



GLOSSARY

Glossary definitions appear under the heading of the resource to which they are applicable. Energy terminology common to all resources is defined in the last section labeled “Energy.”

SOLAR ^{1,2}

Concentrator—Lens (refractor) or mirror (reflector) which directs the intercepted solar radiation onto an absorber area that is smaller than the aperture.

Diffuse insolation—Portion of the global insolation reaching a collector or building surface after scattering from clouds, atmospheric particles or any other materials (i.e., that portion whose direction is not from the sun).

Direct radiation, Direct insolation—That portion of the insolation that comes directly from the sun without scattering by the atmosphere or clouds.

Global insolation—The insolation striking a surface from all directions, including the diffuse plus the beam insolation.

Insolation—Amount of solar energy reaching a surface per unit of time, typically over a day (kWh/m²-day).

Solar spectrum—Distribution of the sun’s energy with wavelength. About 40 percent of solar energy is in the visible wavelengths, with most of the remainder in the long-wavelength (infrared) portion of the spectrum and a small fraction in the ultraviolet portion.

Spectral distribution—Distribution of some quantity (such as solar energy, emissivity, or absorptivity) with wavelength.

WIND

Anemometer—device for measuring wind speed; cup, propeller, or vanes.

GIS—geographic information system; computerized mapping/analytical tool.

Rayleigh distribution—probability determined mathematically from the average wind speed.

Net metering—method of measuring the energy produced and consumed at a business or residence that has its own renewable energy generator such as solar panels or wind turbines.⁹

Wind power class—range of wind power, scale defined by Pacific Northwest Laboratory, small numbers correspond to low wind power, high numbers correspond to higher wind power.

Wind power plant—number of wind turbines at one location for generation of electricity, connected to the utility grid; also called wind farm or wind park.

Wind shear—change in wind speed with height above the ground, commonly modeled with a power law.

Wind turbine—machine for converting wind energy into other forms, primarily mechanical and electrical.

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BIOMASS

The following terms, phrases, and abbreviations are commonly used in the fields of ecology and biomass energy. Definitions were adapted from several sources (3, 4, 5, 6, 7)

Aerobic—living or active only in the presence of free oxygen.

Anaerobic—living or active in an environment with no air or free oxygen.

Anaerobic digestion—degradation of organic materials by microbes in the absence of oxygen to produce biogas (carbon dioxide and methane).

Bagasse—residue remaining after extraction of sugar from sugar cane.

Biodiesel—a diesel fuel consisting of methyl or ethyl esters of the energy storage lipids of plants and animals.

Bioenergy—energy derived from the conversion of biomass.

Biofuel—solid, liquid, or gaseous fuels derived from the conversion of biomass.

Biogas—a gaseous mixture of carbon dioxide and methane yielded by the anaerobic digestion of organic matter.

Biomass—plant or animal matter; strictly, a quantitative estimate of the total mass of organisms (plants and animals) within a given area, measured in units of mass, volume, or energy.

Carbohydrate—any of a group of organic compounds having the approximate formula of $(\text{CH}_2\text{O})_n$ and including, in order of increasing complexity, sugars, starches, hemi-cellulose and cellulose.

Cellulose—a complex polymeric carbohydrate that is the chief structural component of plant tissue, found in cell walls or fibers.

Char—the solid, carbonaceous residue resulting from incomplete combustion of organic materials.

Cultivar—a variety of a plant species in cultivation.

Dedicated energy crop—a crop grown specifically for its ability to generate energy.

Ethanol—ethyl alcohol (“grain” alcohol) produced by fermentation and distillation; chemically, $\text{C}_2\text{H}_5\text{OH}$.

Fermentation—the decomposition of complex organic compounds into relatively simpler ones under the action of a ferment—typically a yeast, bacteria, or other micro-organism.

Hemicellulose—a class of non-cellulosic polysaccharides of cell walls that are more readily hydrolyzed than cellulose to yield simple sugars; includes xylan.

Landfill gas—naturally occurring biogas produced from the decay of organic materials in landfills.

Lignin—the non-carbohydrate, structural constituent of wood and some other plant tissues that encrusts cell walls and cements cells together.

Lignocellulose—plant materials made up primarily of lignin, cellulose, and hemi-cellulose that form the structural portion of plants.

Methanol—methyl alcohol (“wood” alcohol) usually manufactured by steam reforming of natural gas, but also by the destructive distillation of wood; chemically, CH_3OH .

Moisture content—the amount of water contained in biomass, expressed as a percentage of the total mass of dried material (dry basis) or of the original wet material (wet basis).

Oils—triglycerides that are liquid at room temperature, owing to a comparatively lower proportion of saturated fatty acids than in fats.

Phytomass—plant biomass.

Pulp—a mixture of ground-up, moistened cellulosic material obtained from a variety of mechanical, chemical, and thermal treatments and used to make paper.

Sludge—a non-pumpable mixture of solids and liquids, frequently referring to the residue of sewage treatment.

Stover—mature stalks of cured corn used as livestock feed.²

WATER

Conventional hydropower plants—hydropower plants that use water from a lake, river, or reservoir in a single pass through turbines.

Ocean Thermal Energy Conversion (OTEC)—energy from ocean temperature differentials.

Pumped storage plants—Hydropower plants that take advantage of the difference in cost of electricity between peak and off-peak consumption times to economically recycle water between two reservoirs for multiple turbine passes (do not produce new power; rather, they merely act in analogous fashion as batteries for storing power generated by other means).

Salinity Gradient—a change in salinity between bodies of water or layers within a body of water.

Tidal range—The vertical distance between the high and low tide tidal barrage. The dam-like structure used to enclose a natural bay or estuary to form a basin.

GEOTHERMAL ⁸

Accessible fluid resource base—energy in geopressured water in sandstones and shales reachable by production drilling without regard to the amount recoverable or cost of recovery.

Accessible resource base (HDR)—that part of the resource base at temperatures above 25°C down to current routinely drillable depth (approximately 7 km) or the depth at which the critical temperature of water (374°C) is reached, whichever is less.

Accessible resource base (hydrothermal)—limited to permeable reservoirs that can produce water to a maximum depth of 3.2 km to bring thermal energy to the surface.

Aquifer—subsurface rock unit from which water is produced.

Basin—segment of the crust that has been downwarped. Sediments in basin increase in thickness toward the center.

Bolson—a basin with no drainage outlet.

Binary cycle technology—the preferred alternative for developing liquid-dominated reservoirs.

Brine—a highly saline solution.

Drawdown—the reduction in temperature of an HDR unit due to extraction of its heat energy at a rate greater than its natural reheating.

Fault—a plane of weakness within a rock body along which separation and differential movement occurs.

Geopressured—type of geothermal resource occurring in deep basins in which fluid is under high pressure.

Hydrothermal—hot water. The systems can be either a hydrothermal convection system in which upward circulation of water transports thermal energy to reservoirs at shallow depths or to the surface or a conduction-dominated system involving the existence of high vertical temperature gradients in rocks that include aquifers of significant lateral extent.

Injection well—well into which water or gas is pumped to promote secondary recovery of fluids or to maintain subsurface pressure.

Methane—a major component of natural gas.

Potentially useful resource base (for HDR assessments)—that part of the accessible resource base that could potentially be used for either electricity generation or direct heat applications, assuming a minimum process rejection temperature of 40°C.

Recoverable Resource (hydrothermal)—that part of accessible resource base that is producible at the wellhead under reasonable assumptions of future economics and technology.

Reservoir—natural underground container of liquids, such as oil, water or gas. May be formed by local deformation of strata, by faulting, by intrusions, and by changes of porosity.

Resource—fraction of accessible fluid resource base that can be extracted for use at costs competitive with other forms of energy at a foreseeable time, under reasonable assumptions of technological improvement and economic favorability.

Rio Grande Rift—a province extending from New Mexico into Texas has a high heat flow and thermal springs.

Seismic activity—the likelihood of an area being subject to earthquakes.

Subsidence—movement in the earth’s crust in which surface material is displaced vertically downward with little or no horizontal component.

Total resource base (for HDR assessments)¹⁰—all the heat energy contained in the rock units underlying the specified area or region (exclusive of hydrothermal and geopressed systems) to a depth of 10 km at temperatures above a reference of 15°C.

ENERGY

British thermal unit (BTU)—a unit of energy equal to the amount of heat required to raise the temperature of one pound of water 1°F.

Capacity—the maximum power that a machine such as an electrical generator or a system such as a transmission line can safely produce or handle.

Capacity factor—the amount of energy a facility generates in one year divided by the total amount it could generate if it ran at full capacity. A capacity factor of unity implies that the system ran at full capacity the entire year; a typical wind farm will operate at 0.25 capacity factor, or 25%.

Heat rate—the amount of chemical energy required by a given fossil-fueled power plant to produce 1 kWh of electricity, expressed in Btu’s. Heat rate is actually the inverse of the plant’s thermal efficiency but expressed in inconsistent units (both Btu’s and kWh are energy units).

Heating value, higher and lower—the potential combustion energy of any material, referred to as higher heating value (HHV) when water in the combustion products is condensed into liquid, and lower heating value (LHV) when the water remains a vapor.

Joule (J)—a standard international unit of energy; 1055 Joules is equal to 1 BTU.

Kilowatt (kW)—one thousand Watts; the power requirement of ten 100 W light bulbs or about that of a hair dryer.

Kilowatt-hour (kWh)—a unit of energy equal to one kW applied for one hour; running a 1 kW hair dryer for one hour would dissipate one kWh of electrical energy as heat.

Megawatt (MW)—one million Watts; a modern coal plant will have a capacity of about 1000 MW.

Megajoule (MJ)—one million Joules.

Quad—a very large unit of energy equal to one quadrillion (10¹⁵) BTU.

Thermal efficiency—the ratio of the useful work out to the energy in for a given thermodynamic process. Efficiencies are less than one or may be expressed as a percent.

Watt (W)—a standard unit of power defined as one Joule of energy transferred or dissipated in one second.

POLICY

Competitive Renewable Energy Zones (CREZ)—areas of the state identified as having the best renewable energy resources.¹¹

Renewable Energy Credit (REC)—a credit equal to one megawatt-hour of qualified renewable energy generated and metered in Texas that can be used or traded by utility companies.¹²

Renewable Portfolio Standard (RPS)—mandate created by the Texas Legislature through Senate Bill 7 (1999) to construct a specified amount of renewable energy. The first RPS mandated that electricity providers generate a total of 2,000 MW of additional renewable energy by 2009. The current RPS is at 5,880 MW by 2015 with a target of 10,000 MW by 2025.¹³

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