

Energy Glossary

A

absorb - To transform radiant energy into a different form, usually with a resulting rise in temperature.

acid rain - Any form of precipitation having a pH of less than 5.6 on a scale of 0 - 14. Pure water (pH 5.6) becomes acidic through the addition of chemicals from natural or man-made sources.

air pollution - The presence of contaminants in the air in concentrations that prevent the normal ability of the air to clean itself, and that interfere directly or indirectly with the health, safety or comfort of organisms, or with the full use and enjoyment of property.

alternating current (AC) - An electric current with its direction reversed at regular intervals. Electric current in the U.S. and Canada alternates with a frequency of 60 hertz, or cycles per second. Some European countries use 50 hertz.

alternative fuel - Any transportation fuel that is not of or related to petroleum or gasoline.

ampere - A unit of measure of electric current. One ampere equals 6.2×10^{18} electrons passing a point in one second.

anode - The positive terminal of an electrolytic cell; the negative terminal of a primary cell or of a storage battery that is delivering current.

ash - The residue which remains after complete burning (or oxidation) of a combustible material.

attraction - A force acting mutually between particles of matter, tending to draw them together.

B

battery - A group of two or more cells connected together to furnish electric current; also, a single cell that furnishes electric current.

biomass - The total amount of biological material in a given area.

boiler - Equipment which burns fuel or collects the sun's rays. Creates high temperatures to convert water to steam in order to produce electricity.

boiling - Heated to the boiling point; the temperature at which a liquid generates bubbles and converts to vapor.

British thermal unit (BTU) - A common measuring unit of energy, it is the amount of heat necessary to raise the temperature of one pound of water one degree Fahrenheit. One BTU equals 252 calories, 1055 joules, and 0.293 watt-hours. A cubic foot of natural gas equals about 1000 BTU's.

C

calorie (cal.) - (1) A unit of heat energy equal to the amount of heat needed to raise the temperature of one gram of water one degree Celsius. The calorie is used when temperature is measured on the Celsius scale, while the British Thermal Unit is used when the measurement is on the Fahrenheit scale.

capability - The maximum load which a generator, turbine, power plant, transmission circuit, or power system can supply under specified conditions for a given time interval without exceeding approved limits of temperature and stress.

cathode - The negative terminal of an electrolytic cell; the positive terminal of a primary cell or of a storage battery that is delivering current.

Celsius (°C) - A metric temperature scale on which the freezing point of water is 0 degrees and the boiling point of water is 100 degrees. The formula for converting a Celsius temperature to Fahrenheit is $^{\circ}\text{C} = 5/9 (^{\circ}\text{F} - 32)$.

charcoal - A black porous carbon prepared from vegetable or animal substances.

charge - A definite quantity of electricity.

chemical energy - That energy acting or operated or produced by chemicals.

circuit - The complete path traveled by an electric current.

circuit breaker - An automatic switch which breaks the circuit when too much electric current is flowing. It is similar to a fuse, but can be reused or reset.

coal - A solid, combustible, organic hydrocarbon formed by the decomposition of vegetable material without free access to air.

cogeneration - Using industrial waste heat to generate electrical power, thus saving energy from other sources.

condensation - The change from gas to liquid.

conductor (electrical) - A material capable of carrying an electrical current.

conservation - The careful use and management of a natural resource and its products.

conservation of matter and energy (law of) - The total amount of energy and matter in the universe remains constant.

conserve - To manage or use wisely.

consumers - (1) A person or thing that consumes; specifically, a person who buys goods or services for his/her own needs. (2) Organisms that get their energy by eating other organisms; the second trophic level on an ecological pyramid.

consumption - The using up of a quantity of an economic product. In the consumptive process the product is transformed.

conversion - The process of altering the physical or chemical nature of a substance. Processes such as cracking and polymerization can produce increased quantities or qualities of substances from basic fuel. Also, conversion can refer to the use of one energy source to produce another, such as gas used to produce electricity.

crude oil - Petroleum liquids as they come from the ground; formed from animal and vegetable material which collected at the bottom of ancient seas.

cubic foot (cu. ft.) - The volume of a cube, the edges of which are one foot in length. The most common unit of gas volume. The amount of gas required to fill a volume of one cubic foot under standard conditions of temperature, pressure and water vapor.

current - A flow of electric charge.

D

decibel (db) - A unit used for measuring the intensity of sounds.

demand, electric - The requirement for electric power to be delivered by a system at a given instant, or averaged over any designated period of time, expressed in kilowatts or other suitable units.

deplete - To lessen markedly in quantity.

direct current (DC) - An electric current that flows in only one direction through a circuit, as from a battery.

distribution - The act or process of distributing electric energy from convenient points on the transmission or bulk power system to the consumer.

E

ecology - The interrelationships of living things to one another and to their environment or the study of such interrelationships.

economic value - Having practical or industrial significance.

electric current - A flow of electrically charged particles along a conductor.

electrical energy - The energy associated with electric charges and their movements. Measured in watt hours or kilowatt hours. One watt hour equals 3600 joules or 860 calories.

electricity, current - The flow of charged particles (electrons) through a conductor.

electricity, static - Free charged particles (electrons) not in motion.

electrode - A conducting element in an electric cell, electronic tube, or semiconductor device.

electrolyte - A chemical compound which, when dissolved in water, will conduct an electrical current.

electron - A subatomic particle with a negative electrical charge, a small diameter and a mass 1/1837 that of a proton. Every atom consists of one nucleus and one or more electrons.

energy - In scientific terms, the capability or capacity of doing work.

energy conservation - The practice of extending the useful life of the earth's energy resources through wise and efficient management.

energy source - The point of origin of any form of energy.

entropy - A measure (thermodynamic) of disorder or unavailability of energy. A highly ordered system has a small value of entropy; a highly disordered system has a large value of entropy. Any use or conversion of energy irreversibly degrades its entropy, resulting in less energy available of the same quality.

environment - The sum of all external conditions and influences affecting the life, development, and ultimately, the survival of an organism. Everything that affects a living organism.

evaporation - The gradual change from liquid to gas (or vapor) in which molecules escape from the surface of the liquid. It is usually distinguished from boiling, where the change from liquid to gas occurs at a temperature where the vapor pressure equals the external pressure and bubbles form.

F

Fahrenheit - The temperature scale in which the freezing point of water is 32 degrees and the boiling point of water is 212 degrees. The formula for converting a Fahrenheit temperature to Celsius is $^{\circ}\text{F} = 9/5(^{\circ}\text{C} + 32)$.

filament - A conductor made incandescent by the passage of an electric current.

fission - The splitting of a heavy atom into two parts. This splitting releases large amounts of energy and one or more neutrons.

fluorescent lamp - A tubular electric lamp having a coating of fluorescent material on its inner surface and capable of emitting visible light.

food chain (food web) - A sequence of organisms, including producers, herbivores, and carnivores, through which energy and materials move within an ecosystem.

fossil fuels - Coal, oil, natural gas, and other fuels originating from geologic deposits of ancient plant and animal life. These fuels depend on oxidation for release of energy.

fuel - A material used to produce heat or power.

fuel cell - A device in which fuel and oxygen are combined to produce chemical energy that is converted directly into electrical energy.

fuel mix - The percentage of various fuels that make up the total fuel consumption.

fuel oil - An oil that is used for fuel and that usually has a higher flash point than kerosene.

fusion, nuclear - A nuclear reaction involving the combination of smaller atomic nuclei into larger ones with the release of energy. This process is also called a thermonuclear reaction because of the extremely high temperature required to initiate it.

G

garbage - Food waste; unwanted or useless material.

gasification - The conversion of a solid fuel, such as coal, to a gas. The gas can then be used as a source of heat to produce electric power, or can be broken down into liquid fuels such as gasoline.

gasoline - A liquid mixture of light hydrocarbons produced by refining ("cracking") crude oil. Used chiefly as a fuel in internal-combustion engines.

generation - (1) The act or process of producing electric energy from other forms of energy. (2) The amount of electric energy so produced.

generator - A device that converts mechanical energy into electrical energy. For example, the energy from falling water or steam may be used to spin a turbine that turns a coil of wire in the presence of a magnetic field which thus produces an electric current.

geothermal energy - The heat energy available in the earth's subsurface, extracted from three basic sources: (1) steam, (2) hot water, and (3) hot rocks or near-surface intrusions of volcanic molten rock.

gravitational energy - The force manifested by acceleration toward each other of two free material particles or bodies.

greenhouse effect - The heat effect of the atmosphere upon the earth. Light waves from the sun pass through the air and are absorbed by Earth. Earth re-radiates this energy as heat waves that are absorbed by the air, specifi-

cally by carbon dioxide. The air behaves like glass in a greenhouse, allowing the passage of light but not of heat.

green power - That electricity generated from a renewable resource.

H

habitat - The sum total of environmental conditions of a specific place that is occupied by an organism, a population or a community.

heat - Molecular kinetic energy transferred from one object to another or obtained by conversion from another form of energy (as in conversion from electrical or chemical energy).

heat energy - Energy that causes an increase in the temperature of an object, or changes the object from solid to liquid or from liquid to gas.

human effort - A conscious exertion of power by a human being.

hydrocarbon - An organic compound containing carbon and hydrogen in various combinations, found especially in fossil fuels.

hydroelectricity - Electric energy produced by water-powered turbine generator.

hydroelectric plant (conventional) - A hydroelectric power plant which utilizes streamflow only once as the water passes downstream.

hydroelectric plant (pumped-storage) - A hydroelectric power plant which recirculates all or a portion of the streamflow in the production of power.

hydrogen - A colorless, odorless, highly flammable gas. Hydrogen is the lightest and simplest of all the elements. It is a key component, along with carbon, of fossil fuels.

hydro power - Power produced by falling water.

I

import - Energy resources brought in from outside the region.

incandescent bulb - An electric lamp in which a filament gives off light when heated to incandescence by an electric current.

insulation - Any material that provides a high resistance to the flow of heat, sound or electricity from one surface or area to another.

insulator - A material that is a poor conductor of electricity.

J

joule - A metric unit of work or energy; the energy produced by a force of one newton operation through a distance of one meter. Equivalent to one watt second. An exajoule is equal to 10^{18} watts; estimated conventional gas resources are said to equal 10,500 exajoules.

K

kilowatt (kW) - A unit of power, usually used for electric power (equal to 1000 watts), or to energy consumption (at a rate of 1000 joules per second). Roughly, a power of one kW is capable of raising the temperature of a pound (pint) of water 1°F in one second.

kilowatt-hour (kWh) - The amount of work or energy delivered during the steady consumption of one kilowatt of power for a period of one hour. Equivalent to about 853 calories of heat energy.

kinetic energy - Energy possessed by objects in motion.

L

lifetime - The duration of the existence of a living being or usefulness of a thing.

light energy - The kind of energy that travels as visible radiation. For example, photons.

lignite - A brownish-black coal in which the alteration of vegetal material has proceeded further than in peat, but not as far as in subbituminous coal.

load - The power and energy requirements of users on the electric power system in a designated area or the amount of power delivered to a given point.

lumen - The amount of light emitted in a solid angle from a source that radiates to an equal extent in all directions; a measure of light equivalent to a certain number of lighted candles.

M

manual effort - An exertion of power by hand and not by machine.

mechanical energy - The energy of motion used to perform work.

megawatt (MW) - A unit of electrical power equal to 1000 kilowatts or one million watts.

methane - CH_4 is the lightest of hydrocarbons. It releases the most energy per pound; it is the prime component of

natural gas and is formed by the decomposition of organic matter; it can be produced synthetically. Tasteless, odorless, non-toxic, and colorless.

microwave - In general usage, microwaves refer to electromagnetic waves whose lengths are sufficiently short to exhibit some of the properties of light. Microwaves are used in point-to-point communications because they are easily concentrated into a beam. Frequencies of more than 1000 megahertz are usually considered to be microwave frequencies.

mining - The process or business of working mines.

molecule - Atoms combined to form the smallest natural unit of an element or compound.

motor - A machine which converts electrical energy into mechanical energy or which does work.

N

natural gas - An odorless, colorless, tasteless, non-toxic, clean-burning fossil fuel, natural gas is largely CH_4 (methane), a naturally occurring hydrocarbon that can also be produced synthetically as by coal gasification. At times it contains ethane, propane, butane, helium, and hexane.

negative - The plate of a voltaic or electrolytic cell that is at the lower potential.

neutral - Not electrically charged.

neutron - An uncharged elementary particle that has a mass nearly equal to that of the proton. Present in all known atomic nuclei except the hydrogen nucleus, neutrons are the particles that sustain a chain reaction in a nuclear reactor.

nickel cadmium battery - True storage batteries using an electrochemical system; can be recharged many times to give long useful life; not adversely affected by standing many months, either charged or discharged.

non-conductor - A substance that conducts heat, electricity, or sound only in a very small degree.

non-rechargeable - Not having the ability to be recharged.

nonrenewable resources - Depletable energy resources such as the fossil fuels—coal, natural gas, and oil.

non-reversible - Incapable of being reversed.

nuclear energy - Energy that can be produced by changes in the nucleus of an atom as by fission of a heavy nucleus or by fusion of light nuclei into heavy ones with accompanying loss of mass.

nucleus - A dense central core of the atom in which most of the mass and all of the positive charge is concentrated.

nutrient - Elements or compounds essential as raw materials for organism growth and development. For example, nutrients are carbon, oxygen, nitrogen, and phosphorus. Classes of nutrients in food are carbohydrates, fats, proteins, vitamins, minerals, and water.

O

ocean tides - The alternate rising and falling of the surface of the ocean and of water bodies; occurs twice a day and is caused by the gravitational attraction of the sun and moon.

ocean waves - Moving ridges or swells on the surface of open bodies of water.

oil - Any of the various kinds of greasy combustible substances obtained from animal, vegetable, and mineral sources. Oils are liquid at ordinary temperatures and soluble in certain organic solvents, but not in water. Synonym: petroleum.

oil shale - A sedimentary rock containing solid organic matter (kerogen) that yields substantial amounts of oil when heated to high temperatures.

ohm - The unit of measure of electrical resistance. One volt will force a current of one ampere through a resistance of one ohm.

outlet - A set of mounted and insulated electric-service terminals (as in a receptacle or an electric socket) to which electric appliances may be connected.

oxygen - An element that is a colorless, tasteless, odorless gas in the atmosphere, combined in water, in most rocks and minerals, and in numerous organic compounds; capable of combining with all elements except inert gases.

P

peak load - The maximum amount of power delivered during the stated period of time. The term is sometimes used to describe that portion of the load above the base load.

petroleum (crude oil) - A naturally occurring material (gaseous, liquid, or solid) composed mainly of chemical compounds of carbon and hydrogen. Fractional distillation yields gasoline, diesel, lubricating oil, and other products.

pH - A way of expressing both acidity and alkalinity on a scale of 0 - 14, with 7 representing neutrality, numbers less than 7 increasing acidity, and numbers greater than 7 increasing alkalinity.

photon - Unit of light energy.

photosynthesis - The process in which sunlight falling on green plants causes carbon dioxide and water to be converted into more complex organic materials such as glucose. Thus, it is the process by which green plants convert radiant energy into chemical energy.

plants - Young trees, vines, shrubs, or herbs.

pollution - Contamination of the environment, especially with man-made waste.

positive - Having higher electric potential and constituting the part from which the current flows to the external circuit; losing electrons.

potential energy - The amount of energy that a piece of matter has that could be released or used.

potential energy (electrical) - The amount of voltage capable of moving an electric charge from one point to another.

power - The rate at which work is done or energy expended. It is measured in units of energy per unit of time, such as calories per second, and in units such as watts and horsepower. If an amount of work (W) is done over a period of time (t) the power or rate of doing work is $P=W/t$.

primary energy - Energy in its naturally occurring form (coal, oil, uranium, etc.) before conversion to end-use forms.

producers - Organisms that utilize light energy to produce usable chemical energy; i.e., plants, autotrophs. Producers are the first trophic level on a pyramid of energy.

propane - A heavy, flammable gaseous hydrocarbon found in crude petroleum and natural gas.

proton - An elementary particle found in the nucleus of all atoms. It carries a positive charge equal to the negative charge of the electron. The proton is, in effect, the positive nucleus of the hydrogen atom.

R

radiant energy - Any form of energy radiating from a source; i.e., sound, heat, electromagnetic waves, light, x-rays, gamma rays, etc.

radiation - Any high-speed transmission of energy in the form of particles or electromagnetic waves.

rechargeable - A battery in which the active materials can be restored anew.

recycle - To process what are often waste materials (i.e., cans, glass, plastic, newspapers) in order to regain the material for beneficial human use.

refining - A series of processes that improve the usability of a raw fuel. Substances can be separated, converted, or treated to yield desirable compounds.

refuse - Useless, unwanted, or discarded materials.

renewable energy - Those sources of energy capable of being renewed.

renewable resources - Those resources capable of being renewed or replaced by natural ecological cycles or sound management practices.

repel - To force away or apart.

resources - The estimated total quantity of a natural resource such as petroleum, natural gas, coal, wood, minerals, geothermal energy, etc.

reversible - Capable of being reversed.

S

safety - The condition of being safe from undergoing or causing hurt, injury or loss.

scientist - One learned in science; a scientific investigator.

solar, active system - Energy from the sun used to generate electricity and to produce liquid or gaseous fuels. Active solar systems include windmills, hydroelectric energy, solar thermal energy conversion, biomass, ocean thermal energy conversion, and satellite power systems.

solar cell (photovoltaic cell) - An electric cell which converts radiant energy from the sun into electrical energy by the photovoltaic process.

solar collector - A surface which by virtue of geometry or surface properties absorbs solar energy and imparts this energy to a heat transfer fluid which circulates through the collector.

solar, passive system - A means of capturing, storing, and using heat from the sun. Unlike active systems, passive solar systems do not require the use of pumps and controls.

solar energy - Radiation energy from the sun falling upon Earth's surface.

solid waste - Useless, unwanted, or discarded materials with insufficient liquid content to be free flowing.

sound energy - A type of energy in which waves are carried by the transmission of mechanical vibrations through air, water, or solids.

stack - A bundle of fuel cells placed together so as to increase electrical output.

static electricity - Unbalanced, stationary electric charges.

steam - The vapor that forms when water is heated to the boiling point. Jets of steam are capable of driving the pistons in a piston engine or turning the blade of a turbine.

storm door - An additional door with an air space between it and the existing door.

storm window - An additional window with an air space between it and the existing window. Storm windows will cut in half the heat that passes through windows in a house.

substation - An electrical power station which serves as a control and transfer point in an electrical transmission system.

sun - The luminous celestial body around which Earth and other planets revolve.

superconductor - A material which when cooled near absolute zero, has no electrical resistance. Superconducting transmission lines can carry electrical power without loss. Superconducting coils can store large amounts of electrical energy.

supply and demand - The quantity or amount of a commodity that is needed or available.

switch - A device for making, breaking, or changing the connections in an electrical circuit.

synthetic fuel - Gaseous or liquid hydrocarbon material produced from solid carbonaceous material.

T

technology - The means employed to provide objects necessary for human comfort.

temperature - The degree of hotness or coldness measured on a definite scale. Specifically, the temperature of a substance is a manifestation of the speed of molecular movement.

thermal energy - The total potential and kinetic energy associated with the random motions of the particles of a material.

tidal power - The rising and falling motion of the ocean tide used to generate electricity.

transformer - A device which can increase or decrease the voltage of an alternating current.

transmission - The act or process of transporting electric energy in bulk from a source or sources of supply to other utility systems, it is done at high voltage to reduce loss.

turbine - A rotary engine powered by a jet of steam or fluid. It can be used to power a generator for electricity production.

U

uranium - A heavy, naturally occurring, radioactive element of atomic number 92. Its most common isotope, U238, is not fissionable. The isotope U235 is fissionable and is used as a fuel in nuclear reactors.

V

vapor - The gaseous state of substances that are normally liquid or solid. Steam is a good example.

volt - A unit of electrical pressure which forces electrical charges to move through conductors. One volt will force one ampere of current to move through a resistance of one ohm.

voltage - Electric potential or potential difference expressed in volts.

volume - A three-dimensional space measurement. Natural gas is measured by volume (cubic feet).

W

waste - Those materials discarded as worthless, defective, or of no use.

waste water - Water that is no longer suitable for human consumption due to the addition of objectionable material resulting in degradation of water quality.

water pollution - The addition of sewage, industrial, and institutional wastes or other harmful or objectionable material to water in concentration, or in sufficient quantities to result in measurable degradation of water quality.

watt - A metric unit of power, usually used in electric measurements, which gives the rate at which work is done or energy expended. One watt equals one joule of work per second. Stated in another manner, one watt is the work done when an electrical force of one volt pushes 6×10^{18} electrons through a resistance of one ohm in one second.

wind - A natural movement of air of any velocity.

windmill - A machine for doing useful work utilizing the energy of wind.

wood - The hard fibrous substance that makes up the greater part of the stems and branches of trees or shrubs beneath the bark.

work - The transfer of force from one body or system to another. Work is performed by a force moving an object.

Z

zinc-carbon - A widely used household battery rated at 1.5 volts per cell; they are much lower in cost compared to alkalines but also have a lower energy density.