

Glossary of Terms

AIR COMPRESSOR - A device that converts power (using an electric motor, diesel or gasoline engine, etc.) into potential energy stored in pressurized air

AIR HANDLER - A device used to regulate and circulate air as part of a heating, ventilating, and air conditioning (HVAC) system. Air handlers usually connect to a ductwork ventilation system that distributes the conditioned air through the building and returns it to the air handler. Air handlers are also known as Air Handling Units (AHUs).

ALTERNATING CURRENT (AC) - An electric current which periodically reverses direction and changes its magnitude continuously. See also direct current.

AMPLIFIER - Electronic amplifier or amp is an electronic device that can increase the power of a signal (a time-varying voltage or current).

ARC WELDING - The use of an electric arc to melt metals to join metal workpieces.

ASHRAE - American Society of Heating, Refrigeration, and Air conditioning Engineers

ASHRAE LEVEL 1, 2, AND 3 - Categorization of energy audits. Level 1 audits involve a review of utility bills, personnel interviews, and a site walkthrough to identify major inefficiencies. Level 2 audits feature a more detailed, quantitative analysis. Level 3 builds on level 2 with specific measurements and engineering calculations.

BALLAST - A device to limit the current that flows through a load, most commonly a fluorescent lamp. Fluorescent lamps may use magnetic ballasts or electronic ballasts.

BASELINE - The level of energy consumption used as a reference when calculating savings on energy efficiency projects. An appropriate baseline would encompass an operator's usage over a complete operating or duty cycle, inclusive of minimum and maximum values.

BOILER - A closed vessel in which fluid (generally water) is heated. The heated or vaporized fluid exits the boiler for use in various processes or heating applications, including water heating, central heating, boiler-based power generation, cooking, and sanitation.

CAPACITOR - A device used to store an electric charge, consisting of one or more pairs of conductors separated by an insulator.

CARBON FOOTPRINT - The total amount of greenhouse gases (such as carbon dioxide and methane) produced to support human activities directly or indirectly, expressed in equivalent tons of carbon dioxide.

CENTRIFUGAL FAN - A mechanical device for moving air or other gases by centrifugal force. Centrifugal fans often have a ducted housing to direct outgoing air in a specific direction or across a heat sink; such a fan is also called a blower, blower fan, or squirrel-cage fan.

CNC MACHINE - Computer Numerical Control (CNC) machine is the automated control of machining tools (such as drills, lathes, mills and 3D printers) by means of a computer. A CNC processes a piece of material (metal, plastic, wood, ceramic, or composite) to meet specifications by following a coded programmed instruction and without a human operator directly controlling the machining operation.

CURRENT (ELECTRIC CURRENT) - A stream of charged particles, such as electrons or ions, moving through an electrical conductor or space. The moving particles are called charge carriers. In electric circuits the charge carriers are electrons moving through a wire. In semiconductors they are electrons and holes.

CURRENT HARMONICS - Currents at a frequency that is a multiple of the fundamental line frequency. Current harmonics are drawn by nonlinear loads.

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CYCLOCONVERTER (CCV) - A device that converts a constant amplitude, constant frequency AC waveform to another AC waveform of a lower frequency by synthesizing the output waveform from segments of the AC supply without an intermediate DC link. Cycloconverters are used to drive large motors. Applications include rotary kilns, metal shredders, and large scale materials handling.

DIRECT CURRENT (DC) - An electric current that flows in one direction. See also alternating current.

DISTORTION - Undesirable variance of an alternating current wave shape from the expected shape. Typically AC wave shapes follow a smooth sine curve. Distortion makes the wave shape appear jagged or clipped.

ENERGY CONSERVATION MEASURES (ECM) - Any type of activity to reduce the amount of energy used by a given process, technology or facility.

ENERGY MANAGEMENT INFORMATION SYSTEM (EMIS) - Performance management system that allows operators to plan, make decisions, and take actions to manage energy usage and cost.

ENERGY CONSUMPTION - Quantity of energy consumed, measured in kilowatt-hours (kWh), 1000 watts of electricity consumed for 1 hour.

ENERGY MANAGEMENT SYSTEM (EMS) - Tools used by operators that seek to improve energy performance. An EMS uses collected data throughout the organization to improve project efficiency, energy conservation, and energy supply.

ENERGY PERFORMANCE INDICATORS (EPI) - Defined energy indicators for tracking.

ESG - Environmental, Safety, and Governance. Corporations set ESG goals to achieve social responsibility objectives.

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FILTER - An electrical device that removes unwanted components or features from a signal. In power engineering, filters are used to mitigate harmonic currents.

FLICKER - A repeating, undesired voltage disturbance occurring at frequencies less than 25 Hz, caused by large, rapidly fluctuating loads such as arc furnaces and electric welders.

FOURIER SERIES - A mathematical technique to analyze periodic waveforms using the sum of sine waves at the fundamental frequency and a series of multiples thereof, or harmonics.

GATEWAY - A device that connects and transmits information to a data network.

GENERATOR (ELECTRICITY) - A device that converts motive power (mechanical energy) into electrical power.

GREENHOUSE GASES - Gas molecules that absorb heat radiated from the earth's surface and radiate a portion of it back down. The primary greenhouse gasses are carbon dioxide, methane, nitrous oxide, ozone, and water vapor.

GREENHOUSE EFFECT - The earth's surface is warmed by sunlight, and this heat is radiated into the atmosphere. Greenhouse gasses absorb some of this heat and reradiate it toward Earth. Climate change is caused by increased concentrations of greenhouse gasses.

GROUND (OR EARTH) - A reference point in an electrical circuit from which voltages are measured, a common return path for electric current, or a direct connection to earth.

HARMONIC - A sinusoidal wave in an electric power system whose frequency is an integer multiple of the fundamental frequency. Harmonic frequencies are produced by the action of non-linear loads such as rectifiers, discharge lighting, or saturated electric machines.

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HARMONIC DISTORTION - Undesired changes to a wave shape caused by the addition of harmonics to the fundamental frequency. Most distortion can be fully described by a series of harmonics.

HVAC (Heating, Ventilating, and Air Conditioning) - A system that provides suitable indoor air quality by way of adequate ventilation and thermal comfort.

INCANDESCENT LIGHT - An electric light using a wire filament that is heated by electricity passing through it. The filament glows from the high temperature, known as incandescence.

INDUCTION MOTOR - An AC electric motor in which the rotor current is induced by the stator current. The magnetic field from the stator current interacts with the magnetic field from the rotor current to produce torque. Induction motors do not require brushes, making them simple, robust, and efficient.

INVERTER (POWER INVERTER, INVERTOR) - A power electronic device that changes direct current (DC) to alternating current (AC).

INTERRUPTION - Occurs when voltage levels drop to zero, classified as momentary, temporary, or long term. Momentary interruptions occur when service is interrupted, but restored in less than 2 seconds. Temporary interruptions occur when service is interrupted for more than 2 seconds, but is automatically restored in less than 2 minutes.

KILN - A thermally insulated chamber, a type of oven, that produces temperatures sufficient to complete some process, such as hardening, drying, or chemical changes.

LIGHT-EMITTING DIODE (LED) - A semiconductor light source that emits light by quantum mechanical effects.

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LOAD CURVE - Graphical representation of a energy demand over time.

LOAD FACTOR - In electrical engineering, defined as the average load divided by the peak load in a specified time period.

MEGAWATT - one million watts

MOTOR GENERATOR - a rotating electrical machine that generates electricity having one set of characteristics (frequency, voltage, phase, etc) to another having different characteristics by way of a mechanical link. Motor-generators are also used to isolate loads from utilities, and in flywheel energy storage.

NOISE - Random variations in voltage, current, etc.

PASSIVE CONSUMPTION - Energy consumed during non-productive hours or throughout the day due to passive loads.

PEAK ENERGY TIMES - Times during the day when demand on the electric grid is high. Peak energy times vary based on time of year, weather, and usage. Electricity costs are higher during these times.

POWER CONDITIONING - Modifying the power to improve its quality.

POWER FACTOR - The ratio of power consumed (real power) to volts times amps (apparent power). Loads with low power factor will require high currents for the power they consume. Utilities assess a surcharge for customers with low power factor.

POWER FACTOR CORRECTION - Techniques to increase the power factor of a load.

POWER MONITORING - A process that measures electrical and power attributes.

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POWER QUALITY - The degree to which the voltage, frequency, and waveform of a power supply system conform to established specifications.

POWER SUPPLY - A hardware component that supplies power to an electrical device.

RADIO FREQUENCY (RF) - Voltages and currents from around 20 kHz to around 300 GHz.

POWER SYSTEM PROTECTION - A branch of electrical engineering that deals with protecting electrical power systems and minimizing their risk to life and property.

REACTIVE POWER - The portion of apparent power (see power factor) that is not real power. Loads draw reactive power when there is a phase difference between voltage and current. A power factor of 100% indicates that no reactive power is drawn.

RECTIFIER - A device that converts an alternating current into a direct one by allowing a current to flow through it in one direction only.

RESISTANCE (ELECTRICAL) - a force that counteracts the flow of current serving as an indicator of how difficult it is for current to flow.

RESISTOR (ELECTRICAL) - A passive two-terminal electrical component that creates resistance in the flow of electric current.

RESONANCE - The phenomenon of increased amplitude that occurs when the frequency of an AC voltage (or a Fourier component of it) is equal to or close to a natural frequency of the system it is applied to.

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RIDE THROUGH (LOW VOLTAGE) - The ability of an electrical device to maintain normal operation through a brief low voltage event. In power plants, the capability capability of generators to stay connected during brief short circuits or overloads. Also known as Fault Ride Through (FRT) or Under-Voltage Ride Through (UVRT).

SAG - A short duration reduction in voltage.

SCADA (Supervisory Control and Data Acquisition) - A control system architecture comprising computers, networked data communications, and graphical user interfaces for high-level supervision of machines and processes.

SCOPE 1, SCOPE 2, SCOPE 3 - Categories of carbon emissions. Scope 1 emissions are produced directly, such as by burning natural gas to make process steam. Scope 2 emissions are produced indirectly by consuming electricity, heating, cooling, or steam. Scope 3 comprises all other indirect emissions, such as those produced by end users of a company's products.

SPIKE - A fast, short duration electrical transient in voltage (voltage spike), current (current spike), or transferred energy (energy spikes).

SUB-METERING - Measuring the electricity consumption of individual loads where the total consumption of all loads is metered separately.

SUSTAINABILITY - Meeting our own needs without compromising the ability of future generations to meet their own needs.

SWELL - A short duration increase in voltage. Voltage swells lasting over 2 minutes are classified as over voltages.

TRACTION MOTOR - An electric motor that propels a vehicle.

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TRANSFORMER - A device that transfers electric energy from one alternating-current circuit to one or more other circuits, either increasing (stepping up) or reducing (stepping down) the voltage.

TRANSIENT - Sudden and significant deviations from normal voltage or current levels. Transients typically last from 200 millionths of a second to half a second.

UNINTERRUPTIBLE POWER SUPPLY (UPS) - An apparatus that provides emergency power to a load when the input power source or mains power fails. A UPS differs from an auxiliary or emergency power system or standby generator in that it will provide near-instantaneous protection from input power interruptions.

VARIABLE FREQUENCY DRIVE (VFD), or adjustable frequency drive (AFD), variable-voltage/variable-frequency (VVVF) drive, variable-speed drive (VSD), AC drive, micro drive or inverter drive - a type of motor drive used in electro-mechanical drive systems to control AC motor speed and torque by varying motor input frequency and voltage.

VIBRATION - Oscillatory forces or movements in machinery.

VIBRATION TABLE - Devices used to test products to determine or demonstrate their ability to withstand vibration. Vibration tables are also known as shake tables.

WAGES - Water, Air, Gas, Electricity, Steam

WASTE HEAT RECOVERY (WHR) - Capturing the waste heat from industrial processes for use in other processes. Recovering waste heat reduces or eliminates the cost and emissions associated with heating the downstream process.

WAVEFORM - The shape or a graph of how voltage, current, etc varies over time. Most power systems use sine waveforms.

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WAVEFORM GENERATOR - A device that can output a periodic voltage or current with one of several waveforms.