Glossary of Energy and Smart Grid Terms

ACCESS POINTS (APs) – Specially configured nodes on wireless local area networks (WLANs). Access points act as a central transmitter and receiver of WLAN radio signals.

ADVANCED METERING INFRASTRUCTURE (AMI) – Refers to the full measurement and collection system that includes meters at the customer site, communication networks between the customer and a service provider, such as an electric, gas, or water utility, and data reception and management systems that make the information available to the service provider.

ANALOG METER – Analog meters also known as electromechanical are the most common, the simple meter spins forward when consuming electricity. If the analog meter is bidirectional it will spin backwards when your solar electric system is pushing extra electricity back into the grid. The number of times the disc spins forward or backwards determines how much electricity you are using or contributing to the electric grid. The utility company must dispatch a meter reader every month to figure out how much energy is consumed.

AUTOMATIC METER READING (AMR) –The technology of automatically collecting consumption, diagnostic, and status data from water meter or energy metering devices (gas, electric) and transferring that data to a central database for billing, troubleshooting, and analyzing.

AVERAGE COST – The revenue requirement of a utility divided by the utility's sales. Average cost typically includes the costs of existing power plants, transmission, and distribution lines, and other facilities used by a utility to serve its customers. It also included operating and maintenance, tax, and fuel expenses.

AVERAGE DEMAND – The energy demand in a given geographical area over a period of time. For example, the number of kilowatt-hours used in a 24-hour period, divided by 24, tells the average demand for that period.

BATTERY – An electrochemical device that stores and furnishes electric current.

BLACKOUT – A power loss affecting many electricity consumers over a large geographical area for a significant period of time.

BROWNOUT – A controlled power reduction in which the utility decreases the voltage on the power lines, so customers receive weaker electric current. Brownouts can be used if total power demand exceeds the maximum available supply. The typical household does not notice the difference.

BRUSHLESS DC MACHINES (**Brushless Direct Current Motor, or **BLDC**) – Brushless Direct Current (BLDC) motors are one of the motor types rapidly gaining popularity. BLDC motors are used in industries such as Appliances, Automotive, Aerospace, Consumer, Medical, Industrial Automation Equipment and Instrumentation. As the name implies, BLDC motors do not use brushes for commutation; instead, they are electronically commutated. BLDC motors have many advantages over brushed DC motors and induction motors. In addition, the ratio of torque delivered to the size of the motor is higher, making it useful in applications where space and weight are critical factors.

DEMAND (Utility) – The level at which electricity or natural gas is delivered to users at a given point in time. Electric demand is expressed in kilowatts.

DEMAND RESPONSE (DR) – Occurs when consumers use less energy during times of typical peak energy use. The grid then becomes better able to handle energy loads. It also refers to software that manages customer consumption of electricity in response to supply conditions, for example, having electricity customers reduce their consumption at critical times or in response to market prices.

DISTRIBUTED AUTOMATION (DA) – Refers to a family of technologies including sensors, processors and switches that can perform a number of functions automatically to improve reliability, service quality and operational efficiency on an electric grid.

DISTRIBUTED GENERATION (DG) – Use of smaller, widely dispersed plants and more varied energy sources closer to where the energy is being used.

DISTRIBUTION SYSTEM (Electric utility) – The substations, transformers and lines that convey electricity from high-power transmission lines to ultimate consumers.

DYNAMIC PRICING – A way of charging the consumer based on hourly variations in power costs. The three main categories of dynamic pricing are as follows:
> 1. Real-time pricing – Consumers are charged based on hourly fluctuations in the cost of power. Consumers can use real-time pricing to plan their electricity use when prices are lowest.
> 2. Peak-time rebate – Consumers are charged the same base rate regardless of when they use power, but they can earn rebates, or money back, if they use less power during peak periods.
> 3. Critical-peak pricing – For a small number of peak demand hours each year, prices can increase as much as 500 percent. Customers who reduce their usage during these periods pay a slightly lower rate.

ELECTRIC CAR (or Electric Vehicle, **EV**) – An automobile that is powered exclusively by electricity that is stored in batteries or another energy storage device. To recharge these vehicles, they must be plugged into a socket in a manner similar to an electrical appliance.

ELECTRIC UTILITY – Any corporation, municipality or state agency with a franchise (often a monopoly franchise) to sell electric energy to end-use customers.

ELECTRICAL ENERGY– The generation or use of electric power over a period of time, expressed in kilowatt-hours (kWh), megawatt hours (MWh), or gigawatt hours (GWh).

ENERGY – Usable power needed to do work, to move an object, or to grow and sustain living things. Energy may be stored (potential), or working (kinetic). Forms of energy include chemical, radiant, gravitational, mechanical, thermal, sound and nuclear. Some sources of energy include sunlight, wind, water, oil, gas, coal, nuclear reactions, and heat within the earth (geothermal).

ENERGY STORAGE – The use of batteries or other systems, such as an electric circuit element called a capacitor or a water reservoir, to store generated energy, eliminating the need to use energy at the moment of generation.

GAS UTILITY – Any corporation engaged in, or authorized to engage in, distributing or transporting natural gas, including, but not limited to, any such corporation who is subject to the regulation of the Public Utilities Commission.

GRID – The electric utility companies' transmission and distribution system that links power plants to customers through high power transmission line service. It is a network of electrical distribution in the United States that consists of: Western Connection, Eastern Connection, and Texas Interconnection. Alaska and Hawaii have separate grids.

INTERFACE MANAGEMENT UNIT (IMU) – An Interface Management Unit (IMU) adds advanced two-way communications to a wide variety of existing gas meters, and a series of handheld and laptop-based tools aid in configuring and testing these and other Silver Spring devices.

INDEPENDENT POWER PRODUCER (IPP) or Non-Utility Generator (NUG) – Generates power that is purchased by an electric utility at wholesale prices. The utility then resells this power to end-use customers. Although IPPs generate power, they are not franchised utilities or government agencies. NUGs may be privately held facilities, corporations, cooperatives such as rural solar or wind energy producers, and non-energy industrial concerns capable of feeding excess energy into the system.

INVESTOR-OWNED UTILITIES – A for-profit company that provides a utility, such as water, natural gas or electricity, to a specific service area.

INDEPENDENT SYSTEM OPERATOR (ISO) – A neutral operator responsible for maintaining instantaneous balance of the grid system. The ISO performs its function by controlling the dispatch of flexible plants to ensure that loads match resources available to the system.

KILOWATT HOUR – A unit for measuring energy, commonly used for electricity. It corresponds to one kilowatt (kW) of power being used over a period of one hour.

LOAD – The amount of electric power supplied to meet one or more end user's needs.

LOAD FACTOR – In electrical engineering the load factor is defined as the average load divided by the peak load in a specified time period. A high load factor means power usage is relatively constant. A low load factor shows that the peak load is significantly higher than the average load. To service that peak, generators are likely sitting idle for long periods, thereby imposing higher costs on the system. Electrical rates are often designed so that customers with low load factor are charged more per kWh.

LOAD MANAGEMENT – Steps taken to reduce power demand at peak load times or to shift some of it to off-peak times. This may be with reference to peak hours, peak days or peak seasons. The main load affecting electric peaks is air-conditioning usage, which is therefore a prime target for load management efforts. Load management may be pursued by persuading consumers to modify behavior or by using equipment that regulates some electric consumption.

METER – A device for measuring levels and volumes of a customer's gas and electricity use.

MUNICIPAL ELECTRIC UTILITY – A power utility system owned and operated by a local jurisdiction.

MUNICIPAL UTILITY – A provider of utility services owned and operated by a municipal government.

NONRENEWABLE ENERGY – Power source that is harvested for one-time use, primarily from fossil fuels such as oil, coal, and natural gas.

NUCLEAR ENERGY – Power obtained by splitting heavy atoms (fission) or joining light atoms (fusion). A nuclear energy plant uses a controlled atomic chain reaction to produce heat. The heat is used to make steam run conventional turbine generators.

OFFSITE METER READING (OMR) METER – An electric meter that enables a utility to remotely read a customer's energy consumption during regularly scheduled monthly reads using wireless technology.

PEAK DEMAND – The highest electrical demand within a particular period of time. Daily electric peaks on weekdays occur in late afternoon and early evening. Annual peaks occur on hot summer days.

PLUG-IN HYBRID ELECTRIC VEHICLES – Cars and trucks whose engines use a combination of gasoline and electrical power to maximize fuel efficiency. To recharge the electrical battery, these vehicles are designed to plug into a socket in a manner similar to an electrical appliance.

RADIO FREQUENCY (RF) EMISSION/SIGNAL – Radio Frequency waves are a form of electromagnetic energy. They move through space at the speed of light and can be man-made or occur naturally. Radio waves are used for a variety of purposes, but most importantly, they are used in telecommunication services. Smart meters can use low-energy radio frequency waves to transmit information over distances, similar to a cell phone.

RELAYS – Extend the RF signal in spots where a meter isn't located and an Access Point remains out of reach. Behaving much like repeaters in an Ethernet network, Relays are easily deployed on pole tops or building floors to propagate the RF signal.

RENEWABLE ENERGY – Resources that constantly renew themselves or that are regarded as practically inexhaustible because they occur naturally. These include solar, wind, geothermal, hydro and wood. Although particular geothermal formations can be depleted, the natural heat in the earth is a virtually inexhaustible reserve of potential energy. Renewable resources also include some experimental or less-developed sources such as tidal power, sea currents and ocean thermal gradients.

RENEWABLE ENERGY PORTFOLIO STANDARD (REPS) or RENEWABLE PORTFOLIO STANDARD (RPS) – A regulation that requires the increased production of energy from renewable energy sources, such as wind, solar, biomass, and geothermal. Other common names for the same concept include **Renewable Electricity Standard** (RES) at the United States federal level and **Renewables Obligation** in the UK. The RPS mechanism generally places an obligation on electricity supply companies to produce a specified fraction of their electricity from renewable energy sources.

RENEWABLE RESOURCES – Renewable energy resources are naturally replenishable, but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Renewable energy resources include: biomass, hydro, geothermal, solar and wind. In the future they could also include the use of ocean thermal, wave, and tidal action technologies. Utility renewable resource applications include bulk electricity generation, on-site electricity generation,
RENEWABLE RESOURCES (cont'd) – distributed electricity generation, non-grid-connected generation, and demand-reduction (energy efficiency) technologies.

ROLLING BLACKOUT – A series of intentional electrical power outages in a region created to conserve energy when the power supply is low.

SMART GRID – An electric power distribution system that is enhanced with advanced sensors, intelligent controls, and two-way communications.

SMART METER – A device installed in a home to monitor household energy use and provide information on the amount and cost of energy use throughout the day. The information that is recorded is communicated at least daily back to the utility for monitoring and billing purposes.

TIME-OF-USE (TOU) RATES – The pricing of electricity based on the estimated cost of electricity during a particular time block. Time-of-use rates are usually divided into three or four time blocks per twenty-four hour period (on-peak, mid-peak, off-peak and sometimes super off-peak) and by seasons of the year (summer and winter). Real-time pricing differs from TOU rates in that it is based on actual (as opposed to forecasted) prices, which may fluctuate many times a day and are weather-sensitive, rather than varying with a fixed schedule.

TIME-OF-USE METER – A measuring device that records the times during which a customer uses various amounts of electricity. This type of meter is used for customers who pay time-of-use rates.

UNIFIED MESH NETWORK – A Unified Mesh Network is a network design in which each node relays data for the network. All nodes cooperate in the distribution of data in the network.

UTILITY – A company engaged in producing and distributing electrical power for the public.

WIRELESS LOCAL AREA NETWORK (WLAN) – A WLAN links two or more devices using some wireless distribution method (typically spread-spectrum or OFDM radio), and usually providing a connection through an access point to the wider Internet. This gives users the ability to move around within a local coverage area and still be connected to the network. Wireless LANs have become popular in the home due to ease of installation, and in commercial complexes offering wireless access to their customers, often for free. Most modern WLANs are marketed under the Wi-Fi brand name.

Definitions courtesy of Advanced Energy, CPS Energy, Microchip Technology Inc. (Padmaraja Yedamale), Silver Spring Networks, Smart Grid Consumer Collaborative, the U.S. Department of Energy and Wikipedia.