

BRODIES^{LLP}

RENEWABLE ENERGY
GLOSSARY

AAU: Assigned Amount Units under the Kyoto emissions trading scheme.

Accreditation: The process by which a renewable energy installation becomes certified to receive the applicable benefit (whether that is ROC, FIT or CfD).

ACE: The Association for the Conservation of Energy; trade association for energy efficiency suppliers.

ACMMO: The Association of Coal Mine Methane Operators.



AD: Anaerobic digestion; the production of methane rich biogas from the process of decomposition in the absence of oxygen.

ADL1; ADL2: Building Regulations Approved Documents L1 and L2 on conservation of fuel and power in dwellings (ADL1) and other buildings (ADL2).

AEP: The Association of Electricity Producers; trade association representing generators.

AGR: Advanced gas-cooled (Nuclear) reactor.

Airfoil: The cross section profile of the leeward side of a wind generator blade. Designed to give low drag and good lift. Also found on an airplane wing.

Alternating current (AC): Flow of electricity that constantly changes direction between positive

and negative sides. Electricity produced in the UK moves in current that shifts direction at a rate of 50 times per second (50 Hertz, 50Hz).

Alternator: A device that produces alternating current (AC) electricity from the rotation of a shaft. Used in wind and water turbines to generate electricity.

Ammeter: A measuring instrument used to measure the electric current in a circuit. Electric currents are measured in amperes (A), hence the name.

Amorphous silicon: An alloy of silica and hydrogen that can be deposited in thin-layers (a few micrometers in thickness) by a number of deposition methods to produce thin-film photovoltaic cells on glass, metal, or plastic bases.

Amps: The volume of electricity flowing through a conductor.

Anaerobic digestion: Process that produces methane. Natural consortia of bacteria are used to decompose organic matter in the absence of oxygen in closed reactors. Gas suitable for power production is produced, and possibly troublesome wastes (such as those at sewage treatment plants or feedlots) are turned to usable compost.

Anemometer: A device that measures wind speed. Important in designing a properly sized wind power system.

Angle of attack: For a wind turbine, the angle of relative air flow to the blade chord.

APX RPD Price: The Reference Price Data Report published by APX Commodities Limited.

Argus: The UK Market section of the "Argus European Electricity Report", covering electricity pricing.

Array: A number of photovoltaic modules electrically connected to produce a single electrical output.

ARODG: Access Reform Options Development Group – development group set up by Ofgem to examine potential amendments to the UK's transmission access arrangements.

Availability factor: A percentage representing the number of hours a generating unit is available to produce power (regardless of the amount of power) in a given period, compared to the number of hours in the period.

Balancing: With wind turbine blades, adjusting their weight and weight distribution through two axes so that all blades are the same. Unbalanced blades create damaging vibration.

Balancing and settlement code: The governance of electricity dispatch and settlement in England & Wales (and Scotland following the introduction of BETTA).

Base load: The minimum load experienced by an electric utility system over a given period of time. Baseload capacity - Generating equipment operated to serve loads 24-hours per day (eg. nuclear power plants).

BETTA: The British Electricity Transmission and Trading Arrangements introduced in April 2005, extending NETA to Scotland.

BHA: The British Hydropower Association; trade association representing the hydroelectric power industry.

Biodiesel: A liquid fuel made from vegetable oils, made by combining alcohol (usually methanol) with vegetable oil, animal fat, or recycled cooking grease. It can be used as an additive (typically 20%) to reduce vehicle emissions or in its pure form as a renewable alternative fuel for diesel engines.

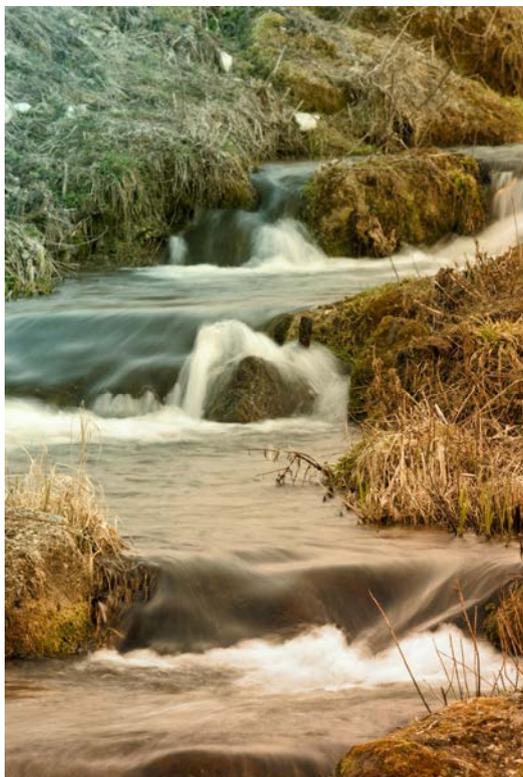
Bioenergy: Useful, renewable energy produced from organic matter, which may either be used directly as a fuel or processed into liquids and gases.



Biofuels: Unlike other renewable energy sources, biomass can be converted directly into liquid fuels, called 'biofuels,' to help meet transportation fuel needs. The two most common types of biofuels are ethanol and biodiesel. Also refers to Biomass converted directly to energy or converted to liquid or gaseous fuels, such as ethanol methane, and hydrogen.

Biomass: Organic nonfossil material of biological origin constituting a renewable energy source. Renewable fuels derived from purpose grown energy crops and the biodegradable proportion of industrial, municipal, agricultural and forestry residues.

Biomass gas (Biogas): A medium Btu gas containing methane and carbon dioxide, resulting from the action of microorganisms on organic materials such as a landfill.



Biopower: Is the use of biomass to generate electricity. Biopower system technologies include 'direct-firing,' 'cofiring,' 'gasification,' 'pyrolysis,' and 'anaerobic digestion.' Most biopower plants use direct-fired systems. Paper mills, the largest current producers of biomass power, generate electricity or process heat as part of the process for recovering pulping chemicals. Also referred to as 'biomass power.'

Blade: The part of a wind generator rotor that catches the wind.

Braking system: A device to slow a wind turbine's shaft speed down to safe levels electrically or mechanically.

British thermal unit (BTU or Btu): A traditional unit of energy equal to about 1.06 kilojoules. It is approximately the amount of energy needed to heat 1 pound (0.454 kg) of water to 1 °F (0.556 °C). Used in the power, steam generation, heating and air conditioning industries.

Brushes: Devices for transferring power to or from a rotating object. Usually made of carbon-graphite. Found in electric motors, alternators and generators.

Bryophyte: Species of river moss, hornworts or liverworts often found in run of river hydro schemes which can help to capture and recycle nutrients, provide a seed bed for larger plants, prevent erosion through binding soil. The species are also instrumental in the formation and maintenance of wetlands. Bryophytes can be seriously affected by a run of river hydro scheme, and a planning consent will often feature conditions regarding their continued existence.

Buckets: In an impulse hydro turbine, the buckets are attached to the turbine near the runner, and used to 'catch' the water. The force of the water hitting the buckets turns the runner, which turns the alternator drive shaft, causing the alternator to generate power.

Buy-out fund: The fund derived from renewable obligation suppliers who 'buy-out' from their obligation to submit ROCs in respect of a proportion of their electricity sales.

Buy-out fund recycling: The redistribution of the buy-out fund back to the electricity suppliers in relation to their proportion of the total ROCs redeemed in that year.

BWEA: The British Wind Energy Association; trade association representing the wind energy industry.

Carbon trust: A Government-funded organisation to promote carbon reduction in business and the public sector.

CfD: A contract for difference entered into by a generator as envisaged by the Energy Bill as published in November 2012 together with the documents entitled "Energy Bill Explanatory Notes" published by DECC on 29 November 2012 and all supporting documents published on that day.

CBM: Coal bed methane; gas actively extracted from coal seams.

CERT: The Carbon Emissions Reduction Target programme of the UK government (formerly called EEC - the Energy Efficiency Commitment).

Capacity: The maximum load a generating unit, generating station, or other electrical apparatus is rated to carry.

Capacity factor: The ratio of the electrical energy produced by a generating unit relative to the electrical energy that could have been produced at continuous full power operation during the same period of time. The Capacity Factor for wind energy in the UK is typically between 20% and 40%.

Capacity, Gross: The full-load continuous rating of a generator, prime mover, or other electric equipment under specified conditions as designated by the manufacturer. It is usually indicated on a nameplate attached to the equipment.

Capacity value: Sometimes referred to as capacity credit, this is an expression of the percentage of conventional generation that can be displaced by wind generation. The capacity value may be equal to the capacity factor at low levels of wind penetration, but will be lower as penetration increases.

Cast silicon: Crystalline silicon obtained by pouring pure molten silicon into a vertical mould. The cast ingots are sawed into wafers for further fabrication into photovoltaic cells. Cast-silicon wafers and ribbon-silicon sheets fabricated into cells are usually referred to as polycrystalline photovoltaic cells.

Cavitation: Air bubbles in a closed water system. Greatly reduces efficiency in a hydro turbine generator system, and can damage water pumps and pipes in a home water supply system.

CfD Counterparty:
The body which
signs and manages
CfD contracts with
eligible generators.

CCGT: Combined cycle gas turbine; modern gas powered electricity generating technology.

cf/s: A unit of measurement for water flow. Flow equals the volume of water (cubic feet) passing through an area in a given time period (per second). 1 cf/s = 7.48 gallons per second.

Chord: The width of a wind turbine blade at a given location along the length.

Clean energy cashback: The term for the Government's schemes to encourage renewable generation of heat and electricity: the renewable heat incentive and the feed-in tariff.

Climate change levy: A tax on energy delivered to non-domestic users in the United Kingdom. Introduced in 2001.

CMG: Compressed methane gas.

CNG: Compressed natural gas.

Co-firing: The burning of mixed fuels (typically refers to biomass with fossil fuel in a coal-fired power station).

Coefficient of performance: The measure of how many units of heat are generated per unit of electricity used.

Combined cycle: An electric generating technology in which electricity is produced from otherwise lost waste heat exiting from one or more gas (combustion) turbines. The exiting heat is routed to a conventional boiler or to a heat

recovery steam generator for utilization by a steam turbine in the production of electricity. Such designs increase the efficiency of the electric generating unit.

Combined heat and power (CHP) plant: A plant designed to produce both heat and electricity from a single heat source.



Combined heat and power association: Trade association representing CHP operators and developers.

Combustion efficiency: The calculation, in percentage, of how well equipment is burning a specific fuel. 'Complete combustion efficiency' (100%) would extract all the energy available in the fuel. However, 100% combustion efficiency is not realistically achievable. Various combustion processes produce combustion efficiencies from 0% to 95+%.

Commissioned: In relation to generating station, the completion of such procedures and tests in relation to that station as constitute, at the time they are undertaken, the usual industry standards and practices for commissioning that type of generating station in order to demonstrate that that generating station is capable of commercial operation.

Concentrator: A reflective or refractive device that focuses incident solar energy onto an area smaller than the reflective or refractive surface, resulting in increased solar energy at the point of focus.

Conservation: A foregoing or reduction of electric usage for the purpose of saving natural energy resources and limiting peak demand in order to ultimately reduce the capacity requirements for plant and equipment.

CUSC: Connection & Use of System Code; Governance arrangements for connection to the transmission system.

Cut-in: The rotational speed at which an alternator or generator starts pushing electricity hard enough (ie has a sufficiently high voltage) to make electricity flow in a circuit.

Current (electric): Flow of electrons in an electric conductor.

D Code: Covers all major technical aspects relating to connections to, and the operation and use of, the distribution network

DBIS (BIS): Department for Business, Innovation and Skills (formerly BERR).

DECC: The Department of Energy and Climate Change of the UK Government.

Declared net capacity: A correction factor applied to the rated capacity of some intermittent generation sources to enable like-for-like comparisons with typical thermal plant capacity.

DEFRA: Department of Environment, Food and Rural Affairs.

Diffuse radiation: The sunlight received indirectly, as a result of scattering due to clouds, fog, dust, moisture vapour or other substances in the atmosphere.

Derating: The process by which the output of a wind turbine is curtailed and restricted, whether through software or other means.

Digester gas: Biogas that is produced using a digester which is an airtight vessel or enclosure in which bacteria decomposes biomass in water to produce biogas.

Diode: A solid-state device that allows electricity to flow in only one direction.

Direct current (DC): An electric current that flows in a constant direction. The magnitude of the current does not vary, or has only a slight variation.

Direct fired: Systems that burn bioenergy feedstocks directly to produce steam. This steam drives a turbine, which turns a generator that converts the power into electricity. In some biomass industries, the spent steam from the power plant is also used for manufacturing processes or to heat buildings. Such combined heat and power systems greatly increase overall energy efficiency.

Direct radiation: Sunlight received directly, which has travelled in a straight path from the sun. Also referred to as beam radiation.

Distributed generation (embedded generation): A distributed generation system involves small amounts of generation located on a utility's distribution system for the purpose of meeting local (substation level) peak loads and/or displacing the need to build additional (or upgrade) local distribution lines.

Distribution: The system of wires, switches, and transformers which serve neighbourhoods and businesses; classified as 132,000 volts and below in England and Wales (132kV is considered to be part of the transmission network in Scotland). A distribution system reduces the voltage from high-voltage transmission lines (275,000 volts or 400,000 volts) to a level that can be distributed to homes or businesses; 132,000V, 33,000V, 11,000V, 3,300V, 440V.

Distribution code: The code of practice which covers all major technical aspects relating to connections to, and the operation and use of, licensed distribution networks.

Distribution system: That part of the electric system that delivers electrical energy to consumers.

Diversion load: Water and wind turbines require diversion loads to use the excess power they generate after the battery bank is fully charged. Ventilation fans and heating elements are popular choices.

Downwind: Refers to a horizontal axis wind turbine in which the hub and blades point away from the wind direction, the opposite of an upwind turbine.

Drag: In a wind generator, the force exerted on an object by moving air. Also refers to a type of wind generator or anemometer design that uses cups instead of a blades with airfoils.

DSO, DNO: Distribution system (or network) operator.

DSM: Demand side management: the process of managing the consumption of energy in order to to optimise available and planned generation resources.

DUKES: The Digest of UK Energy Statistics.

DWG: The Distribution Working Group; a body advising Ofgem and DBIS on the effects of distributed generation on the UK electricity network.

Electricity Retail Association: Trade association representing suppliers formed following the disbanding of the EA.

Embedded benefits: payments made by a power purchaser to a generator reflecting the reductions in centrally administered charges the power purchaser has achieved as a result of the generator not making use of the high voltage transmission system and the power purchaser having netted the generator's output against the power purchaser's normal usage.

Embedded generation: See distributed generation.

Emissions Trading Group: A body now constituted as an industry association advising the UK Government on the implementation of the EU Emissions Trading Scheme.

Energy: This is broadly defined as the capability of doing work. In the electricity industry, energy is more narrowly defined as electricity supplied over time, normally expressed in kilowatt-hours.

Energy consumption: The amount of energy consumed in the form in which it is acquired by the user. The term excludes electrical generation and distribution losses.

Energy crops: Crops grown specifically for their fuel value. These include food crops such as corn and sugarcane, and non-food crops such as poplar trees and switchgrass. Currently, two energy crops are under development: short - rotation woody crops, which are fast - growing hardwood trees harvested in five to eight years, and herbaceous energy crops, such as perennial grasses, which are harvested annually after taking two to three years to reach full productivity.



Energy efficiency: Programmes that reduce energy consumption whilst maintaining a given level of output.

Energy equipment payback time: The time required for generating the energy spent in manufacturing the energy systems. A modern photovoltaic module's energy payback time is typically from one to four years, depending on the module type and location. A typical module lifetime is 20 to 30 years. This means that modern solar systems are net energy producers, i.e. they generate

significantly more energy over their lifetime than the energy used in producing them. Also referred to as 'energy payback time.'

Energy mix: the distribution or proportion of different energy sources within the total energy supply.

Energy resources: Everything which could be used by society as a source of energy.

Energy Saving Trust: Government organisation to promote energy efficiency to domestic, business, local government and trade sectors.

Energy security: The extent to which a nation's or region's energy supplies are robust against potential disruption, including factors such as depletion of natural resources, variability and the political stability of regions where the energy supplies are obtained or trans-shipped.

Energy source: A source that provides the power to be converted to electricity e.g. hydro, solar, wind, biomass, fossil fuel, nuclear fuel.

Energy use: Energy consumed during a specified time period for a specific purpose (usually expressed in kWh).

Enhanced capital allowance: A tax allowance for investment in certain prescribed items of equipment, including some renewable energy device

Environment Agency: The regulator for the environment, including rivers and waste disposals.

EU ETS: Emissions trading scheme of the EU. Replacing the UK ETS.

Evacuated tube: In a solar thermal collector, an absorber tube, which is contained in an evacuated glass cylinder, through which collector fluids flow.

Feed-in tariff: A renewable energy support mechanism used in certain countries, where producers are rewarded at a nationally prescribed level for renewable electricity fed into the grid.

FIDIC: Fédération Internationale Des Ingénieurs-Conseils, a standard set of building contract conditions.

Flat-plate array: A PV array which does not use concentration.

Flume: Open and closed flumes serve to channel water into a reaction-type water turbine.

Forebay: A closed tank at the top end of a hydro power diversion pipeline. It allows the water to settle before entering the

penstock. Usually where the primary filter/trash-rack is installed.

Francis turbine: A type of reaction turbine. Francis turbines have nine or more fixed vanes on the runner. Water enters the runner from the side (through the vertical vanes), and exits out the bottom of the turbine (a 90 degree change in direction). Francis turbines operate with 4 to 2000 feet of head, and can be as large as 800 megawatts of output.

Fuel cells: One or more cells capable of generating an electrical current by converting the chemical energy of a fuel directly into electrical energy. Fuel cells differ from conventional electrical cells in that the active materials such as fuel and oxygen are not contained within the cell but are supplied from outside.

Furling: The act of a wind generator yawing (tilting or rotating) out of the wind either horizontally or vertically to protect itself from high wind speeds.

Furling tail: A wind generator protection mechanism where the rotor shaft axis is offset horizontally from the yaw axis, and the tail boom is both offset horizontally and hinged diagonally, thus allowing the tail to fold up and in during high winds. This causes the blades to turn out of the wind, protecting the machine.

Gasification systems: Use high temperatures and an oxygen-starved environment to convert biomass into 'synthesis gas,' a mixture of hydrogen and carbon monoxide. The synthesis gas, or 'syngas,' can then be chemically converted into other fuels or products, burned in a conventional boiler, or used instead of natural gas in a gas turbine. Gas turbines are very much like jet engines, only they turn electric 'generators' instead of propelling a jet. See 'Syngas'.

GEMA: Gas and Electricity Markets Authority; regulatory part of Ofgem.

Generation (Electricity): Process of producing electric energy by transforming other forms of energy.

Generation, Gross: The total amount of electric energy produced by the generating units at a generating station or stations, measured at the generator terminals.

Generation, Net: Gross generation less the electric energy consumed at the generating station for station's use.

Generator: Machine used to convert mechanical energy into electrical energy.

Geothermal energy: As used at electric power plants, hot water or steam extracted from geothermal reservoirs in the Earth's crust that is supplied to steam turbines at electric power plants that drive generators to produce electricity.

Geothermal plant: A plant in which a turbine is driven either from hot water or by natural steam that derives its energy from heat found in rocks or fluids at various depths beneath the surface of the earth. The fluids are extracted by drilling and/or pumping.

Gigawatt (GW): The unit of electrical power equal to one thousand-million watts, or one thousand megawatts.

Global generation: Total solar radiant energy impinging on a surface, equal to the sum of direct and diffuse radiation.

Governor: A device that regulates the speed of a rotating shaft, either electrically or mechanically.

Grid: Matrix of an electrical distribution system, in the UK, the National Grid.

Grid code: The code of practice which covers all major technical aspects relating to connections to, and the operation and use of, the transmission system.

Guide vanes: Used in reaction turbines to change water flow direction by 90 degrees, causing the water to whirl and enter all turbine runner buckets simultaneously, improving turbine efficiency.

Head: The total vertical distance between the beginning of a hydro system diversion and the micro hydro turbine. The amount of power a turbine produces is proportional to the total available head.

Head loss: Obstructions to the flow of water to a hydro turbine. Anything from the friction on the inside of the pipeline, to water turbulence in the pipe or fittings which change the pipeline direction can slow the water flow down, causing head loss.

Heat pump (Geothermal): A heat pump in which the refrigerant exchanges heat (in a heat exchanger) with a fluid circulating through an earth connection medium (ground or ground water). The fluid is contained in a variety of loop (pipe) configurations depending on the temperature of the ground and the ground area available. Loops may be installed horizontally or vertically in the ground or submersed in a body of water.

Heren: The ICIS Heren European Daily Electricity Markets report that covers baseload electricity delivered in Great Britain.



Hertz: The frequency with which an alternating current waveform rises and falls (as it changes polarity).

High-temperature collector: A solar thermal collector designed to operate at a temperature of 180 degrees Fahrenheit or higher.

Hub: The centre of a wind generator rotor, which holds the blades in place and attaches to the shaft.

ICC: The Infrastructure Conditions of Contract, a standard set of building contract conditions.

Impulse turbine: Impulse turbines produce power when a jet of water from an enclosed diversion pipeline 'shoots' through a small nozzle directly onto the turbine runner. Impulse turbines are best for 'high head' sites (with 20 feet of head or more), but they do not require very high flow rates. Pelton and Turgo turbines are two of the most common impulse turbine families.

Insolation: The solar energy received at a place over a given period. May be expressed as sun-hours per day, langleys per hour, watts per square meter per hour, or any number of other units.

Intake: The point at which water is diverted from a river or stream to the turbine via a diversion. A trash rack/filter and settling tank are often installed at the intake point to prevent debris and sand or silt from reaching the turbine.

Installed capacity: The total generating units' capacities in a power plant or on a total utility system. The capacity can be based on the nameplate rating or the declared net (dependable) capacity (DNC).

Intermittent resources: Resources whose output depends on some other factor that cannot be controlled by the utility e.g. wind or sun. Thus, the capacity varies by day and by hour.

Internal Collector Storage (ICS): A solar thermal collector in which incident solar radiation is absorbed by the storage medium.

Inverter: Used to convert direct current (DC) electricity to alternating current (AC), so that it can power domestic appliances or be exported to the grid.

Isolation diode: A diode which prevents one segment of a PV array from interacting with another array segment. Usually used to prevent array energy from flowing backwards through a sub-voltage series string. May also serve the function of blocking diode.

I-V curve: A current/voltage curve, which expresses the possible combinations of current and voltage output of a photovoltaic device.

J: Joule. Defined as the amount of work done by a force of one newton moving an object through a distance of one metre. Also defined as the work required to move an electric charge of one coulomb through an electrical potential difference of one volt; or one coulomb volt (C·V). This relationship can be used to define the volt. Also defined as the work required to continuously produce one watt of power for one second; or one watt second (W·s). This relationship can be used to define the watt.

JCT: The Joint Contracts Tribunal, various sets of standard building contract conditions.

Kilowatt (kW): The electrical unit of power equal to 1,000 watts.

Kilowatt-hour (kWh): The basic unit of electric energy equal to one kilowatt of power supplied to or taken from an electric circuit for one hour.

kWh/year: Kilowatt hour per year. This can be used in terms of heat output, or the amount of energy needed to heat a house. For example, my solar thermal system is predicted to generate 2,517kWh of heat per year. The Department of Energy and Climate Change (DECC) calculates that the average household requires 3,742 kWh/year of energy to heat its hot water.

kWp: Kilowatt peak is the measure of how much power a photovoltaic system produces from the sun under test conditions. It measures the power produced under 1kW per m² of light. The more efficient the system, the smaller the area of panels needed.

kTOE: Equivalent to 1000 tonnes of oil.

kVA: One thousand volt-amps; similar to one kW.

Lag: The situation in an electrical circuit in which an electric current develops with comparative slowness, and lags behind the corresponding voltage.

Landfill Gas: Gas that is generated by decomposition of organic material at landfill disposal sites. Landfill gas is approximately 50 percent methane.

Lead: The situation in an electrical circuit in which an electric current leads the voltage.

Leading edge: The edge of a blade that faces toward the direction of rotation.

Leeward: Away from the direction from which the wind blows.

Licence exempt generator: An electricity generator too small (<100MW) to be required to hold a generation licence.

Lift: The force exerted by moving air on asymmetrically-shaped wind generator blades at right angles to the direction of relative movement. Ideally, wind generator blades should produce high lift and low drag.

Liquid collector: A medium-temperature solar thermal collector, employed predominantly in water heating, which uses pumped liquid as the heat-transfer medium.

Load: The amount of electric power delivered or required at any specified point or points on a system. Load originates primarily at the power consuming equipment of the customer.

Load factor: The ratio of the average load supplied to the peak or maximum load during a designated period. Similar to capacity factor, but more often used when describing conventional plant.

Losses: The general term applied to energy (kWh) and capacity (kW) lost in the operation of an electric system. Losses occur principally as energy transformations from kWh to waste-heat in electrical conductors and apparatus.



Low-temperature collectors: Metallic or nonmetallic solar thermal collectors that generally operate at temperatures below 110 degrees Fahrenheit and use pumped liquid or air as the heat transfer medium. They usually contain no glazing and no insulation, and they are often made of plastic or rubber, although some are made of metal.

Maximum power: Also referred to as peak power. The point on a device's I-V curve where the product of I and V (Pmax, measured in watts) is maximized. The points on the I and V scales which describe this curve point are named Imp (current @ max power) and Vmp (voltage @ max power.).

Medium-temperature collectors: Solar thermal collectors designed to operate in the temperature range of 140 degrees to 180 degrees Fahrenheit, but that can also operate at a temperature as low as 110 degrees Fahrenheit. The collector typically consists of a metal frame, metal absorption panels with integral flow channels (attached tubing for liquid collectors or integral ducting for air collectors), and glazing and insulation on the sides and back.

Megawatt (MW): One million watts. A large coal-fired power station in the UK typically has an installed capacity of between 2,000 MW and 4,000 MW.

Megawatt-hour (MWh): One thousand kilowatt-hours or one million-watt hours.

Methane: A gas that is naturally produced when organic matter decomposes. The gas can be collected from sources such as landfills, water treatment plants, and livestock farms, and then used as an energy source. Methane gas collection is considered a green power source.

Microgeneration: The generation of heat or power by renewable or low carbon means, by individuals, businesses or communities for their own use.

Miscanthus: Also known as elephant grass, miscanthus is one of the front runners in the search for a commercially viable biomass crop in the UK and Europe. It is originally from China, but has a high yield when grown in the UK.

MJ: Megajoule (one thousand kJ).

Module: A number of solar cells electrically connected, protected from environmental stresses, self-contained and not subdividable, providing a single electrical output.

MSW (Municipal Solid Waste): Residential solid waste and some nonhazardous commercial, institutional, and industrial wastes.

Mtoe: Million tonnes of oil equivalent.

National Terms of Connection: The standard terms and conditions governing any electricity supply contract in Britain. Unless agreed otherwise through a bespoke agreement which must not depart significantly from these statutory terms, the National Terms will form a legally binding agreement between a generator and the operator of the distribution system through which electricity is conveyed to that generator's premises.

NEC: New Engineering Contract, various sets of standard building contract conditions.

NETA: The New Electricity Trading Arrangements introduced in March 2001 for England and Wales, and governed by the Balancing and Settlement Code (see BSC). Now superseded by BETTA.

OFGEM: The Office of Gas and Electricity Markets; the energy regulator for the GB gas and electricity sectors.

Net Metering: Arrangement that permits a facility (using a meter that reads inflows and outflows of electricity) to sell any excess power it generates over its load requirement back to the electrical grid to offset consumption.

Ocean tidal / wave-action: Where water in motion caused by ocean tides and shoreline wave action is used to generate electricity.

OETWG: Offshore Electricity Transmission Working Group.

Off-peak: Periods of relatively low system demands.

Open circuit voltage: The voltage that an alternator or generator produces when it is NOT connected to anything drawing electrical power.

Outage: Time during which service is unavailable from a generating unit, transmission line, or other facility.

Parabolic dish: A high-temperature (above 180 degrees Fahrenheit) solar thermal concentrator, generally bowl-shaped, with two-axis tracking.

Parabolic trough: A high-temperature (above 180 degrees Fahrenheit) solar thermal concentrator with the capacity for tracking the sun using one axis of rotation.

Passive solar: A system in which solar energy alone is used for the transfer of thermal energy. Pumps, blowers, or other heat transfer devices that use energy other than solar are not used.

Payback: The length of time it takes for the savings received to cover the cost of implementing the technology.

Peak: Periods of relatively high system demands.

Peak demand: Maximum power used in a given period of time.

Peak watt: A manufacturer's unit indicating the amount of power a photovoltaic cell or module will produce at standard test conditions (normally 1,000 watts per square meter and 25 degrees Celsius).

Peat: Peat consists of partially decomposed plant debris. It is considered an early stage in the development of coal. Peat is distinguished from lignite by the presence of free cellulose and a high moisture content (exceeding 70 percent). The heat content of air-dried peat (about 50 percent moisture) is about 9 million Btu per ton.

Pelton turbine: A type of impulse turbine with one or more jets of water hitting the buckets of a runner. The runner resembles a miniature water wheel. Pelton turbines are used in high head sites (20 - 6000 feet), and can be as large as 200 megawatts.

Penstock: A closed pipeline through which the water flows to a hydro turbine.

Permanent magnet alternator: An alternator that uses moving permanent magnets instead of electromagnets to induce current in coils of wire.

Phase: One of the characteristics of the electric service supplied or the equipment used. Practically all residential customers have singlephase service at 240 volts. Large commercial and industrial customers typically have threephase service from 440 volts upwards.

Photovoltaic (PV) cell: An electronic device consisting of layers of semiconductor materials fabricated to form a junction (adjacent layers of materials with different electronic characteristics) and electrical contacts and being capable of converting incident light directly into electricity (direct current).

Photovoltaic (PV) module: An integrated assembly of interconnected photovoltaic cells designed to deliver a selected level of working voltage and current at its output terminals, packaged for protection against environment degradation, and suited for incorporation in photovoltaic power systems.

Pitch: The angle between the blade chord and the plane of the blade's rotation. Also called 'setting angle' or 'blade angle'. A blade carved with a twist has a different setting angle at the tip than at the root.



Plant: A facility containing prime movers, electric generators, and other equipment for producing electric energy.

Power: The rate at which energy is transferred.

Power plant: A generating station where electricity is produced.

PPO: Pure plant oil.

Production: The act or process of generating electric energy.

Propeller turbine: A type of reaction turbine with a propeller-style runner. Water passes through the runner and drives the propeller blades. Propeller turbines can be used from 2 to 300 feet of head, and can be as large as 100 megawatts.

Pulse width modulation: A regulation method based on duty cycle. At full power, a pulse-width-modulated circuit provides electricity 100 percent of the time. At half power, the PWM is on half the time and off half the time. The speed of this alternation is generally very fast. Used in both solar wind regulators to provide regulation more efficiently.

Pumped storage: A facility designed to generate electric power during peak load periods with a hydroelectric plant using water pumped into a storage reservoir during off-peak periods.

Pyrolysis: Using a similar process but different conditions (totally excluding rather than limiting oxygen, in a simplified sense) will 'pyrolyze' biomass to a liquid rather than gasify it. As with syngas, pyrolysis oil can be burned to generate electricity or used as a chemical source for making plastics, adhesives, or other bioproducts.

Rated capacity: The power rating of a generating station, (usually in kVA or MW) at which it would operate under the design operating conditions and input fuel (or resource – e.g. wind speed).

Reaction turbine: Reaction turbines produce power from the pressure of water 'falling' on the runners after flowing through the guide vanes. Reaction turbines can operate with head as low as two feet, but require much higher flow rates than impulse turbines.

PPA: A Power Purchase Agreement between a generator and a power purchaser licensed under section 6 of the Electricity Act 1989, as amended by the Utilities Act 2000, for the sale and purchase of renewable energy generated and all associated benefits.

Reference Price: A proxy for the market price of electricity used to calculate the value of difference payments under the CfD.

Reliability: Electric system reliability has two components - adequacy and security. Adequacy is the ability of the electric system to supply the aggregate electric demand and energy requirements of the customers at all times, taking into account scheduled and unscheduled outages of system facilities. Security is the ability of the electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system facilities.

Renewable Energy Association: Trade association representing renewable energy producers of all types.

Renewable heat incentive: Government plans to encourage the take up of renewable sources of heat generation. This was proposed in July 2009 and is expected to be introduced in April 2011. It applies to heat generated in an individual home and large scale district heating systems and heat from waste plants.

Renewables obligation: support mechanism aimed at increasing the percentage of renewable energy generation on the national grid. The renewables obligation works by placing an obligation on electricity suppliers to source an increasing percentage of supply from renewables. Separate obligations apply in Scotland and Northern Ireland.

Reserve capacity: Capacity in excess of that required to carry peak load.

ROCs: Renewable Obligation Certificates; the tradable 'currency' of the RO.

Root: The area of a blade nearest to the hub. Generally the thickest and widest part of the blade.

Rotor: 1) The blade and hub assembly of a wind generator. 2) The disc part of a vehicle disc brake. 3) The armature of a permanent magnet alternator, which spins and contains permanent magnets.

Runner: The part of a micro hydro turbine that actually attaches to the alternator drive shaft. The 'buckets' on the runner are what the water pushes against to turn the runner and generate electricity.

Running and quick-start capability: Generally refers to generating units that can be available for load within a 30-minute period.

SBCC: Scottish Building Contract Committee, a standard set of building contract conditions.

Scheduled outage: An outage that results when a component is deliberately taken out of service at a selected time, usually for the purposes of construction, maintenance, or testing.

Scroll case: An enclosure used by some reaction water turbines to channel the water into the turbine guide vanes at the optimal angle to maximize the turbine's efficiency.

Sellback: When an alternative energy system is connected to the grid, and excess power is sold back to the local utility.

Setting angle: The angle between the blade chord and the plane of the blade's rotation. Also called pitch or blade angle. A blade carved with a twist has a different setting angle at the tip than at the root.

Shaft: The rotating part in the center of a wind generator or motor that transfers power.

Smart windows: Windows that save energy by controlling the amount of solar heat that passes through the window glass. For example, in winter, they lighten and allow lots of heat to pass through the glass but not back out, reducing the amount of energy needed for home heating. In summer, they darken without blocking visible light to reduce the



amount of heat coming into the home and decrease cooling costs. Electrochromic windows darken or lighten by a 'chemical reaction' that is set off by a small voltage. Also referred to as 'electrochromic windows.'

Solar thermal collector: A device designed to receive solar radiation and convert it into thermal energy. Normally, a solar thermal collector includes a frame, glazing, and an absorber, together with the appropriate insulation. The heat collected by the solar thermal collector may be used immediately or stored for later use.

Spinning reserve: Reserve generating capacity running at zero load.

Start-up: The windspeed at which a wind turbine rotor starts to rotate. It does not necessarily produce any power until it reaches cut-in speed.

Static pressure: Pressure produced by an unmoving column of water. (also: static head) There are no friction / head losses when water is not moving, so static pressure is determined only by the vertical height of the water column. The static pressure on a 10ft. tall vertical pipe full of water would be the same as a 1000ft. long pipeline with 10ft. of head over its entire distance.

Stator: The part of a motor, generator or alternator that does not rotate. In permanent magnet alternators it holds the coils and laminates.

Substation: A facility used for switching and/or changing or regulating the voltage of electricity. Service equipment, line transformer installations, or minor distribution or transmission equipment are not classified as substations.

Suction head: Additional energy in a reaction turbine hydro system, created by the draught tube channelling outlet water. Inlet pressure, from the water 'pushing' on the turbine runner as it enters, creates ~80% of the energy in a reaction system. Suction head, from the vacuum created by the closed outlet system, 'pulls' on the runner as the water exits the system, adding up to ~20% additional power output to the system.

Supplier: A person or corporation, generator, broker, marketer, aggregator or any other entity, that sells electricity to customers, using the transmission or distribution facilities of an electric distribution company.

Supplier Obligation: An obligation on electricity suppliers to make payments to the CfD counterparty in order that it can meet its liabilities.

Switchgear: The combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment. The switchgear may used to de-energise equipment to permit maintenance work or to clear faults.

Strike Price: The agreed level of support a generator will receive as specified in the CfD, and used to calculate difference payments under the CfD.

Syngas: A syntheses gas produced through gasification of biomass. Syngas is similar to natural gas and can be cleaned and conditioned to form a feedstock for production of methanol. See 'Gasification Systems'.

System (Electric): Physically connected generation, transmission, and distribution facilities operating as a single unit.

Terawatt (TW): One thousand gigawatts.

Three-phase power system: A power system with at least three conductors carrying alternating current voltages that are offset in time by one-third of the period.

TNUoS: Transmission Network Use of System; charges made by the TSO to users of its system.

Thrust: In a wind generator, wind forces pushing back against the rotor. Wind generator bearings must be designed to handle thrust or else they will fail.

Thrust bearing: A bearing that is designed to handle axial forces along the centerline of the shaft. In a wind generator, this is the force of the wind pushing back against the blades.

toe: Tonne of oil equivalent.

Transformer: A device for changing the voltage of alternating current.

Transmission: The act or process of transporting electric energy in bulk.

Transmission and distribution (T&D) losses: Losses that result from the heating effect of current as it flows through wires to travel from the generation facility to the customer. Because of losses, the electricity produced by the utility is greater than the electricity that shows up on the customer bills.

Transmission and distribution (T&D) system: An interconnected group of electric transmission lines and associated equipment for the movement or transfer of electrical energy in bulk between points of supply and points at which it is transformed for delivery to the ultimate customers.

Transmission lines: Heavy wires that carry large amounts of electricity over long distances from a generating station to places where electricity is needed. Transmission lines are held high above the ground on tall towers called transmission towers.

Transmission network: The electricity transmission system operating at voltages above 132kV (in England and Wales) and including 132kV in Scotland).

TSO, TNO: (Electricity) Transmission System (or Network) Operator.

U-value: Indicates how well a part of the building (ie roof, window, door, wall) keeps the heat inside the building. It measures the heat flow through those components. The higher the figure, the higher the heat loss. It is measured in terms of how many watts (W) of thermal energy is transported through a component of 1 square meter (m²) at a temperature difference of 1 degree centigrade, ie W/m².

UCO: Used cooking oil.

UKBCSE: UK Business Council for Sustainable Energy; grouping of participants in the energy sector interested in promoting sustainable energy.

UK ETS: The Emissions Trading Scheme of the UK, progressively being replaced by the EU ETS.

Upgrade: Replacement or addition of electrical equipment resulting in increased generation or transmission capability.

Utility: A regulated vertically-integrated electricity company. 'Transmission utility' refers to the regulated owner/operator of the transmission system only. 'Distribution utility' refers to the regulated owner/operator of the distribution system which serves retail customers.

Variability: The non-continuous nature of some forms of energy generation, e.g. wind power, solar, hydro, wave and tidal which can be made more predictable through accurate forecasting.

Volt: The unit of electrical potential. It is the electromotive force which, if steadily applied to a circuit having a resistance of one ohm, will produce a current of one ampere.

Volt-amperes: The volt-amperes of an electric circuit; the mathematical product of the volts and amperes. Equals the power in a direct current circuit.

Voltage: Measure of the force of moving electrical energy. Wake Effects: Any restriction or diminution of wind speed, any turbulence or wind shear, or any other effect arising from interference with the flow of wind.

Watt: The electrical unit of power or rate of doing work. One horsepower is equivalent to approximately 746 watts.

Watt-hour: One watt of power expended for one hour.

> Sources

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WPZ: The Wind Protection Zone, an area around a wind turbine which is required to protect the wind resource for the turbine.