

Electric System Fundamentals Glossary

Alternating current (AC)

An electric current that reverses its direction in a conductor at regular time intervals.

Amps

Short for ampere, the unit of measure commonly used to express the rate of current flow in an electric circuit.

Apparent power

The amount of power that comprises both real and reactive power, measured in volt-amps (VA), kilovolt-amps (kVA) or megavolt-amps (MVA).

Automatic Meter Reading (AMR)

The process of collecting meter data remotely through a communications system that sends the data without human intervention.

Backup generator

A generating unit that is used only when the primary source of power is unavailable.

Baseload

Generating units that run all 24 hours of the day.

Battery

A device that converts chemical energy directly to electric energy from substances contained within the battery cell.

Biofuel

Liquid fuel produced from biomass feedstock.

Biomass

Organic non-fossil material of biologic origin such as plant matter or animal waste.

Capacitive load

A load that causes current to lead voltage.

Capacitor

A device that stores electrical charge and is used to improve power factor and help with voltage regulation.

Capacity

The maximum electric power output of a generating unit (measured in MW) or the maximum amount of power that lines or equipment can safely carry.

Capacity factor

The ratio of actual energy produced by a generating unit over a period of time to the energy that would have been produced had the unit run at its rated capacity for that period of time.

Centralized generation

Generation located on the transmission grid.

Circuit

A complete path through which electricity travels; comprised of a source, a conductor, and load.

Coal

A gray, brown or black fossil fuel that is a mineral solid consisting of carbonized vegetable matter.

Cogeneration

The use of fuel to produce process steam where the waste heat is then used to produce a byproduct such as electricity.

Combined-cycle gas turbine

A power plant that uses a gaseous fuel to drive two types of turbines in succession: first a combustion turbine fueled by the gas and then a steam turbine fueled by steam created from water heated with the waste heat from the combustion turbine.

Combined heat and power

A generating unit designed to produce both heat and electricity from a single fuel source.

Combustion turbine

A technology for generation that uses a gaseous fuel to drive a turbine similar to a jet airplane turbine.

Conductor

A material that allows electrons to move easily from one atom to another, thereby facilitating electric flow. Typically used to describe a wire that conducts electricity in any part of the electrical grid.

Current

The rate of flow of electrons through a conductor commonly measured in amperes (amps).

Current transformer (CT)

A device used in metering that allows inexpensive meters to measure large amounts of electricity. A CT reduces the current flowing to the meter by a specific ratio so the meter is not exposed to the larger amount of current actually moving in the electrical system.

Delta configuration

A way of connecting three-phase electric lines, achieved by connecting three independent transformer or generator windings head to toe (end to end).

Demand

The total amount of electricity (power) used at any given moment in time, usually measured in kW or MW.

Demand curve

A graph showing demand at various points in time, often shown on a daily basis with demand plotted for each hour of the day.

Demand meter

A meter that records and displays the highest (peak) demand experienced during a billing period.

Direct current (DC)

An electric current that flows in one direction only.

Dispatch

The act of ordering a generating unit to come on line at a specific output level, usually performed by the system operator.

Dispatch stack

A list, in order from least cost to highest cost, of power plants scheduled to run at a specific point in time in order to match supply to electric demand.

Distributed generation

Generation located at an end-use customer's facility or in very close proximity to the facility on the distribution system.

Distribution

The delivery of electricity over medium and low-voltage lines from the transmission grid to consumers of the electricity.

Distribution line

An electric line with a voltage of 39 kV (39,000 volts) or less.

Distribution substation

A substation located on the distribution system, usually where the transmission grid meets the distribution system or where distribution voltage is reduced from a primary feeder to a secondary feeder.

Electrical Power

The rate of work that can be accomplished by electricity. Commonly measured in units of watts, kilowatts or megawatts.

Energy

The capacity for performing work. On the electrical system this is defined as demand over time measured in kWh or MWh.

Fault

A failure or interruption in an electrical circuit.

Feeder line

An electrical line that carries energy to another line rather than to an end-use device.

Four-wire service

A three phase service from the utility to a customer that has three phase wires connected at a common point at the transformer plus a ground.

Frequency

The rate at which the direction of alternating current flow changes in an AC circuit.

Fuel cell

A device that converts chemical energy directly to electric energy from a fuel source that is external to the cell.

Fuel oil

A liquid or liquefiable by-product of crude oil, heavier than gasoline and naphtha, burned as a fuel.

Generating unit

Synonymous with power plant.

Generation

The creation of electricity whereby an electrical pressure (voltage) is made that causes an electrical current (amperage) to flow.

Generator

The part of a power plant that converts the mechanical power of spinning shaft to electricity. Often the term is used to indicate the whole power plant including the source of mechanical power.

Geothermal

Hot water or steam extracted from reservoirs in the earth.

Grid

Usually used to describe the interconnected transmission system, although sometimes used with distribution (distribution grid) to describe the distribution system.

Heat rate

The amount of fuel required to generate a specified amount of electricity, usually expressed in terms of Btu/kWh.

High voltage direct current transmission lines (HVDC)

Transmission lines that use DC power instead of AC, with a voltage of 200 kV or higher.

Hybrid meter

A meter that combines a rotating disk-based mechanical counter with a solid state register.

Hydro power

Electricity generated by water flowing across a water turbine.

Induction meter

A mechanical meter with a rotating disk counter and dial register.

Inductive load

Loads that require both real and reactive power such as motors and fluorescent lights.

Insulator

A material with high resistance to electricity, meaning that electricity cannot easily travel through it.

Integrated gas combined-cycle (IGCC)

A power plant that takes solid coal, converts it into synthetic gas, and then uses the gas to power a combined-cycle gas turbine.

Inverter

A device that converts direct current (DC) electricity to alternating current (AC).

Kilovolt-amps (kVA)

A thousand volt-amps.

Kilovolt-amps reactive (kVARs)

A thousand volt-amps reactive.

Kilovolt (kV)

A thousand volts.

Kilowatt-hour (kWh)**A unit of energy equal to 1,000 watt-hours. Kilowatt (kW)**

A unit of demand equal to 1,000 watts.

Kinetic energy

Energy available from an object as a result of motion.

Load

An amount of end-use demand.

Load center

A location on an electrical grid where there is significantly more load than there is generation, thus requiring that electricity be moved to the location by transmission lines.

Megawatt-hour (MWh)

A unit of energy equal to 1,000,000 watt-hours or 1,000 kilowatt-hours.

Megawatt (MW)

A unit of demand equal to 1,000,000 watts or 1,000 kilowatts.

Meter

A device used to measure the amount of electricity flowing through a point on the system.

Natural gas

A combustible gaseous mixture of simple hydrocarbon compounds consisting primarily of methane.

Nitrogen oxides (NO_x)

A group of highly reactive gases consisting of one nitrogen molecule and two or more oxygen molecules, a significant contributor to the formation of ground level ozone which can cause smog.

North American Electric Reliability Corporation (NERC)

An international, independent, self-regulated, not-for-profit organization, whose mission is to promulgate electric operation and planning standards and ensure the reliability of the bulk power system in North America.

Nuclear power

Electricity generated using the heat of nuclear fission.

Ohm (Ω)**The basic unit of resistance in an electrical circuit. Ohm's Law**

Physical law that quantifies the relationship between voltage, current and resistance in an electrical circuit.

Output

The amount of energy put onto the grid by a power plant over a specific period of time, usually measured in MWh.

Overhead facilities

Electrical facilities that are installed above ground on transmission towers or distribution poles.

Photoelectric effect

A natural phenomena where certain materials produce an electric flow when they are struck by sufficient amounts of light.

Photovoltaic Cells (PV)

A cell containing material that converts light into electricity.

Potential transformer (PT)

A small transformer used to reduce the voltage of electricity flowing through the meter allowing the meter to measure large amounts of electricity.

Power

See electrical power. Power is synonymous with demand in kW or MW.

Power Factor

The ratio of real power to apparent power in an electrical system or circuit.

Primary distribution

A voltage on the distribution system that is lower than transmission voltage and higher than secondary voltage ranging from 600 volts to 39 kV. Common voltages include 4160V, 12.5 kV, 25 kV, 36 kV and many others.

PV

See photovoltaic.

Quadruplex

A four-wire conductor bundle used for overhead service drops consisting of three insulated wires and one uninsulated ground.

Ramp rate

The speed at which a power plant can increase its power output, usually stated in terms of MW per minute.

Rated Capacity

The maximum power in megawatts that a power plant is designed to provide to the grid without reducing its design life.

Reactive loads

Electric consuming devices such as fluorescent lights and motors that cause the electrons in the circuit to lag behind the voltage in time due to the way they use electricity.

Reactive power

The form of electric power that is measured in volt-amps reactive (VAR), kilovolt-amps reactive (kVAR), or megavolt-amps reactive (MVAR).

Real power

The form of electric power that is measured in watts (W), kilowatts (kW) or megawatts (MW).

Reciprocating engine

An engine that converts pressure to rotating movement by using pistons to turn a crankshaft.

Renewable energy

Electricity that is generated from a source that is naturally replenished in a reasonably short period of time such as solar, wind, geothermal, and biomass.

Resistance

A measure of the strength of impedance to the movement of electricity through a conductor commonly quantified in units of ohms.

Resistive load

Electricity consuming devices such as incandescent lights, heaters and some electronics that use only real power.

Secondary distribution

A voltage on the distribution system that is at the level typically used by customers such as 120V, 208V, 240V, 277V, 480V, or 2,400V.

Service

Electrical components that connect the service transformer to the customer including the wires that run into the facility, the meter that measures electric deliveries and the protective devices that ensure the safety of the service and circuits within the customer facility.

Service conductor

The wires that connect a customer facility to the utility distribution system.

Service configuration

The way that the distribution facilities including the service transformers are connected to provide service to a customer. Key parameters include whether the service is two-wire, three-wire, or four-wire; whether the service is single-phase or three-phase; and if three-phase, whether the service is delta or wye.

Service drop

Overhead conductors used to connect the distribution system to a customer facility.

Service lateral

Underground conductors used to connect the distribution system to a customer facility.

Service transformer

The transformer that converts the voltage of the primary distribution line to the voltage on the secondary distribution line required by a customer.

Service voltage

The voltage delivered by the utility to customer facility.

Simple-cycle gas turbine

A power plant that uses gaseous fuel to drive a gas combustion turbine.

Single phase power

Power produced using a single independent coil of wire in the generator. Power with one voltage curve that travels on a single phase conductor.

Small hydro

Hydroelectric power facilities with an installed capacity of 10 MW or less.

Smart meter

An advanced solid state meter that includes remote communication of data and may also provide remote control capabilities.

Solid state meter

A meter that measures consumption electronically, stores data digitally, and has an electronic register.

Steam turbine

A turbine whose blades are spun by the kinetic energy in moving steam.

Substation

A facility containing switches, transformers and other equipment used to adjust voltages, direct the flow of electricity and monitor circuits.

Sulfur dioxide (SO₂)

A gas made of sulfur and oxygen that is a significant contributor to the formation of acid rain.

Switchyard

An enclosed area that includes the switching facilities and transformers that connect a power plant to the transmission system.

Three-phase power

Power produced using three separate independent coils of wire in the generator. Three-phase power has three separate independent voltages with different timing and with each phase running through a separate conductor.

Three-wire service

A single phase electric service from the utility to a customer facility that consists of three conductors: two hot conductors and one ground.

Time-of-use (TOU) meter

A meter capable of registering and recording the amount of usage in multiple defined time periods such as peak and off-peak.

Transformer

A device used to change voltage by stepping it up or down.

Transmission

The transport of bulk amounts of electricity over high voltage power lines from generators to the interconnection with the distribution system.

Transmission line

A power line with a voltage greater than 39 kV or 39,000 volts.

Transmission substation

A substation located on the transmission grid, usually where two or more separate transmission lines interconnect.

Triplex

A conductor bundle used for overhead service drops consisting of two insulated wires and one uninsulated wire.

Turbine

A machine with blades that are rotated by the movement of liquid or gas thus converting the kinetic energy of the liquid to mechanical energy of a rotating shaft.

Two-wire service

An electric service from the utility to a customer facility that consists of two conductors; it may include two hot conductors or one phase conductor and one ground.

Underground service entrance (USE) cable

A conductor bundle that is used for underground service laterals that can be directly buried in the ground.

Usage

The same as energy in kWh or MWh.

Volt

A unit of measure of voltage.

Volt-amps reactive (VAR)

A unit of measure of reactive power.

Voltage

The electrical pressure that moves electricity through conductors, technically the difference in electrical potential between any two conductors or between a conductor and ground.

Watt (W)

A unit measure of power or demand.

Watt's Law

Law that quantifies the relationship between current, voltage, power and power factor in an electrical circuit.

Wind turbine

A turbine that is spun through the kinetic energy in wind.

Wye configuration

A way of connecting three-phase electric lines, achieved by connecting three independent transformer windings at a common point.