPS Default Value	Column A: Setting Name	Column B: Setting Value (Required)
Over Frequency Regulation Set point 2 (OF2)	61.8 Hz	61.8 Hz		_____Hz
Over Frequency Time Delay #2	0.16 – 1000 sec	0.16 sec		_____sec
Over Frequency Regulation Set point 1 (OF1)	$61.2 < f \leq 61.8$ Hz	61.2 Hz		_____Hz
Over Frequency Time Delay #1	180 - 1000 sec	300 sec		_____sec
Under Frequency Regulation Set point 1 (UF1)	$57.0 \leq f < 58.8$ Hz	58.8 Hz		_____Hz
Under Frequency Time Delay #1	180 - 1000 sec	300 sec		_____sec
Under Frequency Regulation Set point 2 (UF2)	57 Hz	57 Hz		_____Hz
Under Frequency Time Delay #2	0.16 – 1000 sec	0.16 sec		_____sec

Note: Above set points are based on a nominal frequency of 60 Hz. CPS Energy may ask for different setpoint to coordinate with under-frequency load shedding programs and expected frequency restoration time.



5 (b) Settings for Synchronous Generator Systems

Prevention of Interference for DG Systems				
Synchronous Generator Based				
Voltage				
CPS Energy Requirement Descriptor	Allowable Range	CPS Default Value	Column A: Setting Name	Column B: Setting Value (Required)
Over Voltage Regulation Set point 2 (OV2)	1.2 pu	1.2 pu		_____pu
Over Voltage Time Delay #2	0.16 sec	0.16 sec		_____sec
Over Voltage Regulation Set point 1 (OV1)	$1.10 < V \leq 1.20$ pu	1.1 pu		_____pu
Over Voltage Time Delay #1	1 – 13 sec	2 sec		_____sec
Under Voltage Regulation Set point 1 (UV1)	< 0.88 pu	0.7 pu		_____pu
Under Voltage Time Delay #1	2 - 21 sec	2 sec		_____sec
Under Voltage Regulation Set point 2 (UV2)	< 0.5 pu	0.45 pu		_____pu
Under Voltage Time Delay #2	0.16 – 2 sec	0.16 sec		_____ sec



Frequency				
CPS Energy Requirement Descriptor	Allowable Range	CPS Default Value	Column A: Setting Name	Column B: Setting Value (Required)
Over Frequency Regulation Set point 2 (OF2)	> 61.8 Hz	61.8 Hz		_____ Hz
Over Frequency Time Delay #2	0.16 – 1000 sec	0.16 sec		_____ sec
Over Frequency Regulation Set point 1 (OF1)	$61.2 < f \leq 61.8$ Hz	61.2 Hz		_____ Hz
Over Frequency Time Delay #1	180 - 1000 sec	300 sec		_____ sec
Under Frequency Regulation Set point 1 (UF1)	$57.0 \leq f < 58.8$ Hz	58.8 Hz		_____ Hz
Under Frequency Time Delay #1	180 - 1000 sec	300 sec		_____ sec
Under Frequency Regulation Set point 2 (UF2)	< 57 Hz	57 Hz		_____ Hz
Under Frequency Time Delay #2	0.16 – 1000 sec	0.16 sec		_____ sec

Note: Above set points are based on a nominal frequency of 60 Hz. CPS Energy may ask for different setpoint to coordinate with under-frequency load shedding programs and expected frequency restoration time.



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 1547-2018, 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:

CPS Energy Reviewer Name (Print): _____

Signature: _____ Date: _____



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 Interconnection Requirements and the Interconnection Terms, applicable CPS Energy Rates and Riders, CPS Energy Customer Terms and Conditions Applying to Retail Utility Service (formerly known as CPS Energy Rules and Regulations Applying to Retail Utility Service), Revised and Effective: March 1, 2019 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 Interconnection Terms



DISTRIBUTED GENERATION 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 interconnection to CPS Energy’s System, may be installed/interconnected to CPS Energy’s System, in accordance with the “Terms” found herein and the Interconnection Requirements for Distributed Generation.

(“Interconnection Requirements”) found on the 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 customer terms and conditions for Electric and Gas Service (“Customer Terms and Conditions”), CPS Energy’s applicable Rate Schedules (“Rates”), the Interconnection Requirements and the Terms. All terms to be included in execution of final Interconnection Agreement.

2. Interconnection of DG Facility

DG Owner or its contractor shall design and install the DG Facility, as necessary for the interconnection of DG Owner’s DG Facility to CPS Energy’s System at the Point of Interconnection as located and described in the 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 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 “Interconnection Facilities” are defined as all facilities required by CPS Energy as a result of interconnection to the DG to allow the safe, reliable interconnection and operation of the DG. CPS Energy will design the Interconnection Facilities such that the 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 Interconnection Requirements.

3. Inspection of DG Facility

Prior to connection of the DG Facility to the 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 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 Interconnection Facilities

Following approval of the Application and prior to commencement of construction of the 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 Interconnection Requirements ("Interconnection Costs"). DG Owner shall pay CPS Energy the Interconnection Costs within thirty (30) days from the date of the postmark or electronic mail (e-mail) of such invoice, the 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 Interconnections 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 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 Customer Terms and Conditions 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 Interconnection

DG Owner will maintain and operate the DG Facility in strict accordance with these Terms and the Interconnection Requirements. CPS Energy's operation and maintenance of the 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 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 Nodal 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 kW_{ac}. **For DG systems 500 kW_{ac} and larger, notice to CPS Energy is required as outlined in the 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 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 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 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 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 Customer Terms and Conditions. **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 kW_{ac} and prior to 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 per occurrence shall be not less than provided in the 'Section 4.8: Liability Insurance' 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 kW_{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.

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 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 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 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 Customer Terms and Conditions 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 Customer Terms and Conditions 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 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 Interconnection of Distributed Generation (DG Application) - The standard form of Application for 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 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 Electric Reliability Council of Texas (ERCOT) manages the flow of electric power to more than 26 million Texas customers -- representing about 90 percent of the state's electric load. As the independent system operator for the region, ERCOT schedules power on an electric grid that connects more than 46,500 miles of transmission lines and 650+ generation units. It also performs financial settlement for the competitive wholesale bulk-power market and administers retail switching for 8 million premises in competitive choice areas. ERCOT is a membership-based 501(c)(4) nonprofit corporation, governed by a board of directors and subject to oversight by the Public Utility Commission of Texas and the Texas Legislature. Its members include consumers, cooperatives, generators, power marketers, retail electric providers, investor-owned electric utilities, transmission and distribution providers and municipally owned electric utilities.



EMC – Energy Management Center

Energy Supply & Market Operations - The department within CPS Energy that has the daily responsibility for generating unit commitments and operational load forecasting.

Facility Construction Study – A written report including at least the following elements: (1) summary of the System Impact Study; (2) estimated Customer costs for work necessary to interconnect the Facility to the CPS Energy System; (3) schedule of CPS Energy system modifications; and (4) an estimated construction timeline as ascribed in Exhibit G. The Facility Construction Study Estimate will be made available to the owner of the Facility.

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

Interconnection Terms (IT) - The standard form of terms which have been approved by CPS Energy. The 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.

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

Interconnection Study - A study or studies that may be undertaken by CPS Energy in response to its receipt of a completed application for interconnection and parallel operation with the utility system. 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 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_{ac} - Kilowatt, an amount of power equal to one thousand watts.

MW_{ac} - 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

Screening Study- A site specific study performed on the CPS Energy distribution system facilities in and around the proposed Facility site to determine whether the distribution system will require upgrades to ensure the availability of adequate system capacity and other services necessary to accommodate the interconnection of the Facility, as well as determine the Point of Interconnection.



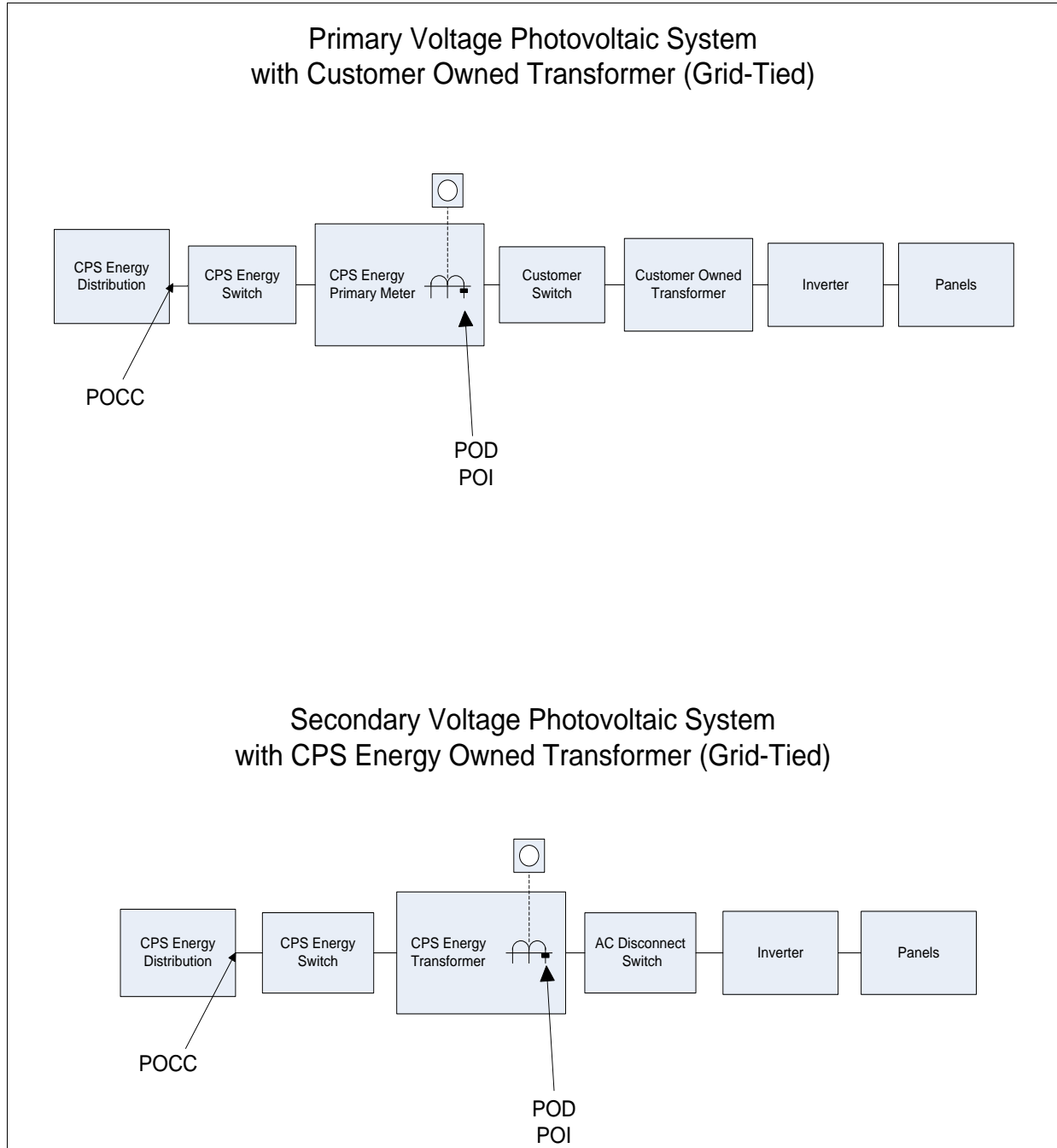
Stabilized - A utility system is considered stabilized when, following a disturbance, the system returns to the normal range of voltage and frequency for a duration of two minutes or a shorter time as mutually agreed to by the utility and DG Owner.

Switchgear - An enclosed metal assembly containing components for switching, protecting, monitoring and controlling electric power systems.

System Impact Study – The distribution-level, 60 kV or less, steady-state and dynamic studies performed by or on behalf of CPS Energy intended to determine the expected impacts of the proposed Facility on the CPS Energy System. This study takes into account the requested modes of operation and reports the necessary upgrades, improvements, or changes needed to allow the interconnection on the distribution system.

POCC, POD, & POI LOCATIONS ILLUSTRATION

Figure AF-1 POCC, POD, POI locations illustrations for grid-tied only^{2, 3}



² For illustrative purposes only, NOT intended for design and/or construction

³ For additional examples refer to the CPS Energy Electric Service Standards, Section 2000

Figure AF-2 - Energy Storage Interconnections Typical Oneline

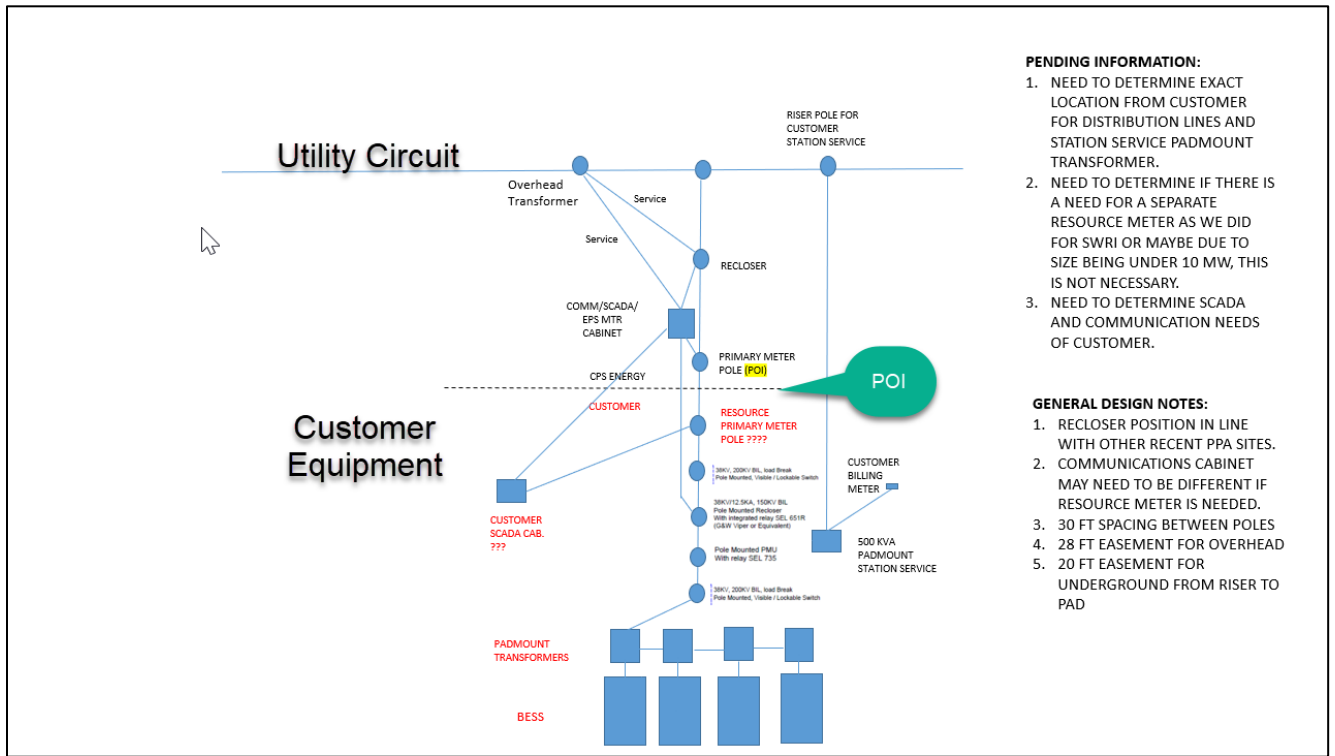
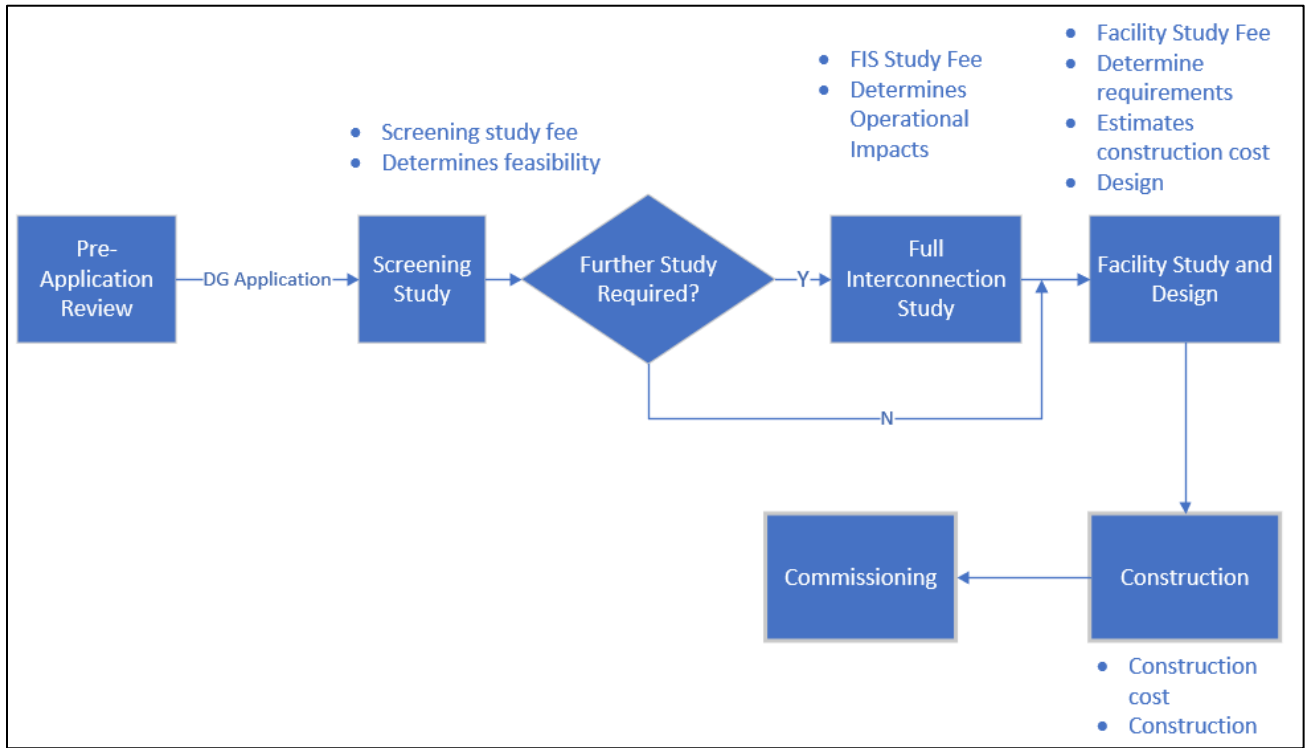


Figure AF-3 – Typical Interconnection Procedure





Appendix G

Data Security and Privacy

Cybersecurity Requirements

The following terms shall supplement the Agreement as applicable. To the extent that the terms of this Appendix G conflict or are inconsistent with any terms of the Agreement, the terms of this Appendix G shall control, but only to the extent of the inconsistency.

1. Customer Personnel. The following provisions shall be applicable to all Customer Personnel:

- a. **Background Investigations.** Customer agrees that all Customer Personnel must pass a Background Investigation (hereinafter defined) confirming the individual's suitability for employment and placement in a position of trust. Customer must use a nationally recognized background investigation company to conduct criminal history checking and verification of education, employment history, Social Security Number, and legal right to work, as described below (collectively referred to as a "**Background Investigation**").
 - i. Background Investigations for Customer Personnel based in the United States include:
 1. a federal and state check for felony and misdemeanor criminal convictions in all locations where the assigned employee has resided, has been employed, has attended school, or has applied for credit in the immediately preceding seven (7) years, including a criminal database check of information from all fifty states for federal and state convictions, a check for outstanding warrants and a check for pending felony charges in all such locations, provided that statewide county searches shall be performed in all states where such search mechanism is available without requiring specialized data (such as fingerprints or DNA);
 2. a check of U.S. Government Specially Designated Nationals and export denial lists, including criminal records search in the National Criminal Database, a check against the Office of Foreign Assets Control list (the "**OFAC List**"), a check against the Bureau of Industry and Security Denied Persons List (the "**BISDP List**"), a check against the Office of Inspector General Exclusion List (the "**OIG List**"), a check against the General Services Administration Excluded Parties List ("**GSA List**"), and a check against any similar type or named exclusionary lists as may be created by the U.S. Government or the State of Texas (an "**Exclusionary List**");
 3. an all-fifty state check of available national, state, and territory sex offender registries;
 4. the name to which such individual's Social Security Number is attributed shall be verified;
 5. the individual's identity shall be verified by an independent identity check by passport or other similar government document;

6. the individual's citizenship, most recent country of permanent residence, and legal right to work in the jurisdiction in which the employee will be performing services shall be verified;
 7. confirmation of academic and professional qualifications, including the highest diploma, degree, or certificate earned; and
 8. employment history, including dates of employment, employers, and positions held, each as provided by the individual and/or as set forth on the individual's resume shall be verified for employment and military service.
- ii. For all Customer Personnel based outside the United States, the Background Investigation shall be equivalent to those set forth in Section 1(a)(i) above and consistent with the applicable non-U.S. laws in the country where the Customer Personnel are based. CPS Energy reserves the right to request what Background Investigations Customer will conduct, or has conducted, to comply with this section, and Customer will provide such information to CPS Energy promptly.
 - iii. Customer shall not provide any Customer Personnel with access to CPS Energy Information or CPS Energy Information Systems if such individual: (1) has been convicted of a felony or misdemeanor for fraud, theft, embezzlement, or other similar crimes involving dishonesty or breach of trust (or the equivalent thereof under relevant non-U.S. law); (2) for whom such a felony or misdemeanor charge is currently pending; (3) for whom any warrant is outstanding; (4) is on any of the following lists: (A) the U.S. Government Specially Designated Nationals and export denial list; (B) the OFAC List; (C) the BISDP List; (D) the OIG List; (E) the GSA List; or (F) an Exclusionary List; (5) for whom there is a significant deviation between the information reported by the individual and results of the background check; or (6) is determined not to be suitable for employment and placement in a position of trust.
 - iv. From time to time upon request of CPS Energy, Customer shall certify to CPS Energy that Customer has caused the Background Investigation to be performed on Customer Personnel with access to CPS Energy Information or CPS Energy Information Systems. Further, Customer shall thereafter certify to having met the foregoing requirements upon authorizing any additional Customer Personnel to access CPS Energy Information.
- b. **Customer Systems and Cyber Security.** To the extent that Customer uses cloud computing applications to access, control, charge, or discharge a Customer Energy Storage Resource, Customer shall take all necessary security measures in accordance with current industry accepted controls to protect Customer's computer systems, networks and databases, and the data processed, transmitted, or stored thereon, including Sensitive Information, against the risk of penetration and alteration by, or exposure to, a third party via any system or feature utilized by Customer or any third party vendor or subcontractor of Customer providing services to Customer or accessing such systems.
 - c. **Access to CPS Energy Systems.** If Customer connects to CPS Energy Information Systems for any reason related to the interconnection of Customer Equipment, Customer

shall not attempt to access CPS Energy Information Systems, either via its personnel performing services onsite, or remotely, without CPS Energy's prior written consent.

- d. **Right to Approve Customer Personnel.** Any Customer Personnel with access to CPS Energy Facilities are subject to the approval of CPS Energy, which may be withheld or revoked for any reasonable reason in its discretion.
- e. **Notice Regarding Customer Personnel.** If Customer has access to CPS Energy Facilities, CPS Energy Information, or CPS Energy Information Systems, Customer shall provide CPS Energy written notice within the twenty-four (24) hour period following any Customer termination of Customer Personnel possessing such access to allow for prompt removal of access to CPS Energy Information Systems. Customer will give CPS Energy advance written notice of at least ten (10) business days if Customer intends to substitute or replace any such Customer Personnel. If CPS Energy has not provided reasonable grounds for the withholding or revocation of its approval, then Customer shall be relieved of its obligations to perform under the Agreement to the extent and for such period that it is delayed in performing them by reason of lack of CPS Energy approval.
- f. **Breach of Network Security.** Customer agrees to notify CPS Energy before going public and simultaneous with any required third party notification, but in no event longer than seventy-two (72) hours from Customer's discovery of any fault or breach of Customer's data security procedures or any provision contained in this Appendix G that results in any actual or threatened loss, corruption, or alteration of any Sensitive Information or any content, data, or actions that could intrude upon or harm a BES Cyber System. Customer shall notify the CPS Energy service desk at (210) 353-2020, or as updated in writing. In such instance, in addition to Customer's other obligations under the Agreement, or under any law, Customer agrees to promptly remedy any such fault or breach and to fully cooperate with CPS Energy in resolving such fault or breach.
- g. **CPS Energy Data Destruction.** At the completion or termination of the Agreement, any CPS Energy data, including Sensitive Information, obtained by Customer should be properly disposed of based on minimum requirements of the U.S. Department of Defense standards. An officer of Customer shall certify in writing that CPS Energy Information and Sensitive Information has been disposed of properly in accordance with the NIST Special Publication 800-88 Destroy Sanitization method or the U.S. Department of Defense Standards.
- h. **Remedies.** If Customer fails (or threatens to fail) to comply with any of the provisions set forth in this Appendix G, CPS Energy shall have the right, in addition to any other remedies available to it, to seek injunctive relief to enjoin such acts, it being specifically acknowledged by the Parties that any other available remedies are inadequate.
- i. **Limitations of Liability.** Notwithstanding any provisions in any agreement to the contrary purporting to limit the liability of Customer, Customer shall remain fully liable for all damages arising from its breach of confidentiality obligations related to CPS Energy's Sensitive Information or any requirement contained in this Appendix G.

2. **Additional Provisions for Customers.** The following additional provisions shall apply:

- a. **CPS Energy Information Systems Use.** If Customer connects to CPS Energy Information Systems for any reason related to the interconnection of Customer Equipment, Customer

shall comply with CPS Energy's Information Systems Use Policy, as published by CPS Energy and as may be modified and in effect from time to time.

- b. **CPS Energy Cyber / Information Systems.** If Customer connects to CPS Energy Information Systems for any reason related to the interconnection of Customer Equipment, Customer shall comply with CPS Energy's Enterprise Cyber Security Policy (Non-NERC), as published by CPS Energy and as may be modified and in effect from time to time.
 - c. **Least Privilege.** Customer agrees to adhere to the principle of least privilege for Customer's account and network access.
 - d. **Authentication and Encryption.** Customer agrees that no controls systems access to external networks, including the internet, will be permitted. Use of strong authentication (such as multifactor authentication) and encryption is used on the website(s) or other methods of communication. Customer shall maintain an access control list for all access to the internal network from an external network and Customer agrees that any of its servers exposed to the internet run on a system utilizing industry standard cybersecurity controls. In addition, any internet-facing server must have a demilitarized zone ("DMZ") that sits between it and Customer's network. The DMZ must be separated by firewalls at each border and incorporate security monitoring safeguards.
 - e. **Data Exchanges and Transfers.** If Customer connects to CPS Energy Information Systems for any reason related to the interconnection of Customer Equipment, any exchange of Sensitive Information shall be protected with the leading industry standard encryption methods for secure data (e.g. Secure FTP, TLS 1.1 or 1.2, as of the Effective Date). CPS Energy may from time to time issue written notice to Customer of required encryption methods and Customer shall comply with such requirements within thirty (30) days of the date of such notice. Customer will also support the exchange of delta information to avoid the sending of Sensitive Information, including full customer and/or employee data, on a frequent basis. Full data exchanges will be limited.
 - f. **CPS Energy's Right to Audit and Review Security Controls.** CPS Energy, at its sole option, shall have the right to review Customer's security controls at any time to determine if they are adequate to protect CPS Energy's Sensitive Information and may, in its discretion, direct improvements of such security controls to prevent malicious or inappropriate access to source code, data, graphics, or audio/visual material used to perform hereunder. CPS Energy shall have the right to review any audit logs kept for all transactions allowed through firewalls or security devices/systems. CPS Energy has and shall have the right to periodically audit Customer's use of the hardware, software, systems, and Sensitive Information.
 - g. **CPS Energy Cybersecurity Training.** Customer shall implement a cybersecurity training program in accordance with NERC CIP 4.
3. **Additional Provisions for Customers Utilizing Cloud Based Services.** To the extent Customer utilizes cloud computing applications or any external solution to host, process, maintain, store, or transmit any information related to accessing, controlling, charging, or discharging a Customer Energy Storage Resource, the following additional provisions shall apply:
- a. **Security Controls.** Customer shall maintain all information systems, data, and Sensitive Information on its internal network utilizing industry-accepted cybersecurity controls

framework (*i.e.*, NIST CSF, CSI 20, COBIT). Customer agrees to maintain appropriate levels of internal controls for granting access to source code, data, graphics, audio/visual materials, and the like used in carrying out the purposes of the Agreement, including the use of strong authentication, such as a mutually agreed upon multifactor authentication, to allow limited and controlled access to Customer's internal network and data.

- b. **Minimum Requirements.** The following minimum requirements must be maintained during the term of Customer's engagement with CPS Energy:
- i. Required Service Organization Control (SOC) report as set forth in Section 3(c) below, and Customer shall review all applicable SOC reports on a yearly basis from each of its service providers.
 - ii. Required completion of Consensus Assessment Initiative Questionnaire (CAIQ) as set forth in Section 3(c) below.
 - iii. Password requirements:
 1. Password complexity (8 characters, upper case/lower case/special character or number, or use of passphrases with 16 characters or more);
 2. Passwords must be changed at a minimum every ninety (90) days (required for externally hosted business applications used by CPS Energy personnel);
 3. Maintain password history of last five (5) previously used passwords;
 4. Have a mechanism to recover passwords;
 5. Support the use of CAPTCHA for external logins;
 6. User ID and passwords must be transmitted securely using industry accepted standards such as HTTPS; and
 7. Utilization of mutually agreed upon Multifactor Authentication (MFA) for external and critical systems
 - iv. Support federation services/technology to support single sign-on.
 - v. Support secure file transfers via PGP over FTP, SFTP or HTTPS (cryptographic standards must adhere to FIPS 160 controls).
 - vi. Provide website application time-out after an extended period of inactivity (maximum of thirty (30) minutes), this timeout must include session tokens as well as active sessions.
 - vii. The internet web site must be accessible using the current Microsoft Internet Explorer supported by CPS Energy or higher.
 - viii. Customer must provide audit trails, logging, or security reports that track activities performed by users. Audit trails should include identity of the user performing

activity, date, and time stamp. At a minimum, audit trails, logging, or security reports must be provided for the following activities:

1. User logins (successful and failed login attempts);
2. Password recoveries (successful and failed attempts); and
3. User access report, that provides complete user list with last successful login date.

c. **Data Security Reporting.**

- i. Customer agrees to review its subcontractor SOC 2 reports on an annual basis, and upon CPS Energy's request shall promptly provide documentation supporting Customer's subcontractor's compliance with the requirements set forth herein.
- ii. If a SOC 2 Type 2 report is required, CPS Energy will determine the specific trust services principles that will be required for the SOC 2 Type 2 report.
- iii. Annually, on or before the anniversary of the Effective Date, Customer shall provide the required SOC report to CPS Energy.
- iv. If Customer fails to timely provide the required SOC report, CPS Energy may terminate the Agreement, in whole or part without liability.
- v. Additionally, if Customer fails to timely and properly address control gaps identified within the required SOC report, CPS Energy may terminate the Agreement, in whole or part without liability.
- vi. If requested by CPS Energy, Customer shall provide CPS Energy with a completed CAIQ. CPS Energy will not accept CAIQ's that do not contain detailed descriptions of how each control is met. If a control is not met, Customer must state how they will mitigate the exposure due to lack of controls.

CPS Energy Security Policies

Note: This Appendix includes the following four security policies, which are attached:

1. CPS Energy Enterprise Cyber Security Policy Non-NERC
2. CPS Energy Information Security Policy
3. CPS Energy General Workplace Security Policy
4. CPS Energy Information Systems Use Policy

Security Policies 1, 2, and 4 are only applicable if Customer connects to CPS Energy Information Systems for any reason related to the interconnection of Customer Equipment. Security Policy 3 is of general applicability and applies to Customer as appropriate.



Appendix H

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 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. 100-1996, IEEE Standard Dictionary of Electrical and Electronic Terms

ANSI/IEEE Std. 493-1900 IEEE Recommended Practice for Design of Reliable Industrial and Commercial Power Systems (IEEE Gold Book)

ANSI/IEEE Std. 1100-1992 IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment (IEEE Emerald Book)

ANSI/IEEE Std. 1159-1995 IEEE Recommended Practice for Monitoring Electric Power Quality

ANSI/IEEE Std. 1250-1995 IEEE Guide for Service to Equipment Sensitive to Momentary Voltage Disturbances

ANSI/IEEE Std. C37.04 ANSI/IEEE Standard Rating Structure for AC High-voltage Circuit Breakers Rated on a Symmetrical Current Basis

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. C37.108-1989 IEEE Guide for the Protection of Network Transformers

ANSI/IEEE Std. C37.13 ANSI/IEEE Standard for Low-voltage AC Power Circuit Breakers Used in Enclosures

ANSI/IEEE Std. C37.14 ANSI/IEEE Standard for Low-voltage DC Power Circuit Breakers Used in Enclosures

ANSI/IEEE Std. C37.16 ANSI/IEEE Standard for Low-voltage Power Circuit Breakers and AC Power Circuit Protectors – Preferred Ratings, Related Requirements, and Application

ANSI/IEEE Std. C37.18 ANSI/IEEE Standard Enclosed Field Discharge Circuit Breakers for Rotating Electric Machinery

ANSI/IEEE Std. C37.2 IEEE Standard Electrical Power System Device Function Numbers

ANSI/IEEE Std. C37.27 ANSI/IEEE Standard Application Guide for Low-voltage AC Non-integrally Fused Power Circuit Breakers (Using Separately Mounted Current-Limiting Fuses)

ANSI/IEEE Std. C37.29 ANSI/IEEE Standard for Low-voltage AC Power Circuit Protectors Used in Enclosures

ANSI/IEEE Std. C37.50 ANSI Standard Test Procedures for Low-voltage AC Circuit Breakers Use in Enclosures



ANSI/IEEE Std. C37.51 ANSI Standard Conformance Test Procedure for Metal Enclosed Low-voltage AC Power Circuit-Breaker Switchgear Assemblies

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

ANSI/IEEE Std. C37.95 IEEE Guide for Protective Relaying of Utility Consumer Interconnections

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

ANSI/IEEE Std. C57.12.40-1994 American National Standard for Secondary Network Transformers - Subway and Vault Types (Liquid Immersed) - Requirements

ANSI/IEEE Std. C57.12.44-1994 IEEE Standard Requirements for Secondary Network Protectors

ANSI/IEEE Std. C84.1-1995, Electric Power Systems and Equipment - Voltage Ratings (60Hertz)

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 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

<p>National Fire Protection Association (NFPA)</p>	<p>1 Batterymarch Park Quincy, MA 02269-9101 Phone (617) 770-3000, Fax: (617) 770-0700 Web: http://www.nfpa.org</p>
<p>Underwriters Laboratories (UL)</p>	<p>333 Pfingsten Road Northbrook, IL 60062-2096 Phone: (847) 272-8800, Fax: (847) 272-8129 Web: http://www.ul.com/</p>
<p>Wyle Laboratories, Inc.</p>	<p>7800 Highway 20 West Huntsville, AL 35806 Phone: (256) 837-4411, Fax: (256) 721-0144 Web: http://www.wylelabs.com</p>
<p>Institute of Electrical and Electronics Engineers (IEEE)</p>	<p>445 Hoes Lane, PO Box 459 Piscataway, NJ 08855-0459 Phone: (800) 678-4333 Web: http://www.ieee.org</p>
<p>National Renewable Energy Laboratory</p>	<p>1617 Cole Boulevard Golden, CO 80401 Phone: (303) 275-3000, Fax: (303) 275-4053 Web: http://www.nrel.gov</p>
<p>Sandia National Laboratories, Photovoltaic Systems Assistance Center</p>	<p>P.O. Box 5800, Division 6218 Albuquerque, NM 87185 Phone: (505) 844-8161, Fax: (505) 844-6541 Web: http://www.sandia.gov/Renewable_Energy/photo_voltaic/pv.html</p>

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, 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: Interconnection Requirements for DG; Updated Feasibility & Interconnection Study Fees in Appendix B
- February 1, 2014: Interconnection Requirements for DG; Revised application and removed Exhibits. Application for 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: Interconnection Requirements for DG; Section 2.6; Added adjustable reactive output capability
- January 15, 2016: Interconnection Requirements for DG; Section 2.7.6; Added ERCOT operating guide for voltage ride through and diagram.
- January 15, 2016: Interconnection Requirements for DG; Section 2.10; removed option to provide (4) 20mA input to the RTU.
- January 15, 2016: Interconnection Requirements for DG; Section 2.10; added language clarifying where communication equipment will reside.
- January 15, 2016: Interconnection Requirements for DG; Section 2.10; modified multimode fiber connection to a fiber to serial transceiver requirement.
- January 15, 2016: 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.
- August 14, 2019: Reorganized sections and deleted duplicate paragraphs.
- October 10, 2019: Added back kW_{ac} , and kVA_{ac} requirements.
- December 3, 2020: Updated voltage and frequency ride through requirements; Updated interference table to meet new IEEE 1547 standard; Revised Appendix D to include additional requirements for Battery.
- December 22, 2021: Added DG Registration and Emergency Operation Plan for

Battery; Updated 'Rules and Regulations' to 'Terms and Conditions'; Added Liability Insurance table; Updated screening fee.

- May 1, 2024: Updated DTT requirements; Added facility study; Added typical interconnection flowchart.