



# Definitions, Acronyms, and Abbreviations

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The definitions defined in the *IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems* (1547) apply to this document. The following definitions are in addition to the ones defined in IEEE 1547, or are repeated from the IEEE 1547 standard.

### A

**Alternating Current (AC):** That form of electric current that alternates or changes in magnitude and polarity (direction) in what is normally a regular pattern for a given time period called frequency.

**Ampere (Amp):** The unit of current flow of electricity. It is to electricity as the number of gallons per minute is to the flow of water. One ampere flow of current is equal to one coulomb per second flow.

**Automatic:** Self-acting, operated by its own mechanism when actuated by some impersonal influence as, for example, a change in current strength; not manual; without personal intervention.

**Automatic Reclosing:** A circuit breaker has automatic reclosing when means are provided for closing without manual intervention after it has tripped under abnormal conditions.

**Automatic Tripping (Automatic Opening; Automatic Disconnecting):** The opening of a circuit breaker under predetermined conditions without the intervention of an operator.

### C

**Capacity:** The number of amperes of electric current a wire will carry without becoming unduly heated; the capacity of a machine, apparatus, or devices is the maximum of which it is capable under existing service conditions; the load for which a generator turbine, transformer, transmission circuit, apparatus, station, or system is rated.

**Circuit:** A conducting path through which an electric current is intended to flow.

**Circuit Breaker:** A device for interrupting a circuit between separable contacts under normal or fault conditions.

**Closed Transition Transfer:** A customer's source of power is transferred from the electric utility to its own generation and vice-versa while momentarily connecting the two systems together. Here, the Customer's load is not interrupted at all during the transfer process. The time duration of the momentary parallel (connection) of the two systems together is only long enough to safely start and bring the Customer's generation into synchronization or to safely shut down the generation. The parallel is typically completed within 30 seconds.

**Current:** A flow of electric charge measured in amperes.

**Current Transformer (CT):** A transformer intended for metering, protective or control purposes, which is designed to have its primary winding connected in series with a circuit carrying the current to be measured or controlled.



A current transformer normally steps down current values to safer levels. A CT secondary circuit must never be open circuited while energized.

## D

**Delta Connected Circuit:** A three phase circuit with three source windings connected in a closed delta (triangle). A closed delta is a connection in which each winding terminal is connected to the end (terminal) of another winding.

**Demand:** The rate at which electric power is delivered to or by a system; normally expressed in kilowatts, megawatts, or kilovolt-amperes.

**Direct Current (DC):** An electric current flowing in one direction only and substantially constant in value.

**Direct-Transfer Trip (DTT):** A method of sending a trip signal from one location to another. *Synonymous to transfer trip*

**Disconnect:** A device used to isolate a piece of equipment. A disconnect may be gang operated (all poles switched simultaneously) or individually operated.

**Dispatchable:** Capable of having generator output (real and reactive power) adjusted ("dispatched") upon request of the Company's power system operator. The adjustment includes capability to start-up and shut down generating units.

### **Distributed Generation Facility (DG Facility):**

**IAC Utilities 199 Chapter 45** - Used by an interconnection customer to generate electricity that operates in parallel with the electric distribution system; a Qualifying Facility typically includes an electric generator and the interconnection equipment required to interconnect safely with the electric distribution system or local electric power system.

**WAC PSC119.02** – A facility for the generation of electricity with a capacity of no more than 15 MW that is located near the point where the electricity will be used or is in a location that will support the functioning of the electric power distribution grid.

**Distributed Energy Resources (DER) / Distributed Resources:** Electrical generation facilities connected to a utility through a Point of Common Coupling.

## E

**Electric Distribution System:** Equipment and facilities owned and operated by a public utility, including overhead and underground facilities, service entrance equipment, meters, transformers, substations, etc. used to transmit electricity to ultimate usage points such as homes and industries from interchanges with higher voltage transmission networks that transport bulk power over longer distances. The voltage levels at which



the electric distribution systems operate at less than 34kV. "Electric distribution system" has the same meaning as the term "Area EPS," as defined in Section 3.1.6.1 of IEEE Standard 1547.

**Electric Power System:** Consists of generation, distribution, equipment and apparatus owned by the Company including overhead and underground facilities, service entrance equipment, meters, transformers, etc., which make up the central station energy delivery system.

**Emergency:** A condition or situation that in the reasonable good faith determination of the affected party based on Good Utility Practice contributes to an existing or imminent physical threat of danger to life or a significant threat to health, property or the environment.

**Energize:** To apply voltage to a circuit or piece of equipment; to connect a de-energized circuit or piece of equipment to a source of electric energy.

**Energy Losses:** The general term applied to energy lost in the operation of an electrical system. Losses can be classified as transformation losses, transmission line losses or system losses.

## F

**Fault Current:** The current that is produced by an electrical fault, such as single-phase to ground, double-phase to ground, three-phase to ground, phase-to-phase, and three-phase. The Fault Current is several times larger in magnitude than the current that normally flows through a circuit. A protective device must be able to interrupt this Fault Current within a few cycles. The Fault Current increases when a new generator is interconnected.

**Frequency:** The number of cycles occurring in a given interval of time (usually one second) in an electric current. Frequency is commonly expressed in hertz.

**Fuse:** A short piece of conducting material of low melting point, which is inserted in a circuit for the purpose of opening the circuit when the current reaches a certain value.

## G

**Generation:** Any device producing electrical energy, i.e., rotating generators driven by wind, steam turbines, internal combustion engines, hydraulic turbines, solar, fuel cells, etc.; or any other electric producing device, including energy storage technologies.

**Generator:** Any device producing electrical energy, i.e., rotating generators driven by wind, steam turbines, internal combustion engines, hydraulic turbines, solar, etc.; or any other electric producing device, including energy storage technologies.

**Generation System:** The interconnected Distributed Generator(s), controls, relays, switches, breakers, transformers, and associated wiring and cables.

**Good Utility Practice:** Any of the practices, methods and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period, or any of the practices, methods and acts which, in the exercise of reasonable judgment in light of the facts known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. Good Utility Practice is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather to be acceptable practices, methods, or acts generally accepted in the region.

**Ground:** A term used in electrical work in referring to the earth as a conductor or as the zero of potential. For safety purposes, circuits are grounded while any work is being done on or near a circuit or piece of equipment in the circuit; this is usually called protective or safety grounding.

**Ground Fault:** An unintentional electric current flow between one or more energized conductors and the ground

## H

**Hertz (Hz):** The term denoting frequency, equivalent to cycles per second.

## I

**IEEE (Institute of Electrical and Electronics Engineers):** Among other things, the IEEE develops technical standards applicable to the electric industry including relays, transformers, and metering.

**Interconnection Customer:** The party or parties who are responsible for meeting the requirements of this standard. This could be the Generation System applicant, installer, designer, owner or operator. Any entity that proposes to interconnect its Generating Facility with the electric distribution or transmission system

**Interconnection Equipment:** Individual or multiple devices used in an interconnection system.

**Interrupting Capacity:** The amount of current a switch, fuse, or circuit breaker can safely interrupted

**Interruption:** A temporary discontinuance of the supply of electric power.

**Island:** A part of an interconnected system may be isolated during a system disturbance and start operating as a subsystem with its own generation, transmission and distribution capability. Then the subsystem becomes an island of the main interconnected system without a tie. In such a case, the islanded system and the main interconnected system will operate at different frequencies and voltages.

## K

**Kilovolt (kV):** 1,000 volts.

**Kilovolt-Ampere (kVA):** The product of kilovolts times amperes; used to refer to high voltage alternating current systems. One thousand volt amperes; see the definition for Apparent Power.



**Kilowatt (kW):** An electric unit of power that equals 1,000 watts.

**Kilowatt-hour (kWh):** A basic unit of electric energy equal to the use of 1 kilowatt for a period of one hour.

**KVar:** Abbreviation for kilovolt-ampere-reactive. It is a measure of reactive power, which is required to regulate system voltage.

## L

**Lagging Power Factor:** Occurs when reactive power flows in the same direction as real power; stated with respect to the generator, lagging power factor occurs when generator is producing VARs.

**Leading Power Factor:** Occurs when reactive power flows in the opposite direction of real power; stated with respect to the generator, leading power factor occurs when generator is absorbing VARs.

**Line Losses:** Electrical energy converted to heat in the resistance of all transmission and/or distribution lines and other electrical equipment, such as transformers, on the system.

**Long Term Parallel Operation:** During normal operation of the generator, the generator stays electrically interconnected with the electric distribution system.

## M

**Metering:** The methods of applying devices that measure and register the amount and direction of electrical quantities with respect to time

**Metering Equipment:** All metering equipment installed or to be installed at the Generating Facility pursuant to the Interconnection Agreement at the metering points, including but not limited to instrument transformers, MWh-meters, data acquisition equipment, transducers, remote terminal unit, communications equipment, phone lines, and fiber optics.

## O

**One-Line Diagram:** A diagram in which several conductors are represented by a single line and in which various devices or pieces of equipment are denoted by simplified symbols. The purpose of such a diagram is to present an electrical circuit or circuits in a simple way so that their function can be readily grasped.

**Open Transition Transfer:** In this scheme, a customer's source of power is transferred from Source 1 to Source 2 and vice-versa without momentarily connecting the two sources together. Here, the customer's load is interrupted momentarily during the transfer process through a mechanical or electrical interlock.

**Outage:** A condition existing when a line or a substation is de-energized.

**Output:** The energy delivered by a generation facility during its operation.

**Overvoltage:** Voltage higher than that desired or higher than that for which the equipment in question is designed.

## P

**Parallel Operation:** The two-way flow of power between a generator and a distribution system; generators that operate in parallel with a distribution system require additional protection and control devices. This may be contrasted with a stand-alone generate that operates isolated from the utility's electric system. A customer-owned generator is connected to the Company electric power system for more than 100 milliseconds or 6 cycles. Parallel operation may be required solely for the customer's operating convenience or for the purpose of delivering power to the Company.

**Peak Load:** The maximum electric load consumed or produced in a stated period of time.

**Peak Shaving:** Generator operation that results in reducing customer's peak load or demand. Closed- transition peak shaving is the condition where the generator is in a parallel operation with the Company's system. Open-transition peak shaving is the condition where the generator is **not** connected in parallel with the Company's electric distribution system.

**Point of Common Coupling (PCC):** The point where the electrical conductors of the distribution system are connected to the customer's conductors and where any transfer of electric power between the customer and the distribution system takes place. [WAC PSC 119.02]

**Point of Interconnection (POI):** The point where the Load or Generation Entities' conductors or those of the respective agents meet the utilities' distribution system (point of ownership change). POI has the same meaning as the term "point of common coupling" as defined in Section 3.1.14 of IEEE Standard 1547.

**Point of Metering:** The point where metering equipment (meters, transducers, current transformers, potential transformers, etc.) is or will be installed to measure the power flow and energy exchange between the Company and the customer.

**Power Factor:** The ratio of real power (kW) to apparent power (kVA); power factor is the cosine of the phase angle difference between the current and voltage of a given phase.

**Power Flow:** One-way power flow is the condition where the flow of power is entirely into the customer's facility. Two-way power flow is the condition where the net flow of power may be either into or out of the customer's facility depending on the operation of the generator and other customer load.

**Protection:** All of the relays and other equipment that are used to open the necessary circuit breakers to clear lines or equipment when trouble develops.

**Protective Relay:** A device whose function is to detect defective lines or apparatus, or other power-system conditions of an abnormal or dangerous nature and to initiate appropriate control circuit action.

## Q

**Qualifying Facility (QF):** A cogeneration facility or a small power production facility that is a qualifying facility under 18CFR Part 292, Subpart B, used by an interconnection customer to generate electricity that operates in parallel with the electric distribution system. A Qualifying Facility typically includes an electric generator and the interconnection equipment required to interconnect safely with the electric distribution system or local electric power system.

## R

**Reactive Power (VAR):** The power that oscillates back and forth between inductive and capacitive circuit elements without ever being used. The function of reactive power is to establish and sustain the electric and magnetic fields required to perform useful work.

**Reasonable Efforts:** With respect to an action required, by attempting, or taking by a Party under the Standard Generator Interconnection Agreement, efforts that are timely and consistent with Good Utility Practice and are otherwise substantially equivalent to those a Party would use to protect its own interests.

**Received Energy:** Energy received by the Company from the customer

**Reclose:** To return a circuit breaker to its closed position after it has opened by relay action.

**Relay:** A device that is operative by a variation in the condition of one electric circuit to affect the operation of another device in the same or in another electric circuit.

**Remote Terminal Unit (RTU):** Remotely-located equipment used for collecting data and/or for supervisory control via communication channel.

## S

**SCADA (Supervisory Control and Data Acquisition):** The combination of telemetry and data acquisition and consists of collecting information, transferring it back to a central site, carrying out necessary analysis and control, and then displaying this data on a number of operator screens. It is used to monitor and control a plant, a substation, or other utility installations

**SCCR (Short Circuit Contribution Ratio):** The ratio of the Generating Facility's short circuit contribution to the short circuit contribution provided through the Company's Distribution System for a three-phase fault at the high voltage side of the distribution transformer connecting the Generating Facility to the Company's Distribution System.

**Self-Excited:** An electric machine in which the field current is secured from its own armature current





**Self-Service or Stand-by Service Generators:** Generators operated in parallel with the Company's electric distribution system only for the purpose of reducing the customer's peak load. These generators are not normally dispatchable by the Company.

**Separately Excited:** Use of an exciter for sending current through the field windings of an electric machine in place of taking the field current from its own armature current.

**Smart Inverter:** A generating facility's inverter that performs functions that, when activated, can autonomously contribute to grid support during excursions from normal operating voltage and frequency system conditions by providing: dynamic reactive/real power support, voltage and frequency ride-through, ramp rate controls, communication systems with ability to accept external commands and other functions.

**Step-Down Transformer:** A transformer in which the secondary winding has fewer turns than the primary, so that the secondary delivers a lower voltage than is supplied to the primary.

**Step-Up Transformer:** A transformer in which the secondary winding has more turns than the primary, so that the secondary delivers a lower voltage than is applied to the primary.

**Switch:** A device for making, breaking or changing the connections in an electric circuit.

**Synchronism:** Expresses the condition across an open circuit wherein the voltage sine wave on one side matches the voltage sine wave on the other side in frequency and amplitude without phase angle difference.

**System Emergency:** Conditions beyond the normal control that affect the ability of the Control Area to function normally including any abnormal system condition which requires immediate manual or automatic action to prevent losses of load, equipment damage, or tripping of system elements which might result in cascading outages or to restore system operation to meet the minimum operating reliability criteria.

## T

**Telemetry:** Remote measurement of a physical value or status (i.e. generator kV, status of a switch, etc.) by means of a communication channel.

**Transfer Trip:** A form of remote trip in which a communication channel is used to transmit the trip signal from the relay location to a remote location.

**Transformer:** An electric device, without continuously moving parts, in which electromagnetic induction transforms electric energy from one or more other circuits at the same frequency, usually with changes of value of voltage and current.

**Transmission System:** The facilities as defined by using the guidelines established by the Iowa Administrative Code and the Wisconsin Administrative Code. They are owned, controlled or operated by the transmission providers that are used to provide transmission service under the Tariff. Transmission is rated 60 kV or greater.

## U

**Utility Grade Relays:** Relays that meet IEEE standards C37.90, C37.90.1, and C37.90.2.

## V

**VAR:** A unit of measurement of reactive power. It is an expression of the difference between current and voltage sine waves in a given circuit.

$$VA^2 = (\text{Watts})^2 + (\text{VARs})^2$$

**Voltage:** Electric potential or potential difference expressed in volts.

**Volt-Ampere (VA):** A unit of apparent power in an alternating-current circuit equal to the product of volts and amperes without reference to the phase difference, if any. At unity power factor, a volt-ampere equals a watt.

**Voltage Regulation:** the process and equipment to maintain voltage within acceptable limits.

## W

**Watt:** The unit of electric power. Watts AC = volts x amperes x power factor (single-phase circuits).

**Watt-Hour:** A unit of work or energy equivalent to the power of one watt operating for one hour.

**Wye or "Y" Connected Circuit (Star Connected):** A three-phase circuit in which windings of all three phases have one common connection which may be connected to ground.

## ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
ANSI	American National Standards Institute
DC	Direct Current
DR / DER	Distributed Resource(s) / Distributed Energy Resource(s)
DTT	Direct Transfer Trip
EPS	Electric Power System
IEEE	Institute of Electrical and Electronics Engineers
ISO	Independent System Operator
MISO	Midcontinent Independent System Operator
NEC	National Electrical Code
NFPA	National Fire Protection Association
PCC	Point of Common Coupling
POI	Point of Interconnection
PST	Short-term Flicker
P.U.	Per Unit
PV	Photovoltaic
PWM	Pulse-Width Modulation
SCADA	Supervisory Control and Data Acquisition
SCR	Silicon-Controlled Rectifier
SSC	Short-Circuit Capacity
UL	Underwriters Laboratories
VAR	Volt-Ampere-Reactive
WTG	Wind Turbine Generator