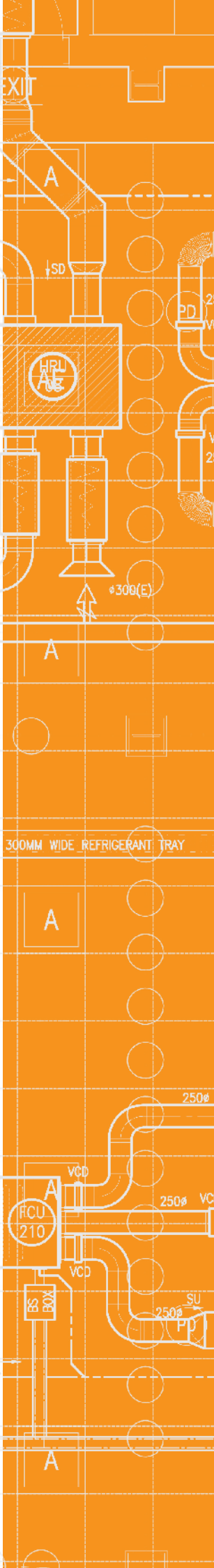
KARSONS Consulting
BUILDING SERVICES ENGINEERS

A-Z 'Beginner's Guide'

to Sustainability in the Built Environment



A-Z ‘Beginner’s Guide’

to Sustainability in the Built Environment

Building a more sustainable world is no easy task. At Karsons Consulting, we thought we’d start with the basics and address the jargon specific to this field. Whether you’re a client, contractor or member of the wider public, it helps to speak the language. This A-Z guide, plus some occasional light commentary, will help you to speak ‘sustainability’ like a native, so you can engage more effectively with the serious challenges and opportunities ahead.

A

Alternative energy
An alternative to fossil fuel combustion. ‘Alternative energy’ is often used interchangeably with ‘renewable energy’ but they are not exactly the same. Some technologies that are not renewable - notably nuclear power – are referred to as alternative energy.

Air leakage rate
The uncontrolled movement of air in and out of a building. Usually measured in cubic metres per hour, per square metre of building façade. (see also air pressure testing)

Air permeability
The rate of air flow through a known area, under a prescribed air pressure.

Air pressure testing
Measuring the air leakage rate from a building - usually based on a standard 50 Pascal pressure difference.

Air-source heat pumps
Small to medium-sized units that extract low grade heat (i.e. not very warm) from the outside air and convert it into useful heating inside a building or, in reverse, useful cooling in summer.
These pumps run on electricity, so there is no need for a gas connection or fuel storage. Air sourced heat pumps tend to look like air conditioning units, and they have a lot in common. See heat pumps.

Asset rating
An energy efficiency rating given to new buildings, based on theoretical (which may not be actual) energy use.

B

BREEAM
The Building Research Establishment Environmental Assessment Method (BREEAM) is an important way of assessing and describing the environmental performance of buildings. It sets standards for sustainable design and build. BREEAM assesses buildings against a variety of criteria such as waste, pollution, energy, land use and ecology, materials, water and ‘innovation’. Based on these criteria, BREEAM provides an overall rating that falls within a band of ‘pass, good, very good, excellent or outstanding’.

BS 8555
BS 8555 is a British Standard ‘Guide to the phased implementation of an environmental management system - including the use of environmental performance evaluation’. It takes a six step approach to environmental management, and is aimed mainly at small businesses. It can be a route towards ISO 14001, or even EMAS.

BS EN 16001
BS EN 16001 is an energy management systems standard. It is potentially useful to a range of organisations, and particularly those covered by the CRC Energy Efficiency Scheme. Although it emphasises energy management issues, it is similar in approach to ISO 14001.

Building Emission Rate (BER)
The Building Emission Rate from a building in operation is compared to the Target Emission Rate (TER), to assess the level of compliance with the Building Regulations.

Building services contractors
Building services contractors, notably those familiar with electrical and related design and installation, can help to assess the feasibility and scope of various energy saving and carbon reduction options. They can provide ‘whole building’ or ‘integrated’ approaches to the design and installation of electrical, mechanical and other building services.

C

Carbon
In the context of climate change, ‘carbon’ has become shorthand for carbon dioxide - the now infamous ‘greenhouse gas’. The carbon-related terms below illustrate how vitally important carbon has become to sustainability...

Carbon cap
The limit set on a Government, organisation or individual for carbon emissions under a carbon trading scheme.

Carbon capture
Removing carbon dioxide from flue gas after fossil fuel combustion, before carbon storage. While not yet commercially viable, if we cannot significantly reduce carbon emissions in other ways, we may still see carbon capture in action.

Carbon credit
A credit (or permit) arising from a greenhouse gas reduction scheme, such as carbon emissions trading.

Carbon dioxide CO2
The most common man-made greenhouse gas, most notably produced when burning fossil fuel for energy. Burning fossil fuel releases ‘extra’ carbon that had been previously locked in geological deposits. C02 is also produced by burning non-fossil fuels such as wood, but the growth of plant-based materials removes the equivalent carbon from the air, rather than from geological storage.

Carbon dioxide equivalent
Carbon dioxide equivalent (C02 e) converts the masses of various greenhouse gases to a mass of C02 that gives the equivalent global warming potential (GWP) - generally over a 100 year timeframe. For example, the C02-e of methane is 25 times that of carbon dioxide.

Carbon Emissions Reduction Target
The Carbon Emissions Reduction Target runs to 2011. It requires significant domestic energy suppliers to boost energy savings. Suppliers must focus 40% of activity on vulnerable and low-income households, and pensioners over 70. Also has provisions for ‘hard-to treat’ homes (i.e. off-grid, or solid walled homes).

Carbon footprint
The total amount of greenhouse gases (not just carbon dioxide) emitted directly or indirectly due to various activities (i.e. ‘doing business’). It is typically expressed in equivalent tonnes of either carbon or carbon dioxide - though it is essential to say which, and to compare like with like.

Carbon monoxide
Not to be confused with carbon dioxide, carbon monoxide (CO) is an odourless toxic gas that can kill in high concentrations or in enclosed spaces. It forms when there is not enough oxygen to produce carbon dioxide (C02). It is not a greenhouse gas but is is an acute health hazard.

Carbon neutral
When applied to a building, it means running the building without net carbon emissions. The usual route to this is a combination of energy efficiency and the use of renewable energy, but can also include offsetting the carbon emissions, for example through tree planting schemes (see also zero carbon).

Carbon offset
A reduction in emissions of carbon or other greenhouse gases that compensates for a greenhouse gas emission somewhere else. A common offset is renewable energy, but it can include a range of other measures, such as managed forestry or burning methane gas from landfill.

Carbon reduction
Reducing the demand for energy obtained from burning fossil fuels (such as coal and gas at power stations).

Carbon Reduction Commitment (CRC)
Views on the CRC Energy Efficiency Scheme range from “expensive and complicated” to “important and innovative”. Either way, the CRC aims to reduce commercial and public sector carbon emissions, by modifying the behaviour of organisations that use at least 6,000-megawatt hours of electricity p.a. These organisations must buy carbon emission allowances at £12/tonne from 2012. In October 2010, the coalition Government announced that all the money raised from selling carbon allowances will go to the Treasury, adding around 8% to commercial energy bills from 2012 - if the coalition doesn’t change the rules yet again.

Carbon storage
Keeping carbon dioxide out of the atmosphere by storing it underground (e.g. in empty oil and gas reservoirs or coal seams). This is sometimes called ‘engineered carbon sequestration’. An alternative is to lock carbon into forests or soils, though this process is slow and reversible (e.g. forest fires).

Carbon trading
Carbon trading is the buying and selling of carbon emission allowances. Organisations that reduce carbon below their allowance can sell the difference to others who want to buy them. To reduce overall carbon emissions, the total amount of allowances is reduced over time.

The Carbon Trust
The Carbon Trust is an independent UK organisation that encourages and promotes low carbon technologies and other carbon reduction measures by business and the public sector. It provides funding to support technological innovation and other carbon reduction measures.

Certification body
An organisation that offers third party certification of a management system. UK accreditation of these organisations is normally carried out by UKAS.

Climate change
This is usually taken to mean climate change caused by human activity such as burning fossil fuels.

Climate Change Act
Amongst other things, the Climate Change Act 2008 sets a UK target for 2050 for the reduction of targeted greenhouse gas emissions by 80% from a 1990 baseline, with an interim 34% reduction by 2020.

Climate Change Levy
The Climate Change Levy is a tax on the commercial supply of energy for lighting, heating and power. Those paying the levy include industry, commerce, and public administration. In 2010 it was:

- electricity = £0.0047 per kilowatt hour
- gas of a kind supplied by a gas utility = £0.0016 per kilowatt hour
- petroleum gas, or other gaseous hydrocarbon as a liquid = £0.0105 per kilogram.

For electricity, the CCL adds around 5% to commercial energy bills.

Code for Sustainable Homes
A voluntary Code that assesses a new home against categories of sustainable design. It uses a 1 to 6 rating system to communicate the overall sustainability performance of a new home. Code 6 is effectively a 'zero carbon' home.

Committee on Climate Change (CCC)
The CCC is an independent body, established under the Climate Change Act 2008 to advise the UK Government on its ongoing carbon budgets, and to report to Parliament on how the UK is doing with regard to its greenhouse gas reduction targets.

Coefficient of Performance (CoP)
The CoP is a ratio of the heating or cooling provided by a system to the energy consumed by the system. The most energy efficient systems have a relatively high CoP (basic electrical heating has a CoP of one).

Combined heat and power (CHP)
Technology that produces electricity from the combustion of fuel and allows process heat to be utilised e.g. to heat buildings or for hot water. CHP can use fossil fuels such as gas but also fuels from renewable sources e.g. woodchip and organic waste. The heat is captured and supplied to premises or used in industrial processes. CHP plants are not suitable for all buildings but where they are, they can be over 90 per cent efficient, compared to power stations that may be less than 40 per cent efficient.

Corporate social responsibility (CSR)
Corporate social responsibility refers to an organisation's responsibility to its stakeholders, which include employees, customers and the general public. CSR requires communication with key stakeholders and is becoming increasingly important in the supply chain.

D

Demand-side management
Demand-side management is designed to help balance energy demand with supply. It is particularly important for electricity, which is difficult or expensive to store. It influences the quantity or patterns of energy use. Peak demand management may not decrease total energy consumption but may reduce the need for investment in networks and/or power plants.

Deming cycle
A continuous quality improvement model which is the basis of environmental, safety and quality management systems worldwide, including ISO 14001 (environment), OHSAS 18001 (occupational health and safety) and 9001 (quality).

Display Energy Certificate
A certificate of energy performance that must be displayed in many public buildings. It shows the energy consumption per unit area of the building, and compares it against a suitable benchmark to give an 'A-G' rating. An 'A' rating shows excellent energy performance.

Duty of care
In the UK, a legal duty imposed on those who hold business waste to ensure that it is, stored, documented and disposed of at appropriately licensed facilities. Also applies to hazardous waste, along with extra legal requirements (see waste).

E

Eco-tax
A tax imposed on all activities deemed harmful to the environment, which aims to modify organisations' behaviour so that they reduce environmental impacts.

EEE
Electronic and Electrical Equipment

Embodied carbon
Embodied carbon assesses the carbon dioxide generated during the life cycle of a product or equipment (e.g. it does not apply to energy consumed or generated during product use).

EMAS
The EU Eco-Management and Audit Scheme (EMAS).

EPBD
Energy Performance of Building Directive (EPBD), sets national requirements for improving the energy performance of buildings.

Energy Performance Certificate
A certificate required when a building is purchased, sold or has a change of lease or tenancy. It compares the design of the building with a model to give an 'A - G' energy rating. 'A' shows excellent energy performance.

Energy review
An energy review shows where, how and what sort of energy is currently used in an organisation. A good energy review will:

- Establish the total amount of energy being used
- Identify wasteful energy use
- Identify opportunities for making carbon reductions and cost savings
- Highlight maintenance requirements, and
- Assess the scope for new technology and other energy saving measures.

Energy Savings Trust
A Government backed organisation that issues energy saving information and advice, and manages programmes to improve energy efficiency, mainly in the domestic sector.

Enhanced Capital Allowance (ECA)
The ECA allows end users to offset 100% of the cost of low energy, water conservation and low carbon equipment against tax in the year it is purchased. Qualifying products are shown in the Carbon Trust's Energy Technology List.

Environmental aspect
Part of an organisation's activities, products and services that can interact with the environment. Aspects are the 'cause' of environmental impacts, and since you have control over them, they are the part to try and manage.

Environmental impact
A good or bad effect on the environment as a result of various aspects of what an organisation does.

Environmental management system (EMS)
Part of an organisation's overall management system that covers environmental and associated issues. It includes all areas that contribute towards maintaining a suitable environmental policy and objectives.

Environmental performance indicator (EPI)
Similar to a Key Performance Indicator (KPI), EPI provides information detailing selected parts of an organisation's environmental performance.

F

Feed-in Tariffs (FITs)
FITs pay homeowners (and some businesses) to generate electricity from selected renewable sources.

Fossil fuel
Organic sediments or pockets formed underground over geological time. Common fossil fuels are coal, natural gas and oil. These fuels are regarded as non-renewable.

Fuel cells
Fuel cells employ electrochemistry (electrodes and electrolyte) and hydrogen and oxygen to generate electricity. Fuel cells are different from conventional batteries which store their own (chemical) electrical energy.

G

Global warming
An overall increase in the Earth's lower atmospheric and surface temperature. This happens when energy that would otherwise radiate back into space is absorbed by greenhouse gases to give a so-called 'greenhouse effect'.

Global warming potential (GWP)
GWP estimates how much a given greenhouse gas contributes to global warming. It is a relative scale that compares the greenhouse gas in question to that of the same mass of carbon dioxide.

Good practice
What virtually everyone is required or expected to do. Can be fairly similar across sectors and is so transferrable that it is often backed up by legal requirements.

Ground source heat pumps
Systems that convert large amounts of low grade heat from the ground into smaller amounts of higher grade heat for use in a building.

H

Heat and Energy Saving Strategy (HESS)
HESS aims to reduce carbon emissions from existing buildings to 'approaching zero' by 2050.

Heat pump
A heat pump uses compression (powered by electricity) to extract heat from a large volume heat reservoir and deliver that heat to a smaller volume heat reservoir. In reverse it can be used to cool or refrigerate.

I

ISO 14001
The pre-eminent international environmental management system standard. It applies to manage significant 'aspects', in order to prevent significant adverse environmental 'impacts'.

Integrated photovoltaics
Systems where photovoltaic panels replace conventional building materials such as roof tiles or facades.

K

Key performance indicator (KPI)
KPIs are commonly used by Government and organisations to evaluate and publicise how much progress has been made towards selected, and ideally indicative, improvement targets.

Kyoto Protocol
A United Nations agreement by over 150 countries to reduce greenhouse gas emissions. Industrialised countries committed to cut overall emissions to 5% below 1990 levels by 2008 - 2012. The protocol is now being overtaken by events, including far bigger international carbon reduction targets.

L

Landfill Tax
A tax that aims to encourage waste producers to produce less waste and recover more value from waste, for example through recycling or composting, before resorting to landfilling.

Life cycle assessment (LCA)
An LCA compiles material, energy and waste flows to help evaluate the environmental impact of a product or service over its life cycle. LCA is often used to compare the impacts of different products that are used for the same function.

Life cycle thinking
An environmental management technique that considers the life cycle impacts of a product or service.

Low and Zero Carbon (LZC) technologies
Building services systems that are either carbon neutral or highly energy efficient, reducing carbon emissions from power generation or fossil fuel use. Also called 'low to no carbon' measures.

M

Marginal abatement cost curve (MACC)
MACCs show the cost per tonne of eliminating C02 emissions and the amount of C02 saved. A MACC curve ranks projects or measures based on their Whole-life Net Present Value (expressed as £/t C02 reduced). MACCs are typically produced to assess the relative cost and carbon reduction implications of potential energy saving or renewables projects.

Market Transformation Programme
A programme to boost products, systems and services with reduced environmental impact. It supports a growing set of 'product' policies that aim to encourage supply-chain measures such as reliable product information, raising minimum 'green performance' standards and encouraging best practice.

Micro-CHP
Typically, CHP with an output of less than 5kW electrical output, designed for use in suitable homes and small commercial buildings.

Microgeneration
Small energy generating systems, typically up to 50kW output. They are installed close to the point of use, either in smaller businesses or homes. Such systems include CHIP, air source heat pumps, renewables such as photovoltaics and less commonly, wind power.

Microgeneration Certification Scheme (MCS)
The MCS is supported by the Government's Department of Energy and Climate Change. It is designed to evaluate products - and those who install them - against robust criteria. The scheme is open to firms involved in the supply, design, installation and commissioning of microgeneration technologies. It is not possible to benefit from Feed-in tarrifs without using an installer who is registered with the MCS. Elecsa, an ECA group company, runs a leading MCS.

Micro-wind turbines
Small wind turbines (usually up to 1kW output) designed to provide electric power to a home or other local site. Seldom at the top of the list for anyone looking to install renewables in built up or sheltered areas.

N

Notional Calculation Methodology
The Notional Calculation Methodology is a procedure for demonstrating compliance with the Building Regulations for non-domestic buildings. It requires the calculation of the annual energy use for a proposed building, which is then compared with the energy use of a standard 'notional' building.

O

Operational rating
A measure of a building's energy use (and resulting carbon emissions) compared to a benchmark for that type of building - usually based on at least 18 months of energy use information. (For new buildings see 'asset rating').

P

PAS 91
PAS 91 is a voluntary pre-qualification guide. It includes a set of environmental management questions for clients and main contractors to ask their sub-contractors, before considering them for tendering. It is supported by key Government Departments and many other bodies, including the ECA.

Passive building
A well insulated and very airtight building that has mechanical inlet and extract ventilation.

Passive solar energy
Key techniques include south-facing windows, natural shading and ventilation, and materials that absorb heat from the sun and then slowly release it.

'Payback' period
The time for the technology to save enough energy/carbon to match the energy/carbon required during stages such as production, installation, maintenance and decommissioning.

Photovoltaics
Photovoltaics convert solar energy into electricity. They are usually made of two or more thin layers of semi conducting material, usually silicon (often referred to as 'solar cells'). When sunlight strikes the cell, electrons move toward the treated front surface. This causes electricity to flow - and up to a point, the greater the intensity of light, the greater the electricity.

Polluter Pays Principle
A fundamental principle of EU environmental policy. It says that the cost of controlling an environmental impact should be borne by the producer of the impact, rather than by society as a whole.

Process efficiency
Using fewer resource inputs combined with generation of less waste for a given level of production or service.

Producer responsibility.
Ensuring that organisations that put substances on the market take responsibility for their environmental impact when they reach the end of their useful life.

R

Renewable Energy
Energy from resources that can be readily replaced. Examples include passive solar, active solar heating, photovoltaics, wind power, hydro-electricity and biofuels (using organic waste, timber or energy crops). The renewable aspect is most attractive because it contributes to energy sufficiency. However, renewables tend to greatly reduce carbon emissions for a given unit of energy, which is the main environmental benefit.

Renewable Heat Incentive (RHI)
The Government-backed RHI is expected to start in June 2011. It aims to provide long term support for renewable heat technologies, from household solar thermal panels to commercial wood pellet boilers and heat pumps. The Government is committed to moving to 12% of all heat generated from a renewable source by 2020.

Renewable Obligation
The renewables obligation is placed on licensed electricity suppliers, who must deliver a specified amount of electricity from eligible renewable sources. Energy companies are required to generate a minimum of 10% of their output from renewable sources, or buy renewables obligation certificates on the open market.

Restriction of Hazardous Substances (RoHS)
The RoHS Directive came into force in July 2006. Among other things, it bans or restricts lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants in new EEE.

S

Significance assessment
The evaluation of environmental aspects and their environmental impact, carried out as part of environmental management.

Simplified Building Energy Model
Calculation software to help building services designers comply with 'Part L' of the Building Regulations.

Site waste management plan (SWMP)
SWMPs are required by legislation for all sizable construction projects. SWMPs aim to increase planning to boost waste reduction, re-use and recovery. The duty holder must identify who is responsible for project resource management, the types of waste that will be generated, and how waste will be measured and managed.

SKA
The SKA rating is a labelling method from RICS that is designed to rate and compare the performance of fit-out projects.

SMART environment target
SMART targets are 'specific, measureable, agreed, realistic and time bound'. They are often lined to objectives, and KPIs or EPIs.

Solar gain
A temperature increase in a space or structure, due to incoming solar radiation. This can be a big problem with large south facing windows, extensions or atriums.

Solar thermal heating
Using energy from the sun to provide hot water for a building. Solar thermal roof panels usually come in two types: flat panels or vacuum tubes.

Stakeholder
Individuals, communities or other bodies that have a significant interest in an organisation or are affected significantly by its policy or behaviour. They can influence the organisation's 'operating space' - what it can and cannot do in terms of its activities, products and services.

Standard Assessment Procedure (SAP)
The SAP has been adopted by Government as the UK method for calculating energy performance within 'Part L' Approved Document L1A - Conservation of fuel and power in new dwellings and Approved Document L1B - Conservation of fuel and power in existing dwellings. It is based on a range of factors that contribute to energy efficiency.

Sustainable development
The Brundtland Commission's classic definition is: "development which meets the needs of the present without compromising the ability of future generations to meet their own needs". Sustainable development is the process that heads towards the ultimate goal of 'sustainability'. The 1987 Brundtland Commission report, Our Common Future, highlighted three components of sustainable development: environment, society and economy (the latter two hinge on sufficient education and training, for example). But it has since been acknowledged that the environment has load bearing and resource limits that must not be exceeded, irrespective of the key importance of the other two. Too much carbon in the atmosphere is one limit, and excessive exploitation of resources and tipping waste into landfills are other prime examples.

Sustainable procurement
A process that allows organisations to meet their needs for useful goods and services whilst avoiding significant social, financial or environmental impacts.

T

Target Emissions Rate (TER)
The preferred rate of greenhouse gas emissions from a proposed building or refurbishment project. It is set by the project team and client at the start of the design process. See BER.

Thermal imaging
Infrared thermal imaging (thermography) is a non-contact temperature measurement and assessment technique...
In the context of energy saving, a thermographic camera shows heat losses from a building's façade and roof, which in turn shows where and what types of insulation or other energy saving measures are required.

Thermal insulation
Material used to reduce heat transfer. Heat can transfer from one material to another by conduction, convection, radiation or by the overall movement of fluids. Insulators minimise the transfer of heat energy. In home insulation, the 'R-value' is an indication of how well a material insulates.

Thermal mass
The capacity of materials to store heat. Buildings composed mainly of bricks, blocks and concrete have a relatively high thermal mass.

W

Waste
Waste materials are anything that a holder discards, or intends (or is required) to discard. An item is discarded when it is no longer part of the normal commercial cycle, or the chain of utility. It is of course, also possible to waste energy...

Waste and Resource Action Programme (WRAP)
A leading Government-sponsored programme that includes waste minimisation. WRAP provides free information and advice to businesses.

Waste minimisation
Providing a given product or service with less waste, notably during the production and delivery process. Also good business.

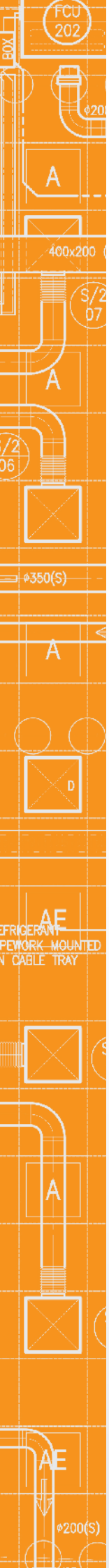
Waste recovery
Processing waste so that extra value can be obtained from it, through recycling, burning for energy (if it is combustible) or composting (if it is biodegradable).

Waste recycling
A key sub-set of waste recovery. The segregation, collection and reprocessing of waste into usable raw materials or products. Since recycling requires a process, which may itself require energy, re-use is often preferred, where possible.

WEEE
Is waste EEE... that is, waste electrical and electronic equipment.

Z

Zero carbon building
Paving the way for future builds, the few of these that do exist have zero net carbon emissions as a result of clever 'passive' design, renewables or other so-called 'allowable solutions'.



KARSONS Consulting
BUILDING SERVICES ENGINEERS

Karsons Consulting are a London based building services consultancy firm providing consultancy and expert services in building services design, environmental engineering and facilities engineering management. Consider those elements that make a building work... lighting, power, heating, air conditioning... We design these services ensuring compliance with the latest regulations and environmental requirements, we work with our clients in managing their buildings and facilities efficiently and we provide technical reports relating to maintenance, energy and technical due diligence.
Our solutions are carefully considered with our clients.

Tel: 020 8281 8119

Email: info@karsonsconsulting.com

30 Westdown Road, London, E15 2BZ, United Kingdom