

Glossary

admittance	The ratio of current to voltage, including the effects of both resistance and reactance; the inverse of impedance.
advanced metering infrastructure (AMI)	A system for measuring individual customers' electricity consumption at intervals of an hour or less and communicating that information at frequent intervals to the distribution utility.
alternating current (ac)	An electric current that reverses direction at regular intervals and is the dominant form of electric power in transmission and distribution systems worldwide.
ampere	A measure of the amount of electric charge passing a point in an electric circuit per unit time.
ancillary services	Services, such as spinning reserves, non-spinning reserves, and regulation, that support the transmission of energy from generating resources to loads while maintaining reliable operation of the network.
attack vector	A path or means by which an attack can be or is made on critical infrastructure.
automatic generation control (AGC)	An automatic system to vary mechanical input to a generator to match small variations in system load.
balancing authority	An entity responsible for balancing generation and load (with specified imports and exports) within a specified geographic region.
bandwidth	Broadly, the amount of information that can be communicated through a given communications channel per unit time. Alternatively, the range of radio frequencies in a given radio channel (spectrum).
battery electric vehicle (BEV)	A vehicle that operates solely with electric power provided by batteries.
bulk power system	That part of the electric grid comprised of generators and high-voltage transmission lines.
capacitance	A parameter relating the charge stored in an electric field to the voltage producing the field. Transmission lines have capacitance because their voltage creates electric fields between conductors and between conductors and the ground.
capacitor	An element exhibiting capacitance.
capacity market	A wholesale forward market for resources to supply energy. These capacity resources are usually, but not always, generators. <i>See "capacity market demand response programs."</i>
capacity market demand response programs	Wholesale forward market programs in which customers bid future load reductions as system "capacity" to replace procurement of conventional generation or delivery resources, usually in exchange for upfront capacity payments.
congestion	A condition that occurs when lack of transmission capacity prevents the least-cost set of generators from serving load, causing an increase in the wholesale price of electricity or cost of service at one or more locations in the system.
contingency	An abnormal event in the power system, such as the tripping of a generator or a transmission line.
converter	A generic term referring to a system employing power electronics to convert electrical energy from one form to another, e.g., from direct current at one voltage to direct current at another voltage or alternating current at one frequency to direct current or to alternating current at another frequency.

critical peak pricing	A dynamic pricing plan that combines peak/off-peak time-of-use rates with substantially higher “super-peak” rates that apply only to peak hours on a limited number of critical days during the year. Critical days typically are announced the day before, on the basis of forecast market conditions.
current	The amount of electric charge flowing past a specified circuit point per unit of time.
demand response	Customer loads that are responsive to conditions in the electric power system, particularly at peak times.
direct current (dc)	An electric current that flows in one direction and is used selectively in electric power systems, primarily for point-to-point applications.
distributed generation (DG)	Small-scale, on-site generation systems owned by entities that are primarily consumers of electricity.
distribution automation	The application of advanced technology to automate the maintenance, control, and operation of the distribution network.
distribution primary voltage	The voltage at which power is distributed before the final step-down transformer to customer delivery voltage (typically 13.8 kilovolts, but can range from as low as 2 kilovolts to as high as 34.5 kilovolts).
distribution system	The part of the power system that delivers electricity to customers, operating at lower voltages than the transmission system.
dynamic line rating (DLR)	Line rating determined by the current ambient conditions, such as temperature and wind speed.
dynamic pricing	A regime in which retail customers face energy prices that vary with the contemporaneous cost of generation or state of supply-and-demand conditions in the electric power system. Prices may be based on day-ahead or hour-ahead forecasts of conditions, and may change for as few as 60 “critical peak” hours per year, or may change hourly or more often in real-time pricing plans.
Eastern Interconnection	One of the two major synchronized alternating current power grids in North America, reaching from Central Canada eastward to the Atlantic coast (excluding Québec), south to Florida, and back west to the foot of the Rockies (excluding most of Texas).
economic dispatch	The assignment of generating units’ production in order to minimize overall costs.
electric vehicle (EV)	A vehicle that operates with electric power provided by batteries. EVs include both plug-in hybrid electric vehicles and battery electric vehicles but do not include hybrid electric vehicles, which are self-powered and never connected to the electric grid.
Electric Reliability Council of Texas (ERCOT)	Synchronized alternating current power grid that occupies nearly all the state of Texas.
extra-high voltage	Transmission voltages between about 345 kilovolts and 765 kilovolts.
fault	On a transmission or distribution line, an abnormal flow of electric current, e.g., an open circuit (an interruption in the flow) or a short circuit (a flow that bypasses the normal load).
fault current limiter (FCL)	A device that limits line current from faults to some pre-determined level.
Federal Energy Regulatory Commission (FERC)	U.S. independent agency that: regulates the interstate transmission of electricity, natural gas, and oil; reviews proposals to build liquefied natural gas terminals and interstate natural gas pipelines; licenses hydropower projects; and performs some other related activities.
feed-in tariff	A fixed price paid for electricity generated from specified renewable technologies.

flexible alternating current transmission system (FACTS)	A set of technologies employing power electronics that enable control of various transmission system operating parameters, including volt-ampere-reactive support and power flow.
generation	The process of converting energy from some other form into electricity, usually in power plants, but also via distributed generators, such as solar photovoltaic arrays.
generator	A device that transforms some other form of energy (typically mechanical energy) into electrical energy.
grid	The physical components of the electric power system that link generating units to the loads they serve, as well as the associated operational, regulatory, and governance structures.
harmonic distortion	The deviation of a waveform from a pure sinusoidal shape caused by the addition of frequencies other than 60 hertz.
high-temperature super conductor (HTSC)	A material with resistance that becomes very low (but not zero) when cooled to temperatures at or somewhat below that of liquid nitrogen (77 Kelvin).
high-voltage direct current (HVDC)	Technologies for transmitting bulk power via direct current at transmission-level voltages.
impedance	The opposition of a conducting device to the flow of alternating current through it; the inverse of admittance. The impedance of an element depends on its reactance in addition to its resistance.
independent power producer	An entity that is not a public utility and that owns facilities to generate electricity for sale to utilities and/or end users.
independent system operator (ISO)	A regulated entity without generation or distribution assets that oversees the wholesale electricity market and operates the bulk power system in a particular region.
inductance	A parameter relating energy stored in a magnetic field to the current producing the field. Transmission lines have inductance because their current creates magnetic fields around their conductors.
inductor	An element exhibiting inductance.
inertia	The resistance of any physical object to a change in its state of motion (or rest). Inertia is proportional to mass; inertia in generators and loads enhances the stability of an electric power system.
inverter	A power electronic system whose function is to convert electric power from direct current to alternating current.
line rating	Maximum steady-state power that can be safely carried in a transmission line of a given length under standard ambient conditions.
load	The aggregate demand for electricity consumed by devices connected to the electric grid; sometimes also used to include the customers who own and operate those devices.
load duration curve	The distribution function for electrical demand in a particular region, typically formed using hourly load data for a year (8,760 points) ordered from highest to lowest, each showing the electrical power required by the load in a different hour of the year.
load factor	The ratio between average and peak power.
load management/ load control	Demand response programs that offer customers incentives to reduce their consumption in response to an instruction or signal from the system operator.
locational marginal price	For any economic dispatch, the marginal cost of meeting a small increment of load at a particular location; the spot price of electricity at that location.
loop flow	An undesirable flow of power over a secondary transmission path, potentially causing congestion and unfavorable economic operation.

losses	The difference between generated power and power delivered to the load, typically caused by resistance in transmission lines and transformers and converted to waste heat.
low-voltage ride through	The ability to maintain system operations and integrity despite a low-voltage event, principally due to a short-circuit fault.
microgrid	A part of an electric power system consisting of distributed generators, loads, and specialized controls that is capable of operating either in parallel with a utility system or as a stand-alone system.
N-1 contingency analysis	Evaluation of the transmission line and transformer power flows and bus voltages in case of the loss of a single component, such as a particular generator.
phase angle	The time, expressed as an angle, by which a voltage and current waveform, or two voltage or two current waveforms, are shifted relative to each other.
phasor	A mathematical concept used to represent a sinusoidal wave as a magnitude and phase angle, where frequency is implicit. Voltage and current waves on the power system are sometimes expressed as voltage and current phasors since their frequency is constant (60 hertz in North America).
phasor measurement unit (PMU)	A device used to measure current, voltage, and frequency every 1/30th of a second or faster in synchronicity with other such measurements across a wide area based on a Global Positioning System time signal.
plug-in hybrid electric vehicle (PHEV)	A vehicle with an internal combustion engine as well as batteries that can be charged using an external power source.
power	The rate at which energy is flowing.
power electronics	Electronic circuits, employing switching electronic semiconductor devices, whose function is to control electrical energy and convert it from one form to another, e.g., from alternating current to direct current, or alternating current at one frequency to alternating current at another frequency.
power factor	The ratio of real power to apparent power. Reflects the degree to which a given amount of current is producing useful work.
power quality	The extent to which the voltage waveform at a load conforms to the ideal sinusoidal shape and nominal value. Poor power quality is generally the result of loads that draw current that is not sinusoidal (a particular problem with electronically controlled loads) or weak distribution networks producing frequent outages or voltage sags.
price responsive demand	Load that responds to prices that vary with system supply-and-demand conditions.
public utility commission	A state agency typically responsible for regulating retail electric rates and other utility prices.
reactance	The property of a conducting device that introduces a phase shift between voltage and current and introduces an impediment to the flow of alternating current.
reactive power	Power that exists in ac power systems when reactance is present. Reactive power charges and discharges the energy stored in reactive elements. It does no time-average work, but its presence still contributes to electrical losses and voltage drops.
real-time pricing	See dynamic pricing.
regional transmission organization (RTO)	An independent system operator (ISO) that the Federal Energy Regulatory Commission has certified to have satisfied a specified set of requirements and that has slightly greater responsibilities for system reliability than ISOs that have not been so certified.

regulation	In electric power systems, a control scheme that attempts to maintain some quantity at a nominal value or within a nominal range. This term is often applied to the concept of maintaining voltage and frequency within certain bounds. Also refers to the activity of a government agency charged with controlling the behavior of a public utility or other entity.
remote terminal unit (RTU)	An electronic device used for interfacing between the supervisory control and data acquisition system and the physical world.
renewable portfolio standard	A state-level requirement that a minimum fraction of in-state electricity consumption correspond to generation from specified renewable technologies, such as wind, solar, or geothermal.
resistance	The property of a conducting device to resist the flow of current through it.
rights-of-way	Geographical areas occupied by power transmission lines.
static volt-ampere-reactive compensator (SVC)	A power electronics device belonging to the family of devices known as “flexible alternating current transmission systems” used for voltage control by injecting and withdrawing reactive power.
superconductor	A material with resistance that goes to zero when cooled to temperatures in the range of 21 Kelvin or below.
supervisory control and data acquisition (SCADA)	Specialized computer systems that monitor and control industrial processes, including the operation of components of the electric grid, by gathering and analyzing sensor data in near real time.
synchronized phasor measurement (synchrophasor)	The measurement produced by phasor measurement units; a voltage or current phasor that has been synchronized with other such measurements using a common time signal from the Global Positioning System.
system average interruption duration index (SAIDI)	Reliability indicator that measures the average outage duration for each customer served.
system integrity protection scheme (SIPS)	A protection scheme that takes action based on a combination of local and remote measurements to counteract propagation of a major system disturbance.
time-of-use rates	Rate schedules that establish fixed time periods based on average system load characteristics, across which prices vary. Typical time-of-use tariffs divide weekdays into two or three time periods (peak, off-peak, and perhaps an intermediate block) and assign weekend hours to an off-peak block. Prices increase from off-peak through peak hours, and the entire tariff schedule may change across seasons.
transformer	A device used to connect two alternating current circuits operating at different voltages.
transmission network	The part of the power system that carries electric power over moderate to long distance, usually at high voltage.
transmission overlay	A network of transmission lines to be superimposed on the existing transmission network. Usually refers to lines that are longer and have higher voltage and capacity than existing lines.
unit commitment	The process of scheduling a generator (unit) to provide energy during a specific time period.
variable energy resource (VER)	A generator for which output varies over time and is imperfectly predictable, e.g., wind- and solar-powered generators.
vertical integration	In the electric power sector, a situation in which an entity that distributes electricity to retail customers also owns generation and transmission facilities that are connected to its distribution system.

volt (V)	Unit of electric potential and electromotive force, equal to the difference of electric potential between two points on a conducting wire carrying a constant current of one ampere when the power dissipated between the points is one watt; roughly analogous to water pressure in a pipe.
volt ampere (VA)	A measure of apparent power that defines the capacity of equipment, such as transformers or generators, that is limited in voltage and current. It combines both real (time average) and reactive power components.
volt-ampere reactive (VAR)	The unit used to measure reactive power, which is present in an ac system when current and voltage are out of phase.
voltage	The value of electromotive force or potential difference, expressed in units of volts.
voltage source convertor (VSC)	A power electronic device for converting a direct current voltage to an alternating current voltage.
watt (W)	The standard unit of electric power, the rate at which work is done when one ampere of current flows through an electrical potential difference of one volt.
watt-hour	A unit of electrical energy equal to 3,600 joules.
Western Interconnection	One of the two major synchronized alternating current power grids in North America. It stretches from Western Canada south to Baja California in Mexico, reaching eastward to just over the Rockies into the Great Plains.
wide-area measurement systems (WAMS)	A network of devices, usually consisting of phasor measurement units, that measures quantities of interest on the transmission network across a large geographic area in real time.