Electricity Storage Related Glossary - *DRAFT* *(01-16-20)*

AC Batteries - AC batteries are the combination of batteries (typically lithium), a battery management system and inverter-charger in a single unit - allowing AC coupling to a power system.

AC Coupled System - AC coupled systems utilize a PV inverter coupled with a hybrid inverter, or combination inverter-charger, to manage battery storage.

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.

Back-up Power (electric provider) - Electric energy or capacity supplied by an electric provider to replace energy ordinarily generated by DG facility equipment during an unscheduled outage of the distribution system.

Capacity (energy storage)- The capacity of a storage system is defined as the amount of energy that it can deliver in discharge. Energy storage capacity is typically specified in amp-hours or in watt-hours.

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. This could also be referred to as the "duty cycle".

DC Coupled System - DC coupled systems use PV modules and charge controllers to charge batteries and an inverter to supply AC power.

Demand Response - the change in the power consumption of an electric consumer to better match the demand for power with the supply.

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

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 Storage (ES) - Energy storage that is interconnected to the electric distribution, transmission or electric user site to supply electric capacity. Electrical energy storage includes electrochemical technologies (e.g., batteries and fuel cell storage systems) and electromechanical technologies (e.g., flywheels and compressed air energy storage).

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 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.

Hybrid Generation-Storage System (ES-DER) - An energy system that usually consists of two or more renewable energy sources to provide increased system efficiency and balance in the energy system.

Hybrid Inverter Systems - An inverter that operates on grid, off-grid, hybrid operation (both on-grid and off-grid), and for backup.

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.

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.

Operational Mode Programming - The energy storage controller software programming that controls the charging, discharging, and bypass (export or non-export) of the energy storage system.

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.

Protective Functions - Protective functions (or relays) monitor voltage or current transducers and operate in response to electrical quantities, according to ANSI device numbers, to either to close or to open contacts.

Plug-in Electric Vehicles (PEV) - A electric motor vehicle with rechargeable battery packs that can be charged from the electric distribution system.

Plug-in hybrid electric vehicles (PHEVs) - An electric vehicle with a battery that can be recharged by plugging it in the electric distribution system or be charged with its on-board engine-generator.

Power Quality (electric) - A measure of the electric system's ability to deliver energy that is steady and within a prescribed voltage level, frequency, and waveform. This would lead to the ability to power equipment that is suitable to the proper operation of that equipment.

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).

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 and/or distribution 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 convert excess heat to electricity, or cold thermal storage may create ice or chilled water in tanks to displace air-conditioning load.

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 - The use of batteries that power plug-in electric vehicles (PEVs) as energy storage capable of providing electrical services to the grid.