

Climate jargon buster

Meeting the demands of the climate emergency requires all parties within the façade industry to be able to communicate effectively on the topic. To this end, this article provides simple explanations of common sustainability terms and phrases. Where appropriate the source of definitions have been referenced.

Are we missing a term? Do you disagree with our definitions? Please let us know at sustainability@cwct.co.uk.

Concepts

The building performance gap

The *building performance gap* refers to the disparity between the predicted energy consumption of buildings and their actual energy use. The causes of the disparity are understood to result from uncertainties in the environmental conditions, workmanship and occupant behaviour. Narrowing the gap is required to enable Designers to make meaningful comparisons between the *embodied* and *operational carbon* impacts of design decisions.

Carbon capture and storage (CCS)

Carbon capture and storage (AKA carbon capture and *sequestration*) is the process of capturing the carbon dioxide arising from fossil fuel combustion or industrial processes, transporting it to a storage site and storing it where it will not enter the atmosphere ⁽¹⁾.

Circular economy

A *circular economy* is a systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the 'take-make-waste' linear model, a *circular economy* is regenerative by design and aims to gradually decouple growth from the consumption of finite resources ⁽²⁾.

Declared unit

Declared unit refers to the unit of quantity of a construction product (e.g. kg, m² or m³) for use as a reference unit in an *EPD* for an environmental declaration based on one or more information modules. Refer to *BS EN 15804 Section 6.3.3* ⁽³⁾.

Design for adaptability

Design for adaptability refers to designing to support the continued use of a building, system or component by allowing for and accommodating potential future adaptations ⁽¹⁾.

Design for deconstruction (DfD)

Design for Deconstruction (AKA design for disassembly) refers to the design decisions that increase the quality and quantity of materials that can be reused at the end of a building's life ⁽¹⁾.

Environmental impact categories

There are 15 *environmental impact categories* defined in *BS EN 15804*. Each of these has an associated environmental indicator and unit of measurement. Much of the discussion about sustainability focusses on the 'Climate change' *impact category*, whose indicator is *GWP* and unit of measurement is kgCO₂e (*carbon equivalent*). Other categories include acidification, stratospheric ozone depletion and fossil fuel depletion. For full details refer to Table C.1 of *BS EN 15804* ⁽³⁾.

Form factor

A building's *form factor* is the ratio of its external surface area (i.e. the parts of the building exposed to outdoor conditions) to the internal floor area ⁽⁴⁾. The term *façade form factor* is often used to express the ratio of the façade surface area (i.e. excluding the roof) to the internal floor area. Overall embodied carbon targets for building are often quoted in units of *GWP* per square meter of internal floor area, for this reason the *façade form factor* will have a significant influence on the embodied carbon of the façade if it is reported in the same units.

Functional unit

Functional unit refers one or more quantified performance metrics of a product or system for use as a reference unit. The *functional unit* provides a basis for comparison between products. Refer to *BS EN 15804 Section 6.3.2* ⁽³⁾.

Life cycle

The *life cycle* refers to the consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal ⁽⁵⁾. For the environmental assessment of buildings, the *life cycle stages* are set out in *BS EN 15958* ⁽⁶⁾.

Life Cycle Assessment (LCA)

Life cycle assessment (LCA) is a method of compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product or system throughout its *life cycle* ⁽⁵⁾.

Life cycle modules

Life cycle modules refers to the components of the *life cycle stages* defined in *BS EN 15978* ⁽⁶⁾. The *life cycle modules* are:

- Product stage
 - A1 – Raw material supply
 - A2 – Transport
 - A3 – Manufacturing
- Construction process stage
 - A4 – Transport
 - A5 – Installation
- Use stage
 - B1 – Use
 - B2 – Maintenance
 - B3 – Repair
 - B4 – Replacement
 - B5 – Refurbishment
 - B6 – Operational energy use
 - B7 – Operational water use
- End of life stage
 - C1 – Deconstruction
 - C2 – Transport
 - C3 – Waste processing
 - C4 – Disposal
- Benefits and loads beyond the system boundary
 - D – Reuse and recycling potential

It should be noted that *PAS 2080* ⁽⁷⁾ defines two additional life cycle modules for consideration in infrastructure projects:

- B8 – Other operational processes
- B9 – User utilisation of infrastructure

Life cycle stages

Life cycle stages refers to the stages of the life cycle framework presented in *BS EN 15978* ⁽⁶⁾. Each life cycle stage is composed of *life cycle modules*. The *life cycle stages* are:

- Product stage (A1 – A3)
- Construction process stage (A4 – A5)
- Use stage (B1 – B7)
- End of life stage (C1 – C4)
- Benefits and loads beyond the system boundary (D)

Living wall

A *living wall* (AKA *living façade*) is a vertical surface, incorporating vegetation into its structure or face, to facilitate various aesthetic, environmental, social or economic functions and benefits. While research and studies on the subject are limited, it is thought that living walls could make a significant contribution to sustainability if properly integrated into a design and building life cycle ⁽⁸⁾.

Material passport

A *material passport* refers to a document that describes all the materials and components that comprise a product, system or asset in order to give them a value for their original intended purpose, their recycling capacity and their reusability. For more information refer to reference ⁽⁹⁾.

Material stewardship

Material stewardship broadly describes the process by which the societal value of materials lent to projects is preserved. *Material stewardship* relies upon data exchange, book keeping, and prevention of activities that would trigger downcycling by all those parties involved in the extraction, processing, working or fabricating, shipping, maintaining, disassembling and returning to the supply chain. For more information refer to reference ⁽¹⁰⁾.

Post-consumer material/scrap

Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose. This includes returns of material from the distribution chain ⁽¹¹⁾.

Pre-consumer material/scrap

Material diverted from the waste stream during a manufacturing process. Excluded is reutilisation of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it ⁽¹¹⁾.

Primary energy

Primary energy refers to the original source, or form, of energy that is used to power an action or generate a product without any additional processes or refinements. *Primary energy* refers to that created by natural processes without the intervention of human engineering, such as the production of electricity. This might take the form of oil based fuels, solar, hydro, nuclear or wind energy.

Recyclability

Recyclability is a measure of the ease with which a material or product can be recycled into its constituent parts in order to be reused. Generally the term '*recyclability*' is used informally without quantified units of measure.

Regenerative design

Regenerative design is an approach to design that seeks to ensure the built environment has an ability to go beyond *net zero carbon* and actively give back to the environment it was created from by restoring or renewing its own sources of energy and materials ⁽¹²⁾.

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Reuse

To *reuse* is to use a product again while largely maintaining its original form. Unlike recycling, reuse requires minimal reprocessing ⁽¹⁾.

Recycled content

Recycled content is a measure of how much material within a product is from a non-virgin source ⁽¹⁾.

Recycling rate

Recycling rate is a measure of how much of a product is collected and returned to the manufacturing process. A high *recycling rate* reflects that the product is technically recyclable and that the market infrastructure exists for it to be reclaimed ⁽¹⁾.

Regulated energy

Regulated energy refers to energy consumed by a building, associated with fixed installations for heating, hot water, cooling, ventilation, and lighting systems as oppose to *unregulated energy* ⁽¹³⁾.

Unregulated energy

Unregulated energy refers to energy consumed by a building that is outside of the scope of Building Regulations, e.g. energy associated with equipment such as fridges, washing machines, TVs, computers, lifts, and cooking ⁽¹³⁾.

Urban heat island

Urban heat island refers to an urban area characterised by temperatures higher than those of the surrounding non-urban area ⁽¹⁴⁾. As urban areas develop, buildings, roads, and other infrastructure replace open land and vegetation. These surfaces absorb more solar energy, which can create higher temperatures in urban areas.

Carbon

Biogenic carbon

Biogenic carbon refers to the carbon removals associated with carbon *sequestration* into *biomass* as well as any emissions associated with this sequestered carbon ⁽¹³⁾.

Biomass

Biomass is material of biological origin excluding material embedded in geological and/or fossilized formations ⁽¹³⁾.

Carbon equivalent

Carbon equivalent, often informally simplified to “carbon”, is the unit of measurement of the *Global Warming Potential (GWP)* environmental indicator as recognised in Table 2 of BS EN 15978 ⁽⁶⁾.

Carbon equivalent is measured in units of kgCO₂e or kgCO₂-equiv,

Carbon footprint

Carbon footprint refers to the amount of greenhouse gases that are emitted into the atmosphere by a person or other entity (e.g building, organization or company). The *carbon footprint* is usually expressed in *carbon equivalent* over a given time period.

Carbon sink/ source

A *carbon sink* is anything that absorbs more *GHGs* from the atmosphere than it releases – for example, plants, the ocean and soil. In contrast, a *carbon source* is anything that releases more carbon into the atmosphere than it absorbs (e.g. the burning of fossil fuels or volcanic eruptions) ⁽¹⁵⁾.

Direct/ indirect emissions

Direct emissions are GHG emissions from sources that are owned or controlled by the reporting entity. *Indirect emissions* are GHG emissions that are a consequence of the activities of the reporting entity, but occur at sources owned or controlled by another entity ⁽¹⁶⁾.

Embodied carbon

Embodied carbon refers to the total GHG emissions generated to produce, maintain, deconstruct and dispose of a built asset. It is defined by the UK Green Building Council as the “total greenhouse gas emissions generated to produce a built asset, this includes emissions caused by extraction, manufacture/processing, transportation and assembly of every product and element in an asset and may also include maintenance, replacement, deconstruction, disposal and end-of-life” ⁽¹⁷⁾. In the context of carbon calculations, the *embodied carbon* refers strictly to *life cycle modules A1-A5, B1-B5 and C1-C4*.

Energy Use Intensity (EUI)

Energy use intensity (EUI) is an annual measure of the total energy consumed in a building. It includes all of the energy consumed in the building, such as regulated energy (heating, hot water, cooling, ventilation, and lighting) and unregulated energy (plug loads and equipment e.g. kitchen white goods, ICT/AV equipment). EUI is expressed in terms of energy consumed per unit (i.e. kWh/m²) where the unit area may be calculated as the GIA (Gross Internal Area) or NLA (Net Lettable Area).

Global Warming Potential (GWP)

Global Warming Potential (GWP) is a measure of how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO₂). The *GWP* is measure in kgCO₂e (*carbon equivalent*). The *GWP* measure was developed to allow comparisons of the global warming impacts of different gases ⁽¹⁸⁾.

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Greenhouse gases (GHG)

Greenhouse gases (GHG) are the family of gases that are associated with global warming and climate change. They collect in the atmosphere, trapping heat and contribute to a rise in overall temperatures. There are six main GHGs recognised in the 1992 Kyoto Protocol as being responsible for global warming and climate change: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

Operational carbon (OC)

Operational carbon (OC) refers to the *GHG* emissions arising from all energy and water consumed by a building in use over its life cycle (Modules B6 and B7) ⁽¹⁾.

Sequestration

Carbon *sequestration* can be defined as the capture and long-term secure storage of carbon from the atmosphere. *Biogenic carbon* is a type of sequestration. Common *sequestration* mechanisms relevant to the industry include the photosynthesis of plants and carbonation of concrete.

Upfront carbon

Upfront carbon refers to the *GHG* emissions associated with materials and construction processes up to practical completion (*Life cycle modules* A1-A5, 'cradle-to-practical completion') ⁽¹³⁾.

User carbon

User carbon refers to the *GHG* emissions relating to a 'users' utilisation of infrastructure and the service it provides during operation (*Life cycle module* B9, *PAS 2080*) ⁽⁷⁾.

Whole life carbon (WLC)

Whole life carbon (*WLC*) is a measure of the total emissions generated by a building from construction to occupation and operation, through to demolition and disposal. A whole life carbon assessment of a built asset should provide an accurate account of its carbon impact on the environment ⁽¹⁹⁾.

Targets

Absolute zero carbon

Absolute zero carbon (AKA Carbon zero, gross zero) refers to an asset or product with zero carbon emissions without reliance the use of *carbon offsets* ⁽¹³⁾.

Carbon neutral

Carbon neutral (AKA carbon balance) is where all carbon emissions are balanced with *carbon offsets* based on carbon removals or avoided emissions ⁽¹³⁾.

Carbon offset

A *carbon offset* is a reduction in emissions of carbon dioxide or other greenhouse gases made in order to compensate for emissions made elsewhere. *Carbon offsets* provide individuals or organisations a mechanism to balance their carbon footprint.

Climate positive

Climate positive, (AKA Carbon negative), refers to an activity that goes beyond *net zero* by achieving an overall reduction in *GHG* in the atmosphere ⁽¹⁾.

Net negative carbon

A *net negative carbon* asset is one where the sum total of embodied carbon emissions over a building's life cycle (Modules A1-A5, B1-B5 and C1-C4) are minimised, meets local carbon targets (e.g.kgCO₂e/m²), and with additional *carbon offsets*, is less than zero.

Net zero carbon

A *net zero carbon* asset is one where the sum total of all asset-related *GHG* emissions, both operational and embodied, over its life cycle including disposal (*Modules* A1–A5, B1–B7, C1–C4), plus offsets, equals zero. Minimising emissions should always be prioritised over offsetting. Adapted from Whole Life Carbon Network (2020) Improving Consistency in Whole Life Carbon Assessment and Reporting ⁽²⁰⁾.

Net zero embodied carbon

A *net zero embodied carbon* asset is one where the sum total of embodied carbon emissions over a building's life cycle (Modules A1-A5, B1-B5 and C1-C4) are minimised, meets local carbon targets (e.g.kgCO₂e/m²), and with additional *carbon offsets*, equals zero ⁽¹³⁾.

Net zero upfront carbon

A *net zero embodied carbon* asset is one where the sum total of embodied carbon emissions over a building's life cycle modules A1-A5 (i.e. 'cradle-to-practical completion'), are minimised meets local carbon targets (e.g.kgCO₂e/m²), and with additional *carbon offsets*, equals zero ⁽¹³⁾.

Net zero operational carbon

A *net zero operational carbon* asset is one where no fossil fuels are used in the operation. All energy use (Module B6) has been minimised, meets the local energy use target (e.g. typical quantified by *EU*) and all energy use is generated on or off site using renewables. Any residual direct or indirect emissions from energy generation and distribution are compensated for with *carbon offsets* ⁽¹³⁾.

Net zero carbon – operational water

A *net zero carbon – operational water* asset is one where operational water use (Module B7) is minimised, meets local water targets (e.g. litres/person/year) and where those *GHG* emissions arising from water supply and wastewater treatment are compensated for with *carbon offsets* ⁽¹³⁾.

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Net zero in-use asset

A *net zero in-use asset* is one where on an annual basis the sum total of all asset related *GHG* emissions, both operational and embodied, (Modules B1-B7) are minimized, meets local carbon, energy and water targets, and with residual compensated for with *carbon offsets*, equals zero ⁽¹³⁾.

Nearly zero energy buildings (NZEB)

Nearly zero energy buildings (NZEB) is a definition from the European Union's European Performance of Buildings Directive (EPBD). The EPBD was transposed into UK domestic legislation in 2020. The definition of NZEB is decided by each EU member state (and the UK) but in principle is a building with low energy demand. As the definition of a NZEB varies widely, it may not meet *net-zero carbon* standards and the two definitions should not be confused.

Science based target

A *science based target* is a target that is consistent with the pace recommended by climate scientists to limit the worst impacts of climate change ⁽¹⁾.

Target CO₂ emission rate (TER)

The *target CO₂ emission rate (TER)*, defined in UK Building Regulations Approved Document L1A and L2A, sets a minimum allowable standard for the energy performance of a building and is defined by the annual CO₂ emissions of a notional building of same type, size and shape to the proposed building ⁽²¹⁾.

Documents, standards and organisations

BRE Green Guide

The *BRE Green Guide* (recently cited by GLA's New London Plan) provides guidance on the relative impacts of the different elements typical to construction specifications ⁽²²⁾.

BREEAM

The *Building Research Establishment Environmental Assessment Method (BREEAM)*, provides a methodology for assessing, rating and certifying the environmental impact of building construction. This is the dominant environmental impact assessment method used in the UK and specific versions exist for some other territories. For more information refer to <https://www.breeam.com/>.

BS EN 15804

British Standard publication *BS EN 15804* provides core product category rules for all construction products and services. It provides a structure to ensure that all Environmental Product Declarations (EPD) of construction products, construction services and construction processes are derived, verified and presented in a harmonised way ⁽³⁾.

BS EN 15978

British Standard publication *BS EN 15978* sets out a framework for the assessment of the environmental impact of new and existing buildings. It shows the modules used in assessing *Whole Life Carbon* (Life Cycle Stages) and the various terms that are used to describe them (Modules A1-A5, B1-B7, C1-C4 and D) ⁽⁶⁾.

Environmental Product Declaration (EPD)

An *Environmental Product Declaration (EPD)* is a documentation process that measures the environmental impact of a product so that it can be compared to other similar products that perform the same function. The *Life Cycle Assessment* methodology is used to quantify the measurements being conducted. ISO 14025:2006 provides a framework for the principles and procedures for developing type 3 environmental declaration programmes and type 3 environmental declarations.

Inventory of Carbon and Energy (ICE) database

The *ICE database* is a widely recognised database of *embodied carbon* for building materials. Established in 2004 by Craig Jones of the University of Bath (UK), the database is in essence a collation of EPDs for many thousands of products ⁽²³⁾.

IPCC

The *Intergovernmental Panel on Climate Change (IPCC)* is the United Nations body for assessing the science related to climate change. The *IPCC* prepares comprehensive assessment reports about knowledge on climate change, its causes, potential impacts and response options.

LEED

Leadership in Energy and Environmental Design (LEED) is a US based environmental building impact assessment method which is used throughout the world. *LEED* aims to provide guidance to the design, construction, operation and maintenance of buildings designed to a sustainable agenda ⁽²⁴⁾.

Minimum Energy Efficiency Standards (MEES)

Minimum Energy Efficiency Standards (MEES) are standards that came into force in 2018, requiring that rented office property meet an Energy Performance Certificate (EPC) rating of Band E or better. In 2020 the government issued an Energy White Paper stating their commitment to a future tightening of MEES, requiring a minimum EPC Band B by 2030. At the time of writing the government is establishing a framework for how this requirement will be applied and enforced. For more information refer to reference ⁽²⁵⁾.

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PAS 2080

The *PAS 2080 – ‘Carbon management in infrastructure’* standard details the principles and process for managing carbon in infrastructure ⁽⁷⁾.

Passivhaus

Passivhaus is a building performance standard, originating in Germany, for the construction of new dwellings which minimise energy input to the building via heating or cooling. Buildings designed to the standard typically feature high levels of insulation and very low levels of air leakage. The standard has expanded over time to now address non-residential buildings and has also been used for refurbishment works ⁽²⁶⁾.

UK Green Building Council (UKGBC)

The *UK Green Building Council* (UKGBC) was established in 2007 to bring clarity, cohesion and leadership to the construction and property development sector, they aim to campaign for a sustainable built environment. The *UKGBC* have produced a number of papers and guidance documents for tackling sustainable issues arising from the building procurement process. For more information refer to reference ⁽²⁷⁾.

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