



Interconnection Requirements for Distributed Energy Resources

CPS Energy and the Distributed Energy Resource Facility Owner (“Owner”) recognize the importance of having design, operational, and maintenance requirements to coordinate the interconnection of Owner's system with CPS Energy's system. This document addresses typical requirements for interconnecting Distributed Energy Resources (“DER”) Facilities to the CPS Energy system.

1. General Requirements.

1.1. Notice to All Owner’s Personnel. The Owner’s contractors, agents, and operating/maintenance personnel shall be informed of and follow the requirements that are applicable to the specific DER Facility as listed in the Interconnection Agreement (IA). Advanced notice of intent and verification of compliance is required before connecting to CPS Energy system.

1.2. Notifying CPS Energy. Unless otherwise stated in this document any required notification to CPS Energy shall be made to the CPS Energy DER Department.

1.3. Display of Documents. Copies of the IA along with this document shall be posted in the DER Facility and all facilities associated with the operation of the DER Facility.

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

1.5. Disconnect. CPS Energy may disconnect the generator from the distribution system in an emergency, or should the Owner fail to install, operate, and maintain all wiring and equipment in such condition and/or manner that endangers persons or property, or may cause impairment of CPS Energy's interconnection and service to Owner, or any of CPS Energy's distribution customers.

1.6. Definitions.

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

1.6.2. Point of Common Coupling (PCC) - From the perspective of the DER,



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 measured, as it best represents the DER's impact on other customers connected to the CPS Energy System.

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

1.6.4. DER Facilities/System - All facilities installed, including the DER generator itself, to connect the DER to the POI.

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

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

1.6.7. SCADA - Supervisory Control and Data Acquisition.

1.6.8. EMC – CPS Energy's Energy Management Center.

1.6.9. Interconnection Agreement (IA) – Agreement executed between CPS Energy and Owner.

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

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

2.1. Design Considerations.

2.1.1. Standards. The Owner's equipment shall be designed in accordance with but not limited to UL Standards, Institute of Electrical and Electronics Engineers (IEEE) Standards, the National Electrical Code (NEC), the National Electrical



Safety Code (NESC), the ERCOT Operating Guides, CPS Energy Electric Service Standards and any other applicable local, state or federal codes or standards.

2.1.2. Safety.

2.1.2.1. Visual Disconnect. 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 Owner shall follow CPS Energy's switching, clearance, tagging, and locking procedures, which CPS Energy shall provide for the Owner.

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

2.1.3. Listed or Certified Equipment. For DER Systems up to 50 kW, certified equipment and equipment listed with an approved test label up to 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 Owner's design by CPS Energy. When the 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 equipments see one of the following web sites:

<http://www.gosolarcalifornia.ca.gov/equipment/inverters.php>

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

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

2.1.5. Remote Disconnect Control. If the DER is 2 MW or larger or CPS Energy determines (based on studies or reviewing test results) that a DER may not trip properly when isolated from CPS Energy's system, CPS Energy shall provide (at the Owner's expense) a communication channel to support



communication between CPS Energy and the Owner's facility. The channel may be a leased data circuit or other mutually agreed upon medium.

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

2.1.7. Exporting Power to CPS Energy. Exporting to CPS Energy may require additional operational or protection devices and will require coordination of operations with CPS Energy.

2.2. Prevention of Interference.

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

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

2.2.3. Test Current Injection. Test method shall conform to current IEEE anti-islanding standards. Direct current (DC) must be no greater than 0.5% of rated output current.

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



Interference Table		
CPS Energy DER Operating Variable	Trigger Point for Disconnect	Maximum Time to Disconnect (Reference)
1. Voltage @ Point of Interconnection (POI)		
Over Voltage Set point #1	+5% of nominal voltage	2 sec (PUCT)
Under Voltage Set point #1	-10% of nominal voltage	2 sec
Over Voltage Set point #2	+10 % of nominal voltage	0.167 sec
Under Voltage Set point #2	-30% of nominal voltage	0.167 sec
2. Flicker	Voltage at the POI must be less than 3% voltage dip (as defined by the “Maximum Borderline of Irritation Curve” in IEEE 519)	
3. Frequency		
Over Frequency Set point	+0.5 Hz from base frequency	0.25 sec
Under Frequency Set point	-0.7 Hz from base frequency	0.25 sec
4. Harmonics		(IEEE 519)
Total Harmonic Distortion	<5.0% of fundamental frequency	
Individual Harmonics	<3.0% of fundamental frequency	
5. Fault and Line Clearing for Loss of Voltage on any phase of CPS Energy circuit	-30% of nominal voltage	0.167 sec
6. Direct Current Injection	< 0.5% of DER Facility rated output current. (IEEE 1547-2003)	

Note: “Over Voltage Regulation Set point #1” should not be greater than +5% because CPS Energy cannot subject other customers to voltage of +5 - +10% for more than 30 seconds at PCC according to Texas PUC. If greater than +5% is desired, CPS Energy will require voltage calculations prior to approval of installation.

2.3. Single Phase DER--Control, Protection and Safety Equipment. Equipment required for control, protection and safety specific to single phase DER, typically of 50 kilowatts (kW) or less.

- interconnect disconnect device at the POD and at the DER Facility when required
- an over/under voltage trip
- an over/under frequency trip
- synchronizing check for switching

2.4. Three-Phase DER--Control, Protection and Safety Equipment. This section



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

2.4.1. Three-phase Synchronous Generators.

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

2.4.2. Three-Phase Induction Generators. Induction generation may be connected and brought up to synchronous speed (as an induction motor) if it can be demonstrated that the initial voltage drop measured on CPS Energy side at the PCC is within the visible flicker stated in Section 2.2 of this document. Otherwise, the Owner may be required to install hardware or employ other techniques to bring voltage fluctuations to acceptable levels.

2.4.3. Line-Commutated Inverters do not require synchronizing equipment.

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

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

2.4.5.1. All DER installations shall have:

- Interconnect disconnect device
- DER disconnect device
- Over-voltage trip
- Under-voltage trip
- Over/under frequency trip
- Manual or automatic synchronizing check (for facilities with stand alone capability).



2.4.5.2. For 25 kW but not more than 500 kW, the installation shall also have, in addition to the above requirements:

- Either a ground over-voltage trip or a ground over-current trip depending on the grounding system if required by CPS Energy,
- Reverse/under power sensing if the facility is not exporting (the DER is less than the minimum load of the Owner's facilities).

2.4.5.3. For 500 kW but not more than 2,000 kW, the installation shall also have in addition to the above requirements:

- Automatic synchronizing check (for facilities with stand alone capability)
- If the facility is exporting power, the power direction protective function may be used to block or delay the under frequency trip with the agreement of CPS Energy.

2.4.5.4. For 2,000 kW up to 10,000 kW, the installation shall also have, in addition to the above requirements:

- Telemetry/transfer trip may also be required by CPS Energy as part of a transfer tripping or blocking protective scheme.

2.4.6. Exporting Power - If the three phase generator is greater than 50 kW and is exporting power to CPS Energy, the generator power factor must be remotely adjustable from +/- 0.95 and conform to SCADA RTU communication requirements. (Note the VAR output must be +/- 0.31 per unit.)

2.5. System Acceptance and Commissioning.

2.5.1. Inspection and Start-up Testing.

2.5.1.1. Startup Notice -The Owner shall provide CPS Energy with notice at least two weeks before the initial energizing and start-up testing of the Owner's DER equipment and CPS Energy may witness the testing of any equipment and protective systems associated with the interconnection.

2.5.1.2. For 500 kW and Greater, Before Initial Parallel Operation;

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



revise and re-submit the Interconnection Application with information reflecting the modifications.

2.5.1.3. For 500 kW and Greater, During Start-up Tests on All DERs - Set AC Power Quality monitoring at the POI to verify conformance with the interference table.

2.5.1.4. For 500 kW and Greater, Provide a Commissioning Report - Owner shall submit a summary report containing the test procedures used and the results of the tests within thirty (30) days of testing. The report shall be submitted to the CPS Energy DER Department. Thereafter, Owner may be required to retest the system protection elements upon any reasonable request by CPS Energy.

2.5.2. Site Testing and Commissioning.

- Testing of protection systems shall include procedures to functionally test all protective elements of the system up to and including tripping of the DER and interconnection point disconnects.
- Visual inspection shall be made to ensure grounding coordination requirement of IEEE 1547-2000 section 4.1.2 has been implemented.
- Testing will verify all protective and power quality set points and relay/breaker trip timing. CPS Energy may witness the testing of installed switchgear, protection systems, and DER controls.

2.5.3. Final Setup Information. For DER 500 kW and over, the Owner shall provide a list of set points for all protection equipment and regulation equipment to CPS Energy DER Department at the time of acceptance. This may be a picture, screen shot, printout or other form of verification acceptable to the CPS Energy DER Department.

2.6. Metering.

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

- For DER Facilities up to a 50 kW designed output, a CPS Energy revenue meter



shall be installed at the inverter output, in addition to any premises metering. This is not an ERCOT meter point.

- For DER Facilities greater than 50kW and up to the registration threshold, which is presently 1MW output (as per ERCOT Protocol Section 10.2.2), metering is required to capture the power delivered to the bulk CPS Energy distribution system for ERCOT reporting as described in ERCOT Protocol 10.2.2. Meter data for settlement is not required to be submitted to ERCOT.
- DER Facilities greater than 1MW (the current registration threshold) and less than 10MW output, will require a Transmission and/or Distribution Service Provider (TDSP) ERCOT meter to provide settlement meter data. DER's must be registered with ERCOT and CPS Energy must read, validate, edit, and submit meter data to ERCOT. This data must be validated and edited in accordance with the Texas Standard Electronic Transaction (SET) Protocols found on the ERCOT website. At CPS Energy's discretion, this meter point may be made an ERCOT Polled Settlement (EPS) meter point and ERCOT will directly poll the meter.
- All DER Facilities 10MW and greater will be EPS metered. Multiple DER Facilities connected at one meter point with a combined capability of 10 MW or greater may require gross real-time MW and MVAR telemetry from each DER Facility.

2.6.2. Meter Location. The DER 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 Interconnection Agreement. Typical meter locations are as follows:

- Meter enclosure(s) or meter sockets shall be located adjacent to respective DER switchgear and not attached to or inside switchgear.
- CPS Energy metering instrument transformers located in the DER switchgear shall meet the requirements outlined in the CPS Energy Electric Service Standards. Instrument transformers shall meet CPS Energy requirements for potential and current transformers.
- Meter enclosures associated with Utility pole mounted instrument transformers shall be located adjacent to the Utility pole. Utility pole mounted instrument transformers will be provided and installed by CPS Energy.



2.6.3. Installation. CPS Energy shall supply, specify, own, and maintain all meters and associated equipment to measure energy flow of the DER. The DER Owner shall provide for material, installation and maintenance in accordance with NESC and CPS Energy specification as follows:

- The DER Owner shall install, own, and maintain all conduit raceway(s) required for site installation metering, relaying, and communications.
- The DER 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 DER Owner during the design phase of the project.

2.6.4. Meter Capability and Telemetry Requirements. In general all CPS Energy/Owner agreements, CPS Energy Tariff(s), and ERCOT Protocol Section 10 shall govern the minimum meter requirements. Specific communication and telemetry requirements are as follows:

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

2.6.5. Metering Auxiliary Power and Communication Requirements. The DER Owner shall provide for communications and auxiliary power requirements identified during the design and review phase of the project. Meter points for DER Facilities 1MW and greater will require the following:

- Meter communications will be required at the meter point for remote meter access. An internet connection and dial up telephone service shall be provided at the DER Owner's expense with termination at the metering equipment metering enclosure. Please note internet access and telephone dial up may be available as part of CPS Energy communications system.
- A single 120 VAC, 15 Amp circuit shall be provided for meter equipment from an uninterruptable power supply by the DER. Typical 120 VAC circuit load is 2



Amps maximum.

2.7. 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 or provide a 4-20ma input to the RTU.

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

- A mutually agreed upon location on its premises for the installation of CPS Energy's SCADA equipment.
- As mentioned in 2.6.2. above, Owner to provide adequate general space for the metering, RTU, SCADA, and communications equipment. This space is 6ft. x 6ft. x 7ft. high to allow for the equipment rack structure and NESC working clearance.
- A 120 VAC 15 Amp circuit shall be provided for SCADA equipment from an uninterruptable power supply by the Owner. Typical 120 VAC circuit is 2 Amps maximum.
- 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 of multi-mode fiber.
- Unrestricted access to all CPS Energy SCADA equipment.

2.8. Monitoring Power Quality. CPS Energy may supply, own, and maintain a permanent power quality monitor on site if deemed necessary. Purpose of the monitor is to ensure compliance with interconnection parameters and to prevent interference with CPS Energy as described in Section 2.2.

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

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



2.9. 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 provided by CPS Energy Communication Services. Cabinet size is 74” high by 66” wide and 36” deep. CPS Energy Communication Services department will provide the specification of the fiber optics cable and copper cable.

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

- A conduit raceway, fiber optics and/or copper cable from the Data circuit Demarc to the SCADA Cabinet.
- A conduit raceway, fiber optics cable and/or copper cable for communication from the communication equipment to each metering enclosure (this includes CPS Energy meter and DER owned meter), relays, and other IED.
- A duplex 120 VAC circuit rated no less than 15 Amps for CPS Energy Communication equipment (Typical circuit load < 5 Amp).
- An uninterruptible power source.
- A leased Data circuit or other mutually agreed upon medium from DER site to a determined CPS Energy Substation.
- Foundation/Concrete slab 66” X 36”.
- Unrestricted access to all CPS Energy Communication equipment and path. If unrestricted access is not available, DER Owner shall provide contact information and escalation list for 24 hours a day, 7 days a week.

2.10. Phase Over Voltages Additional Design Review.

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

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

- If the DER is small enough relative to the feeder size (e.g., 10% or less of the feeder peak load), it may not contribute enough voltage support to raise the voltage to hazardous levels.
- If the DER has a way of regulating phase-to-neutral voltage, it can ensure that this



will not happen.

- If the DER installation does not comply with one of the options above for limiting voltage overloads, it may require additional study to determine what can be done to mitigate this issue.

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

3.1. Operating Authority and Personnel.

- CPS Energy System Operator (SO) will have the ultimate responsibility for carrying out the operating procedures described herein.
- CPS Energy maintains the Energy Management Center (EMC) on a 24-hour basis for the purpose of coordinating the operation of all Transmission, Distribution, and Generation facilities connected to CPS Energy.
- The 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 DER is on line and generating energy or reactive power on the CPS Energy system.

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

3.3. Energizing the Connections Between CPS Energy and the DER Facility. Only authorized employees of CPS Energy are permitted to make and energize the connections between CPS Energy's system and the Owners facilities.

3.4. Emergency Conditions.

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

3.4.2. ERCOT Emergency. CPS Energy is a member of ERCOT and operates its system in accordance with the operating criteria, guidelines, and protocols of ERCOT.



As a result, CPS Energy may interrupt service to the DER in the event of an ERCOT declared emergency or as directed by ERCOT Operations.

3.5. DER Owner Operating and Maintenance Responsibility.

3.5.1. Equipment Responsibility. Owner assumes all responsibility for the electrical system on the Owner's side of the Point of Delivery (POD).

- 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 Owner, or any of CPS Energy's customers.
- Owner shall inspect and maintain all facility structures and equipment provided by Owner on an industry or manufacturer's recommended basis.

3.5.2. Control and Protective Equipment. The Owner is responsible for routine maintenance of any DER 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 Owner, Owner will conduct periodic breaker trip testing and notify CPS Energy in advance of such testing so that CPS Energy may witness such tests.

3.5.3. Maintenance and Operation Records. The 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 5.5).
- Operation log for DER systems greater than 500 kW. As a minimum the log shall include the date, DER time on, and DER time off, and MW and MVAR output.
- Facility one-line must be maintained and a correct one-line diagram of Owner's facility must be provided to the CPS Energy EMC SO after any change. CPS Energy may review such documents at reasonable times.

3.5.4. Owner Switching Request. The Owner shall;

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



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

3.5.6. Notification of Disruption. 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 Owner's facility two character mnemonic name (if applicable) and applicable equipment numbers as designated by CPS Energy on the approved one-line diagram.

3.5.7. Reasonable Access.

- Owner shall provide CPS Energy's authorized representative access to 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, CPS Energy authorized representatives shall have access 24 hrs a day, 365 days a year.

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

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

3.5.8.2. 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 Owner of disconnect, unless an acceptable agreement is negotiated.

3.5.9. Equipment Compatibility. 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, Owner shall first notify CPS Energy of the replacement or modification, submit specifications to



CPS Energy and obtain CPS Energy's approval of compatibility with CPS Energy's distribution system.

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

3.6. CPS Energy Operating and Maintenance Responsibility.

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

3.6.2. CPS Energy Disconnect Notice. CPS Energy will use reasonable efforts to provide Owner with seven calendar days advanced notice of any scheduled switching for distribution lines connecting the DER. CPS Energy shall have the right and authority to disconnect DER 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 DER 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 DER Facility is not in compliance with the requirements herein, and the non-compliance adversely affects the safety, reliability or power quality of CPS Energy's electric system.
- The Owner is in violation any of the DER agreement(s) with CPS Energy.

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

3.6.3. CPS Energy Disconnect due to Interference. CPS Energy shall have the right to disconnect its system from the Owners system. CPS Energy will determine the timing and duration of the interruption. CPS Energy will consider reconnecting its power system to the Owner when CPS Energy has evidence that the electric energy of the Owner meets the Standards and Requirements of the agreement (Section 2.2) with the Owner. CPS Energy will determine the timing, conditions and details of the reconnection on a case by case basis.

3.6.4. Annual Maintenance Outage. CPS Energy performs periodic maintenance on its equipment. Such maintenance on CPS Energy equipment at the POD or any of the Interconnection Facilities may require scheduling approximately an eight hour outage



annually during normal working hours. Such outage of Owner's equipment will typically be coordinated to coincide with Owner's annual maintenance schedule. The Owner's maintenance schedule shall be on file in the CPS Energy System Operator's office and must be updated at least annually. Any changes to such schedule shall be reviewed and approved by CPS Energy.

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

- Revenue metering equipment owned by CPS Energy--This equipment shall be inspected on a reasonable basis, but not more often than every two months. CPS Energy will maintain and replace this equipment as necessary.
- CPS Energy owned metering instrument transformers and associated equipment-- A power outage to Owner's equipment is required for the maintenance of the revenue metering or control instrument transformers at the POI.
- All SCADA 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 Owner agree. CPS Energy will provide Owner copies of the results of the annual relay tests upon request and notify Owner of any protective relay equipment requiring repair or replacement.
- All communication equipment used with distribution line protective relaying including periodic performance testing--Owner will be notified of any problems or irregularities found.

3.7. Switching Guidelines. Switching of CPS Energy equipment is required at times for equipment outages to allow both CPS Energy and Owner to perform maintenance and construction. CPS Energy and Owner activities should be coordinated whenever possible to reduce switching requirements. 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 Owner's system, 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, 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 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 Owner agree to provide any required switching as promptly as reasonably possible.

- To remove a transformer from service, all loads should be removed first.
- To remove line equipment from service, switching at remote CPS Energy or other customer facilities is required. Owner must request an outage as previously described. CPS Energy will provide all switching on the CPS Energy side of the POD.

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

3.9. Clearance Procedures.

It is CPS Energy's practice that 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 Owner's facility and contact any other CPS Energy operators or crews necessary to accomplish switching at remote terminals.
- Owner and/or CPS Energy personnel shall place safety or "hold" tag on switches when they are opened. Tagging of equipment remote from 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 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 Owner's system is tagged mutually by 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 Owner shall operate the switch until the operator whose tag is still on the switch has notified CPS Energy's SO that he is removing his tag.
- Release of all clearances and removal of all grounds are required before "hold" tags are removed and any switches closed. "Hold" tags are removed only after the clearance is released by the individual who secured the clearance and switching instructions are received from CPS Energy's SO.



3.10. Grounding Procedures.

- CPS Energy shall place safety grounds on CPS Energy equipment when required for maintenance procedures.
- All grounding on the Owner's side will be performed by the Owner's personnel.
- The operator providing maintenance is responsible for placing safety grounds around the equipment to be maintained.
- No safety grounds should be placed where a switching device could be opened, removing the protection of a safety ground(s).
- The number and locations of all grounds should be provided to CPS Energy's SO.
- All grounds must be removed before "hold" tags are removed from switches.

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

- 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). 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).

3.12. Owner Operations.

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

3.12.2. Owner Reconnect Notice. In the event Owner's system is isolated from the CPS Energy's system, Owner shall notify CPS Energy's SO before attempting to resynchronize with CPS Energy's system.

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



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

3.13. Owner's Operational Reactive Support Responsibility.

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

The Owner's voltage regulators must have characteristics acceptable to CPS Energy and must be in service at all times.

3.14. Speed Governor Maintenance and Notification (if applicable).

- 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 DER Department.
- Owner shall maintain its speed governor in service (if applicable) when operating synchronous to CPS Energy unless blocked due to a temporary operating problem.
- Owner shall immediately notify CPS Energy's System Operator when blocked.

3.15. Amendments.

These Interconnection Requirements may be amended from time to time by CPS Energy to account for significant modifications in the manner in which 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 Owner.