

Key Definitions for Energy Storage Proceeding R.10-12-007

AB 2514 = (a.k.a. Public Utilities Code Sections 2835-2839) Legislation enacted in 2010 directing the California Public Utilities Commission to open a proceeding to determine, if appropriate, procurement targets for energy storage by load serving entities.

Aggregation = The functional bundling of dispersed resources (or loads) to operate as a combined unit.

Ancillary Services = Non-electrical-energy products that generation resources also provide to maintain grid system reliability. Ancillary services include: spinning and non-spinning reserve, frequency regulation, ramping up or down, voltage control, blackstart capability and other services defined by a grid operator or utility control operator.

Application = A combination of end uses (and benefits) that an energy storage system may capture when sited at a specific place and managed in a particular way.

Benefit = A single value or revenue stream captured by a resource. A stream of benefits comes from solving the identified problem and providing additional end-uses that result in providing value or capturing revenue.

Bulk Storage = Large-scale energy storage that is interconnected to the grid at transmission-level voltage, and is used primarily for electric supply capacity. Can be generator co-located (storage onsite combustion turbines, or stand-alone (compressed air energy storage, pumped hydro), or aggregated (large-scale aggregated battery storage interconnected at transmission level).

Capacity Value = The avoided cost of new generation capacity that would otherwise be contracted or constructed to meet an incremental resource need.

Charge/Discharge Cycle = The operational profile of an energy storage device that defines how much of the time it must be used to store electrical energy versus how much time it is available to supply electrical energy or other services.

Conventional Energy Resources = Electric generation facilities or technologies that have been in practical use for a long time (i.e., hydroelectricity) or which represent the majority of generation resources in use (i.e., coal, natural-gas, nuclear). Although some utilities may still consider renewable energy technologies as “alternative resources” they have reached the status of mainstream, if not conventional resources.

Generation Curtailment = A forced limitation of electrical energy output from a facility due to lack of demand.

Day Ahead Market = Also known as the Integrated Forward Market, the Day Ahead Market co-optimizes energy and ancillary services (AS) to assure a feasible, secure, and least cost operating plan for the next day.

Demand = The rate at which electric energy is delivered to or by a system or part of a system, generally expressed in kilowatts or megawatts, at a given instant or averaged over any designated interval of time; or, the rate at which energy is being used by the customer.

Demand Charge Management = The ability to reduce or eliminate specified utility service charges associated with use of energy during high-demand periods.

Direct Digital Control (DDC) = The automated control of a condition or process by a digital device.

Dispatchability = Operational control over the periods when a storage resource is employed to generate, supply or charge electrical power.

Distribution Upgrade Deferral = The avoided cost of deferred infrastructure on the distribution system.

Duration = A measure of how long a storage device can discharge, or supply electrical energy; may be measured in a range from milliseconds to hours.

Energy Time Shift = The differential value derived by using energy during off-peak periods to charge an energy storage device that can be discharged during a peak or other period of higher prices (a.k.a., Energy Arbitrage).

End Use = A specific, targeted operational use for a resource in the field, that may result in capture of one or more benefits.

Frequency Regulation = An ancillary service category that provides support for maintaining grid stability within a defined range above or below 60 Hertz (a.k.a., 60 cycles per second).

Generation-Sited Storage = A category of energy storage solutions that are co-located with large-scale generation (vs. distributed generation); includes molten salt or other media (co-located with concentrated solar thermal), and storage co-located with natural gas combustion turbines.

Independent System Operator (ISO) = An independent, federally regulated entity established to coordinate regional transmission in a non-discriminatory manner and ensure the safety and reliability of the electric system.

Local Capacity Requirement (LCR) = The California Independent System Operator (CAISO) performs annual studies to identify the minimum local resource capacity required in each local area to meet established reliability criteria. Based on the study results, load serving entities receive a proportional allocation of the minimum required local resource capacity by transmission access charge area, and submit resource adequacy plans to show that they have procured the necessary capacity.

Long Term Procurement Proceeding (LTPP) = The biennial LTPP proceeding evaluates utilities' need for new fossil-fired resources and establishes rules for rate recovery of procurement transactions. It also serves as the “umbrella” proceeding to consider, in an integrated fashion, all loading-order resource procurement policies and programs.

Microgrid = A defined geographic area, set of buildings or campus facilities capable of operating autonomously from the electrical grid by supplying all of its own generation.

Mileage = A term denoting payment for providing fast-regulation services, defined in units of “MW – miles” as the regulation provided in an hour and is calculated as the sum of the absolute value of positive and negative movements requested by the grid operator to provide regulation.

Multi-Function Analysis = A storage project may at different times operate as a Generation, Transmission, Distribution or Load resource. This functionality determines the jurisdictional authority that governs its markets or terms of use; i.e., FERC/transmission, CPUC/distribution.

Non-Generator Resources (NGRs) = Grid resources, other than electrical generation units, such as energy storage devices and demand response.

Operational Considerations = A description of how a storage project is used; i.e., on a defined basis, what application is it being employed for; what resource solution is it providing, who is deciding, etc..

Optionality = A value derived from certain characteristics of a resource that may provide flexibility in terms of scale, function, location, time of deployment, and risk-reduction.

Peaking Capacity = The amount of megawatts associated with a conventional generation unit used specifically to meet demand during high load periods.

Peak Shaving = Reducing the amount of energy used during peak periods of demand; this may be accomplished through conservation or by shifting consumption patterns to off-peak periods.

Power Quality = A measure of the electric system's ability to deliver energy at a steady and predictable voltage level.

Power Reliability = A measure of the electric system's ability to deliver uninterrupted service.

Reactive Power = The portion of electricity that establishes and sustains the electric and magnetic fields of alternating-current equipment. Reactive power must be supplied to most types of magnetic equipment, such as motors and transformers. It also must supply the reactive losses on transmission facilities. Reactive power is provided by generators, synchronous condensers, or electrostatic equipment such as capacitors and directly influences electric system voltage. It is usually expressed in kilovars (kvar) or megavars (Mvar).

Regulation Down = Regulation reserve provided by a resource that can decrease its actual operating level in response to a direct electronic (AGC) signal from the CAISO to maintain standard frequency in accordance with established reliability criteria.

Regulation Up = Regulation provided by a resource that can increase its actual operating level in response to a direct electronic (AGC) signal from the CAISO to maintain standard frequency in accordance with established reliability criteria.

Resource Adequacy (RA) = A requirement that load-serving entities ensure they have 115 percent of the generation capacity necessary to meet expected load. This is also an annual proceeding at the CPUC to determine what the RA need will be for the following year, and associated policies.

Round Trip Efficiency = The ratio of total energy that can be discharged by a storage system divided by the amount of energy needed to fully charge the system.

Spinning Reserve = The portion of unloaded synchronized generating capacity that is immediately responsive to system frequency and that is capable of being loaded in ten minutes. It must be capable of running for at least two hours.

Supervisory Control and Data Acquisition (SCADA) = A system of remote control and telemetry used to monitor and control the transmission system.

Thermal Energy Storage = A type of energy storage system that captures heat or cold for use at a later time. Examples of thermal storage include using molten salt to store and later to later convert excess heat to electricity, or cold thermal storage may create ice or chilled water tanks to displace air-conditioning load.

Transmission Upgrade Deferral = The avoided cost of deferred infrastructure on the high-voltage transmission grid.

Use-Case = A document that describes a problem being solved by a particular storage system in a particular location with a clear operating regime, funding structure, governance scheme, etc..

Voltage Support = Services provided by generating units or other equipment such as shunt capacitors, static VAR compensators, or synchronous condensers that are required to maintain established grid voltage criteria. This service is required under normal or system emergency conditions.

Variable-Energy Resources (VER) = The electrical output of some renewable energy technologies (esp. wind and solar) may vary over time or exhibit intermittency.

Vehicle-to-Grid (a.k.a. V2G) = The use of batteries that power plug-in electric vehicles (PEVs) as storage media capable of providing electrical services to the grid.