Glossary

Absorption chiller A type of chilling plant that uses heat as its energy source, as opposed to electrical energy.

ACE Association for the Conservation of Energy.

Anaerobic digestion A process for making useful fuel gas (methane) by controlled decomposition of organic matter by micro-organisms.

Baseload Electricity from generating plant that runs constantly through the day and night.

Bedroom standard An indication of occupation density: a standard number of bedrooms are allocated to each household according to its composition with respect to age, sex and marital status. See also Overcrowding.

Biomass Anything derived from plant or animal matter (though not fossilised) – including agricultural and forestry wastes or residues and energy crops. Biomass requires processing before use, eg chipping of tree material, drying and pelletising of crops, digestion of food or farm waste to produce methane.

Biomass boiler A device for burning biomass to provide space and water heating to a whole dwelling (or to a collection of end-users via a heat network) on a controlled time and temperature regime, and with continuous fuel supply.

Biomass stove A device for burning biomass to provide direct radiant heat to a single room.

Building Research Establishment (BRE) The BRE is a UK centre of expertise on buildings, construction, energy, environment, fire and risk.

BREDEM Building Research Establishment Domestic Energy Model.

BREHOMES Building Research Establishment Housing Model for Energy Studies.

Carbon In this report carbon is an abbreviation of carbon dioxide. Emissions of carbon dioxide are measured in terms of the weight of carbon emitted. To convert tonnes of carbon (tC) into tonnes of CO_2 (tCO_2), multiply by 3.67.

Carbon dioxide (CO_2) Carbon dioxide contributes approximately 60% of the potential global warming effect of human-made emissions of greenhouse gases worldwide. The burning of fossil fuels releases CO_2 fixed by plants millions of years ago and thus increases its concentration in the atmosphere (DTI 2004a).

Carbon Index (CI) The CI is based on the total annual CO2 emissions associated with space and water heating per square metre of floor area. It is expressed as a number between 0.0 and 10.0 rounded to one decimal place. The Carbon Index (CI) can be used to demonstrate compliance with the relevant standard under the Building Regulations 2002: Approved Document L1 (England and Wales), Technical Standards Part J (Scotland), or Part F (Northern Ireland).

Carbon Storage Long-term storage of CO_2 in the ocean or underground in depleted oil and gas reservoirs, coal seams and saline aquifers. Also referred to as engineered carbon sequestration (DTI 2003a).

Carbon Trust The Carbon Trust is an independent company funded by government to assist the UK move to a low carbon economy by helping business and the public sector reduce emissions and capture the commercial opportunities of low carbon technologies.

Cathode ray tube (CRT) A vacuum tube in which a beam of electrons is produced and focused onto a fluorescent screen. The traditional technology for computer monitors and televisions, CRTs are now being superseded by liquid crystal display screens.

Climate Change Levy (CCL) A levy applied to the energy use of all non-domestic sectors, subject to some exemptions and reductions to encourage energy efficiency (DTI, 2003a).

Climate Change Programme (CCP) The UK contribution to the global response to climate change. It sets out a strategic package of policies and measures across all sectors of the economy.

Centrally-generated electricity Electricity generated in power stations and supplied via the National Grid.

Clear Skies A grant scheme for a number of low- and zero-carbon technologies, open to householders and community groups in England, Wales and Northern Ireland. See http://www.clear-skies.org/

Scottish householders and not-for-profit community organisations can apply for grants from the Scottish Community and Household Renewables Initiative – see http://www.est.co.uk/schri

Combined Cycle Gas Turbine (CCGT) Combined cycle gas turbines use both gas and steam turbine cycles in a single plant to produce electricity with high conversion efficiencies and relatively low emissions.

Combined heat and power (CHP) Combined Heat and Power is the simultaneous generation of usable heat and power (usually electricity) in a single process, thereby discarding less waste heat than conventional generation (DTI, 2003a).

Comfort factor The proportion of an energy efficiency improvement which results in improved comfort or higher levels of service, instead of reduced energy consumption. For improvements to space heating, the comfort factor is typically 30-50%. In lighting it is usually less significant.

Communal establishment An establishment providing managed residential accommodation (2001 Census).

Community heating A community heating system provides heat to more than one building or dwelling from a central plant via a heat network.

Compact fluorescent lamp (CFL) Commonly referred to as low energy light bulbs, CFLs are energy-efficient replacements for 'ordinary' incandescent light bulbs.

Condensing mode The efficiency of a boiler can be improved if it is designed for and operated in 'condensing mode'. In the right conditions, extra energy is retained in the heating system as water condenses (thereby giving up some heat), rather than all being lost in exhaust gases.

Conservation Area An area of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance.

Contraction and convergence The science-based, global climate policy framework proposed by the Global Commons Institute. Contraction means all governments agree to be collectively bound by an upper limit to greenhouse gas (GHG) concentration in the atmosphere, subject to periodic review. Convergence means that developed and developing countries converge on the same allocation per inhabitant by an agreed date. It combines the 'global commons' of the atmosphere with the principle of equal rights per person.

Daytime valley A reduction in the national electricity demand profile in between the morning and evening peaks.

Decent Homes Standard Set by the ODPM, the Decent Homes Standard is a minimum standard that all social housing in England should achieve by 2010. A decent home is 'wind and weather tight, warm, and has modern facilities'.

DEFRA UK Department of the Environment, Food and Rural Affairs.

Delivered energy Energy supplied to a customer. Also referred to as 'energy supplied'. See also primary energy and useful energy.

Demolition Any building work which involves demolishing and rebuilding 50% or more of the external walls. Where a façade is retained (eg for heritage/building conservation reasons), this is still a demolition if a substantially new building is built behind the old façade.

Distributed generation Electricity generation plant that is connected directly to distribution networks rather than to the high voltage transmission systems (the National Grid). It includes much renewable generation (eg wind farms) as well as LZC technologies that generate electricity.

District Heating See community heating.

District Chilling Provision of space cooling to more than one building or customer, via chilled water in a network of pipes.

Domestic Energy Efficiency Scheme (DEES) The Northern Ireland equivalent of Warm Front.

Domestic Tradable Quota (DTQ) See Personal Carbon Allowance.

DTI UK Department of Trade and Industry.

Dwelling A dwelling is a self-contained unit of accommodation. Self-containment is where all the rooms (in particular the basic facilities ie kitchen, bathroom and toilet) are behind a door that only the household can use. A dwelling can therefore be a single household or a number of households which share at least one of the basic facilities but do not share living accommodation. In all stock figures, vacant dwellings are included but non-permanent dwellings are generally excluded. For housebuilding statistics, only data on permanent dwellings are collected.

Energy Efficiency Commitment (EEC) The Energy Efficiency Commitment is an obligation placed on all domestic energy suppliers to achieve a specified energy saving target through the installation of energy efficiency measures in homes across Great Britain. At least 50% of the benefits should accrue to vulnerable households. A similar scheme (the Energy Efficiency Levy) operates in Northern Ireland.

Energy Performance of Buildings Directive (EPBD) This European Union directive requires each member state to: establish a methodology for rating the energy performance of buildings; ensure that energy certificiates are issued when a building is built, sold or rented; establish an inspection regime for large energy installations in buildings; ensure that LZC technologies are considered when a new building is being designed.

Energy Efficiency Standards of Performance (EESoP) The precursor of EEC.

Energy-using Products Directive A European Union framework directive to reduce the environmental impacts of energy-using products (except vehicles), paving the way for the development of eco-design requirements on a product-specific basis.

Embedded generation An alternative term for distributed generation.

Emissions factor The carbon emitted as a by-product of generating one kilowatt-hour of energy from a fuel or mix of fuels. Different electricity generators are brought on-line to meet peak demand, so the overall fuel mix typically changes, resulting in different emissions factors at different times of day and at different seasons. Expressed as kilogrammes of carbon (or carbon dioxide) per unit of delivered energy (kgC/kWh or $kgCO_2$/kWh).

Energy centre In a community heating scheme, the energy centre is the building that houses the energy generating plant. This may include boilers or CHP units.

Energy Conservation Authority (ECA) One of the 408 local authorities in Great Britain responsible for reporting on all the housing in their area under the Home Energy Conservation Act. The Housing Executive for Northern Ireland acts as ECA for the whole province.

Energy from waste Electricity, and sometimes heat, generated from municipal waste. Cleaner techniques than incineration include pyrolysis or gasification of waste (see Methane UK report at www.eci.ox.ac.uk).

Energy Saving Trust (EST) The Energy Saving Trust was set up by the UK Government following the 1992 Rio Earth Summit, with the goal of achieving sustainable and efficient use of energy, and cutting carbon dioxide emissions from the residential sector. The EST is a non-profit organisation funded by government and the private sector.

Energy Service Company (ESCo) An organisation that can provide energy supply (both conventional and low and zero carbon) and demand management to enable implementation of the least cost option, taking into account the cost of borrowing.

Foresight The DTI-sponsored Foresight programme produces visions of the future, to guide strategy. Foresight projects aim to identify opportunities from new science and technology, or to consider how future science and technology could address key future challenges for society. http://www.foresight.gov.uk/

Fuel cell A fuel cell produces electricity in a chemical reaction combining hydrogen fuel and oxygen (present in the air). Hydrogen is often extracted from natural gas (CH_4). There are many different designs of fuel cell, each with advantages and disadvantages. In the context of the 40% House report, fuel cells could be used to generate electricity in combined heat and power applications, with better electrical efficiencies (and thus carbon savings) than current designs using a Stirling engine.

Fuel Poverty Of the various contested definitions, the one most often used in policy-making is: A household is in fuel poverty if, in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income (including Housing Benefit or Income Support for Mortgage Interest) on all household fuel use.

Geothermal energy Energy from below the surface of the earth. In a small number of locations, the geology allows useful heat to be extracted from deep below the ground.

Government Actuary's Department (GAD) The source of forecasts, studies and reports on UK population.

Greenhouse gas (GHG) A greenhouse gas is one that contributes to global warming. The most significant GHGs are carbon dioxide, methane and nitrous oxide. Water vapour is also a GHG, but the water vapour in the atmosphere is largely beyond human control.

Heat network A system of pipes taking heat, typically in the form of hot water, from a centrally sited energy centre to any number of homes, or other end-users.

Heat pump Heat pumps work like a refrigerator, moving heat from one place to another. To move heat takes energy. Energy can come in the form of electricity (vapour compression) or be thermal energy (absorption heat pumps). Heat pumps can provide space heating, cooling, water heating and sometimes exhaust air heat recovery. A ground-source heat pump typically gives out 3 units of warmth for each unit of electricity used.

Heat recovery A technique for maximising efficiency by making use of heat that would otherwise be wasted (eg in hot exhaust gases).

Home Energy Conservation Act (HECA) HECA requires all Energy Conservation Authorities to report annually on the energy efficiency of the housing stock in their area.

Home Energy Efficiency Scheme (HEES) A grant scheme for low income, fuel-poor households to fund a range of insulation and heating measures. The name HEES is still in use in Wales, but has been superseded in England (Warm Front), Scotland (Warm Deal) and Northern Ireland (Warm Homes).

Homelessness A homeless person is someone who has no accommodation available, or has accommodation which cannot be secured or is moveable.

Household A household comprises one person living alone, or a group of people (not necessarily related) living at the same address who either share at least one meal a day or share living accommodation, that is, a living or sitting room. The occupant(s) of a bedsit who do not share a sitting or living room with anyone else comprise a single household.

Housing Benefit Housing benefit is paid by local authorities to assist with rent payments of tenants who are on state benefits or on low incomes.

Housing Corporation Funds and regulates registered social landlords (RSLs) in England. Other bodies perform similar roles in Northern Ireland, Scotland and Wales. The Corporation is sponsored by the ODPM. http://www.housingcorp.gov.uk/

Housing Health and Safety Rating System (HHSRS) This replaces the Housing Fitness Standard by the autumn of 2005. The central concept is one of hazard, and separate hazards in a dwelling are weighted according to the harm that could result. Excessive cold and high temperatures are classified as potentially hazardous to the elderly (no other age group). For each, the 'ideal' is stated to be a SAP rating of 80-85, with minimum and maximum temperatures of 16.25°C and 25.25°C.

Income Support for Mortgage Interest (ISMI) Government assistance for those on low incomes with repayments on mortgages of up to £100,000.

Infiltration Uncontrolled exchange of (cold) outside air for (warm) inside air, leading to unnecessary heat loss. The term 'infiltration' is used to refer to uncontrolled losses: controlled exchange of air, which is necessary for human health and to avoid damage to the building fabric through excess water content, is 'ventilation'.

Kyoto Protocol The Kyoto Protocol binds those industrialised nations that are signatories to reduce emissions of greenhouse gases by an average of 5.2% below 1990 levels by 2008-2012. The UK is legally bound by its Kyoto target to reduce greenhouse gas emissions by 12.5% over that period. Originally signed in 1997, the protocol came into force on 16th February 2005.

Learning and Skills Council (LSC) The Learning and Skills Council is responsible for funding and planning education and training for over-16-year-olds in England and Wales.

Light emitting diode (LED) A semiconductor device that emits visible light when an electric current passes through it. It is highly efficient and long-lived, and has a low power requirement.

Listed Building A building of special architectural or historic interest.

Load factor Usually applied to generating plant, load factor is the ratio of the average electrical load to the theoretical maximum load, expressed as a percentage.

Low or zero carbon (LZC) technologies Low or zero carbon technologies are taken to be renewable energy generators or technologies with better fuel efficiency than conventional technologies, and which are retrofitted to or integral to the building or community. Examples of LZC technologies are community heating with CHP or biomass, combined heat and power (CHP), solar water heaters, ground-source or air-source heat pumps, solar photovoltaics, and wind turbines.

Major photovoltaics demonstration programme A programme funded by the DTI to install photovoltaic systems on domestic and community buildings. Grants of up to half the installation cost were provided.

Market transformation Changing the market for products and services to reduce environmental impact, using a combination of information, incentives and regulation in a coherent strategy.

Market Transformation Programme (MTP) The MTP is a DEFRA initiative that develops policy strategies for improving the resource efficiency of traded goods and services in the UK. MTP uses market projections and policy scenarios to explore alternative future developments.

Micro-CHP CHP at the scale of a single dwelling, and used in place of a domestic central heating boiler.

MtC Million tonnes of carbon (ie carbon dioxide weighed as carbon only).

Municipal Solid Waste (MSW) All rubbish collected by local authorities (or their contractors), including rubbish from homes, schools, colleges and co-collected trade waste.

ODPM UK Office of the Deputy Prime Minister, responsible for policy on housing, planning, devolution, regional and local government and the fire service.

Ofgem Ofgem (Office of Gas and Electricity Markets) is the UK energy regulator, charged with: making gas and electricity markets work effectively regulating monopoly businesses intelligently securing Britain's gas and electricity supplies meeting its increased social and environmental responsibilities. Ofgem oversees the operation of the Energy Efficiency Commitment.

Overcrowding The UK Census of 2001 uses an occupancy rating to give a measure of under-occupancy and overcrowding, based on the 'room standard' of the 1985 Housing Act. This relates the actual number of rooms to the number 'required' by members of the household, based on the relationship between individuals and their ages.

Payback The capital cost of a device can be related to the energy savings it makes in terms of a payback period. If a device costs £120 and saves £20 a year, the simple payback period is six years. Payback should also take account of the cost of borrowing the initial investment.

Permanent dwelling A building whose structure should satisfy at least one of the following criteria: the walls are of brick, stone and mortar, concrete, breeze block or similar material the roof is of ceramic tiles, slate, thatch, shingle or concrete the length of the shortest wall is at least 4.5 metres – it has over 60 years of life span (Housing Statistics 2002)

Personal Carbon Allowance (PCA) Under a system of PCAs, each adult would be given an equal allowance covering carbon emissions generated from fossil fuel energy used within the home and for personal transport, including air travel. Allowances would be tradable, and would decrease over time within a mandatory, UK-wide scheme. The primary aim of the scheme would be to deliver guaranteed levels of carbon savings in successive years in an equitable way.

Photovoltaics (PV) A photovoltaic solar cell converts light directly into electricity. Light striking the front of a solar cell produces a voltage and current – it has no moving parts. A group of interconnected cells creates a solar panel and solar panels, in turn, can be connected in series or parallel to create a solar array and any voltage-current combination required.

Primary energy Primary energy to deliver a given service is the energy converted when a fuel is burned, for instance, to generate electricity. With the current electricity generation system, primary energy is roughly three times delivered energy: for each unit of electricity delivered to the consumer, two units are lost in generation and transmission. See also delivered energy and useful energy.

Pyrolysis The production of gaseous fuels by heating hot materials containing organic matter in the absence of air.

Royal Commission on Environmental Pollution (RCEP) An independent standing body established in 1970 to advise the Queen, the Government, Parliament and the public on environmental issues.

Reformer A device for processing a fuel such as methane (CH_4) into hydrogen (H_2) for use in a fuel cell.

Refurbishment Repairs and alterations to a building that involve a lesser degree of destruction than demolition.

Registered Social Landlord (RSL) Housing associations, trusts and co-operatives registered with the Housing Corporation.

Renewable energy Energy flows that occur naturally and repeatedly in the environment. This includes solar power, wind, wave and tidal power and hydroelectricity. Solid renewable energy sources include energy crops and other biomass; gaseous renewables come from landfill and sewage waste.

Renewables Obligation The obligation placed on electricity suppliers to deliver a stated proportion of their electricity from eligible renewable sources.

Renewables Obligation Certificate (ROC) Eligible renewable generators receive ROCs for each MWh of electricity generated. These certificates can be sold to suppliers. In order to fulfil their obligation, suppliers can present enough certificates to cover the required percentage of their output, or pay a 'buyout' price per MWh for any shortfall. All proceeds from buyout payments are recycled to suppliers in proportion to the number of ROCs they present.

RLA Residential lights and appliances.

Solar thermal/solar hot water A system for using solar radiation to heat water, typically in a roof-mounted panel connected with pipes to a storage tank.

Standard Assessment Procedure (SAP) The SAP is the Government's recommended system for energy rating of dwellings. It is used for calculating the SAP rating, on a scale from 1 to 120, based on the annual energy costs for space and water heating; and for calculating the Carbon Index, on a scale of 0.0 to 10.0, based on the annual CO_2 emissions associated with space and water heating. The SAP rating is used to fulfil requirements of the Building Regulations to notify and display an energy rating in new dwellings, and for monitoring the energy efficiency of the housing stock. Revisions to SAP in 2005 will include a recalibration of the scale from 1-120 to 1-100.

Stirling engine An external combustion engine used for generating electricity. Heat moves a piston inside the device, and the moving piston can be used to power an electrical generator. Early designs of micro-CHP units use Stirling engines, although there is potential to increase the overall efficiency of micro-CHP with new, emerging technologies, such as fuel cells.

Takeback See comfort factor.

Teleworker The UK Labour Force Survey defines teleworkers as people who do some paid or unpaid work in their own home and who use both a telephone and a computer (Hotopp, 2002).

Total Fertility Rate (TFR) Total Fertility Rate is the average number of children a woman would have if she experienced the age-specific fertility rates of a particular cohort for her entire childbearing years. Changes in the number of births are in part due to changes in the population age structure. So the TFR is commonly used to look at fertility because it standardises for the changing age structure of the population (NS 2004f).

Under-occupancy A dwelling is under-occupied when it contains two or more bedrooms above the bedroom standard, calculated in accordance with age/sex/marital status composition and the relationship of the members to each other (Definitions in ODPM 2004d).

United Kingdom Climate Impacts Programme (UKCIP) The UK Climate Impacts Programme publishes scenarios that show how our climate might change and co-ordinates research on adapting to our future climate. UKCIP shares this information, free of charge, with organisations in the commercial and public sectors to help them prepare for the impacts of climate change.

United Kingdom Domestic Carbon Model (UKDCM) A highly disaggregated computer model of the energy and carbon emissions associated with the UK housing stock and the residential sector. The UKDCM was developed as part of the 40% House project, and provides all of the key numbers behind the 40% House scenario, described in the 40% House report.

Useful energy The net energy provided to a dwelling for space or water heating, from a heat source (ie the delivered energy multiplied by the boiler efficiency). See also primary energy and delivered energy.

U-value The U value of a building element (wall, floor, roof, window etc) is an expression of the rate of energy flow (Watts) for a given surface area (m^2) and a given temperature difference between indoors and outdoors, conventionally expressed on the Kelvin scale (K), but practically measured in degrees celsius. U values are measured in W/m^2K. The lower the U-value, the better the thermal insulation.

Vacant dwelling A dwelling is defined as vacant if all the household spaces within it are empty.

Vacuum insulation panel (VIP) A VIP consists of a special panel enclosed in an air-tight envelope, to which a vacuum is applied. This product gives three to seven times as much insulation as the equivalent thickness of materials such as rigid foam boards or foam beads. Panels can be made in almost any size, so that they can be fitted within products. They are currently used in large-scale refrigeration and in container systems, with potential for residential refrigeration and the insulation of solid walls.

Ventilation The controlled exchange of outside air for inside air. Fresh air is necessary for human health and to avoid damage to the building fabric through excess water content, but it needs to be controlled to minimise heat loss. The principle of 'build tight, ventilate right' is important to super-efficient buildings, maintaining adequate fresh air without wasting heat. See infiltration.

Vulnerable A vulnerable household is one in receipt of at least one of the principal means-tested or disability-related benefits (ODPM 2004b). Alternatively, it is an older household, one with children, or one where there is disability or long-term illness (DTI 2002b).

Warm Deal (Scotland) A scheme for the provision of energy efficiency improvements to households in receipt of a range of benefits, administered by EAGA partnership for all housing stock and by local authorities for their own stock (DTI, 2003a).

Warm Front (England) A scheme for the reduction of fuel poverty in vulnerable households by improving energy efficiency. It is aimed at households with children, the over-60s and the disabled or long-term sick (DTI, 2003a). Annual expenditure is approximately £150m (NAO, 2003).

Warm Homes (Northern Ireland) A scheme for the provision of energy efficiency improvements, designed to increase access to energy efficiency advice, including grant availability, among low-income households with young children, particularly single-parent families. It also aims to reduce the incidence of fuel debt within the target group, improve comfort levels and prevent cold-related illness (DTI, 2003a).

Warm Homes Act The Warm Homes and Energy Conservation Act 2000.

W/m^{2}K See U value.

UNITS OF ENERGY

Energy is the ability to do work. In this report, energy is measured in multiples of Watt-hours (Wh). 1 Wh is the amount of energy used by a 1 W device operating for an hour, or a 2 W device operating for half an hour, and so on.

kWh (kilowatt-hour) 1 kWh = 1,000 Wh

MWh (megawatt-hour) 1 MWh = 1,000 kWh = 1,000,000 Wh

GWh (gigawatt-hour) 1 GWh = 1,000 MWh = 1,000,000,000 Wh

TWh (terawatt-hour) 1 TWh = 1,000 GWh = 1,000,000,000,000 Wh

UNITS OF POWER

Power is the rate at which energy is converted. The SI unit of power is the Watt (W).

kW (kilowatt) 1 kW = 1,000 Watts

MW (megawatt) 1 MW = 1,000 kW = 1,000,000 Watts

GW (gigawatt) 1 GW = 1,000 MW = 1,000,000,000 Watts

TW (terawatt) 1 TW = 1,000 GW = 1,000,000,000,000 Watts