

CHAPTER 13: Sustainability

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FUNCTIONAL REQUIREMENTS

This Chapter of the Technical Manual is provided to give guidance in relation to sustainability and is not intended as a prescriptive Chapter.

13.1 THE CODE FOR SUSTAINABLE HOMES

The Code for Sustainable Homes (CfSH) is the model within England and Wales that is used to improve the sustainability of new homes through reducing carbon emissions by developing sustainable methods of construction. It is part of the government's continued commitment to address climate change.

The Code measures the sustainability of a home against nine different design categories. There are mandatory and tradable categories within these that allow the client to come up with the best possible solution to suit the property in question.

The CfSH has six different levels which can be met. The levels range from Level 1 which is the lowest through to Level 6 (zero carbon) which is the top level achievable. There are a minimum of points required to be achieved for each level as shown in Table 1. There is not a specific requirement to achieve a level and a 'nil-rating' certificate can be issued if a Code assessment is not carried out. Although specific Code ratings can be required for social housing schemes and also public housing in certain areas of the country.

Relationship between total percentage points score and Code level	
Total percentage points score (equal to or greater than)	Code levels
36 points	Level 1
48 points	Level 2
57 points	Level 3
68 points	Level 4
84 points	Level 5
90 points	Level 6

Table 1: Relationship between total points score and Code level

The CfSH will assess the property against nine different categories. Each category is allocated a number of credits and a weighting factor which then determines how many points are scored. The average weighting factors are shown in Table 2 and the various sub-categories are analysed in Table 3.

Various sub-categories within each category are mandatory (as highlighted in Table 3) and have to be achieved as a minimum. The optional categories are then used in a trade-off basis to pick up the necessary points required for the Code level in question.

Category	Credits available	Average weighting factor	Achievable points
Energy	31	1.17	36.4
Water	6	1.50	9.0
Materials	24	0.30	7.2
Surface water run-off	4	0.55	2.2
Waste	8	0.80	6.4
Pollution	4	0.70	2.8
Health and wellbeing	12	1.17	14.0
Management	9	1.11	10.0
Ecology	9	1.33	12.0
Total:			100

Table 2: Category credit weightings

Summary of environmental categories and issues	
Categories	Issue
Energy and CO ₂ emissions	Dwelling emission rate (M) Fabric energy efficiency (M) Energy display devices Drying space Energy labelled white goods External lighting Low or zero carbon (LZC) technologies Cycle storage Home office
Water	Indoor water use (M) External water use
Materials	Environmental impact of materials (M) Responsible sourcing of materials – basic building elements Responsible sourcing of materials – finishing elements
Surface water run-off	Management of surface water run-off from developments (M) Flood risk
Waste	Storage of non-recyclable waste and recyclable household waste (M) Construction waste management (M) Composting
Pollution	Global warming potential (GWP) of insulants NOx emissions
Health and well being	Daylighting Sound insulation Private space Lifetime homes (M)
Management	Home user guide Considerate constructors scheme Construction site impacts Security
Ecology	Ecological value of site Ecological enhancement Protection of ecological features Change in ecological value of site Building footprint

Table 3: Summary of environmental categories and issues

(M denotes mandatory element)

The Code for Sustainable Homes assessment process

- Pre-assessment (optional) which is a basic report that can be used as evidence by the Developer for planning consent.
- Site registration (required) the version of the Code in use at the point of registration will remain the version that the site is assessed under.
- Design stage assessment (optional) process where the CfSH is based upon the design drawings, specification and commitments of the Developer. This will result in an ‘interim’ certificate. (Developers new to the CfSH may struggle to achieve the desired Code Level if they do not carry out this process).
- Post construction stage (required) process based on the confirmation through site records and / or visual inspection resulting in the ‘Final’ Code for Sustainable Homes certificate of compliance.

All Code for Sustainable Homes assessors must be accredited to an approved accreditation scheme. These accreditation schemes undertake quality assurance on behalf of DCLG.

Further information and online Code calculator

Further information on the Code for Sustainable Homes and an online code calculator can be found in the Technical Manual section of our website.

13.2 LOW CARBON / LOW ENERGY HOMES

What is zero carbon?

There is currently much debate as to the true definition of zero carbon, but at present, a zero carbon home is defined as meeting a dwelling emission rate to Level 5 of the Code for Sustainable Homes. A Code Level 5 property will have a 100% improvement over a Building Regulations compliant property.

True zero carbon is a home that meets the emission rates to Level 6 of the Code for Sustainable Homes. Code Level 6 properties have 'Zero net CO₂ emissions' which means that all energy consumed in the dwellings including cooking, and appliances are provided or offset by a sustainable or renewable source.

To achieve Level 6 of the Code for Sustainable Homes, the house will need to contain a significant amount of the latest energy saving technologies such as PV, solar and hydro power to name just a few. These technologies will need to be fitted alongside the other various energy features such as roof, floor and wall structures that have very low U-values to name just a few.

SAP Calculations and EPC

Standard Assessment Procedure, or SAP as it is usually called, is the Government approved method of assessing the energy performance of any new property. A SAP calculation measures the CO₂ emissions and energy efficiency of a

residential unit. The results are used to produce an Energy Performance Certificate. SAP 2009 calculates the typical annual energy costs for space and water heating, and the SAP 2005 model also takes into account lighting.

SAP calculations and Energy Performance Certificates are mandatory requirements on a new residential development and must be included on any Building Regulations submissions to comply with Part L. EPCs are calculated from the SAP calculations produced at as-built stage. The calculations also state how much carbon dioxide the dwelling emits and is called the dwelling emission rate. The dwelling emission rate (DER) must be below the target emission rate (TER) for the dwelling.

EPCs show how energy efficient a home is on a scale of A to G. The most efficient homes which will have the lowest fuel bills are in Band A. The certificate also shows on a scale of A to G about the impact the home has on the environment. Better-rated homes should have less impact through carbon dioxide (CO₂) emissions. The certificate includes recommendations on ways to improve the home's energy efficiency to save you money and help the environment. All newly constructed dwellings must have an EPC to meet the requirements of the Energy Performance in Buildings Directive (EPBD).

Energy efficient dwellings

Energy saving within a house can be designed specifically to meet the type of house lived in, (such as a two bed terrace or a five bed detached)

so that the people living within that house can get the greatest benefits from the energy saved. Various types of systems can be applied to the dwelling in question to help reduce the energy CO₂ living costs.

Typical SAP standards to meet compliance

Table 4 shows the minimum allowable standards for U-values within the different elements of the building shown in the SAP calculation. The air permeability testing can be given a default reading of 15m³/h/m² if the air permeability test is not carried out. Otherwise the reading of 10m³/h/m² must be met at the as-built stage when the air permeability test is completed. (See Air Tightness and Robustness for definition of air permeability). These are minimum standards as defined in Part L1a 2010 of the Building Regulations.

However, for the dwelling to meet the required DER, improvements to the dwelling over and above these standards may be required.

U-value

The U-value is the measurement of heat transmission through a material or assembly of materials. The U-value of a material is a gauge on how well heat passes through the material and the lower the U-value, the greater the resistance to heat and therefore has a better insulating value.

Thermal bridging

Building Regulations require that thermal bridging be taken into account in SAP and SBEM

calculations. The junctions that need to be accounted for include wall-floor junctions, wall-roof junctions, lintels, jambs, sills, intermediate floors, balconies, corners, party walls and other significant junctions. Their effects are expressed in terms of Ψ -Values, or linear thermal transmittance values, and, unless they are recognised Accredited Details, they should be evaluated using thermal simulation software, following agreed conventions and standards. A standard default value of Ψ -Value 0.15 can be entered into the SAP. Although if Accredited Construction details are confirmed the Ψ -Value can be entered manually.

Renewable energy reports

Local Planning Authorities may require developments to obtain a percentage of energy from renewable sources which can be shown via a renewable energy report. In preparing energy statements the following steps are involved:

- Determining the target energy performance of the building compared to Building Regulations.
- Identify the energy saving measures that will be employed to achieve the target.
- Estimate the likely carbon emissions from the building.
- Consider the implementation of low or zero carbon technologies.

13.3 AIR TIGHTNESS AND ROBUSTNESS

The requirements of Part L within the Building Regulations means that new build houses within England have to be tested for air tightness.

What is air leakage?

Air leakage is the uncontrolled flow of air through gaps and cracks in the fabric of a building. Too much air leakage will lead to preventable heat loss and discomfort to the occupants from cold draughts. With the increasing need for energy efficient buildings and also the requirements of Building Regulations, air tightness within a building has become much more of an issue.

Air testing requirements

Air Pressure Testing (air tightness testing) is a requirement of the Building Regulations Approved Document L1a (2010). Dwellings should be constructed to limit the uncontrolled flow of air through the building envelope whilst incorporating adequate controllable ventilation.

Testing should be carried out when the properties are finished but unfurnished. All external doors and windows must be fitted along with the primary heating system, ventilation and lighting. Baths, sinks, shower units and toilets should be installed to the point where the traps can be filled with water.

An air pressure test should be carried out on three units of each dwelling type or 50% of all instances

of that type, whichever is the lesser. A block of flats should be treated as a separate development irrespective of the number of blocks on the site.

The design air permeability for each dwelling type within a development will be determined by Designers as part of the overall DER (Dwelling CO₂ Emission Rate) calculation produced by the SAP calculations. The maximum design air permeability allowable is 10m³/(m².hr) at 50Pa. If the test result does not meet the requirement then remedial works and further testing will be required.

Units that are not tested will use the air permeability value equal to the average result(s) of the unit(s) of the same type tested with the addition of 2m³/(m².hr) at 50Pa when completing the as-built SAP calculations. An air pressure test can be avoided on development sites where no more than two dwellings are to be erected, if a design air permeability figure of 15m³/(m².hr) at 50Pa is entered into the SAP calculations and the DER is still no worse than the TER (Target CO₂ Emission Rate).

For dwellings to be classed as of the same type they have to be of the same generic form (i.e. detached, semi-detached, end terrace, mid terrace, ground floor, mid floor, top floor), be of the same number of storeys, have similar adjacency to unheated spaces (corridors, stairwells, integral garages), have similar principle construction details, have a similar number of significant penetrations (doors, windows, chimneys, flues) and have envelope areas that do not differ by more than 10%. Houses with low air pressure test

results in conjunction with adequate controlled ventilation will benefit the homeowner with:

- Lower fuel bills;
- Better living conditions;
- Environmentally friendly homes.

Accredited construction details

Accredited construction details have been developed to assist the construction industry achieve the performance standard requirements to comply with Part L of the Building Regulations. They focus on issues such as insulation and air tightness and help to encourage a common approach to design, construction and testing for new homes.

The details contain checklists which should be used by the Designer, Constructor and Building Control body to demonstrate compliance with Part L.

13.4 RENEWABLE ENERGY SOURCES

Solar

Solar water heating systems use heat from the sun to warm domestic hot water. A conventional boiler or immersion heater can be used to make the water hotter, or to provide hot water when solar energy is unavailable.

Advantages

- It is a cheap source of water heating in comparison to other renewables.

Disadvantages

- Reliant on a south un-shaded orientation for optimum results.
- Large cylinder capacities are required.

Solar photovoltaic (PV)

Solar panel electricity systems, also known as solar photovoltaic (PV), capture the sun's energy using photovoltaic cells. These cells do not need direct sunlight to work - they can still generate some electricity on a cloudy day. The cells convert the sunlight into electricity, which can be used to run household appliances and lighting.

Advantages

- It has a good pay-back period and reduced installation costs.

Disadvantages

- The pay-back is reliant on renewable heat incentives from Local Authorities etc. which may be reduced or withdrawn.
- Installation outlay is still expensive.

Wind turbines

Wind turbines harness the power of the wind and use it to generate electricity. 40% of all the wind energy in Europe blows over the UK, making it an ideal country for domestic turbines (known as 'micro wind' or 'small-wind' turbines). A typical system on a site within an exposed area could

easily generate power for your lights and electrical appliances.

Advantages

- Ideal for exposed areas of land.

Disadvantages

- Not suitable for urban locations.

Hydroelectricity

Use running water to generate electricity, whether it's a small stream or a larger river. Small or micro hydroelectricity systems, also called hydropower systems or just hydro systems, can produce enough electricity for lighting and electrical appliances in an average home.

Advantages

- The source is a constant flow of energy.

Disadvantages

- Reliant on nearby flowing water and is therefore rarely used.

Heat pumps

Ground source heat pumps use the natural energy stored in the earth to heat your home.

Air to water heat pumps are intended to be the sole source of heating and hot water production for the home. Air to water heat pumps use the constant energy available in the air with a

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refrigerant circuit which allows the temperature to be improved to a suitable level for heating or hot water for the home.

Air to air heat pumps provide heating and cooling for the home. The heat pump includes an outdoor and an indoor unit which convert latent energy in the air into heat for your home. The outdoor unit extracts the energy in air outside the property. This heat, absorbed by refrigerant solution within the unit, is turned into hot air by the indoor unit and circulated within the property.

Advantages

- Claimed high levels of energy efficiency.
- Can be used to heat and cool a building.

Disadvantages

- Does not generate the same heat output as traditional boilers.
- Building fabric required high levels of insulation and air tightness for optimum results.



Technical Manual Registration Form

Contact details

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Surveyor / sales persons name

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