energy envoys

Energy Tutorial: Building Fabric

Energy performance in buildings

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INTRODUCTION

As we have learned from Module 1 of the Energy Tutorial, the majority of our domestic energy is used for space heating in our homes (61%). Given that heating is by far the biggest consumer of energy in our homes, reducing the amount of energy used for heating is really important if we are going to significantly reduce our energy consumption and carbon emissions. How easily heat is lost from a building is therefore a key measure of energy performance.

Taking a 'fabric first' approach

Although we can also reduce the amount of energy used for space heating through installing more efficient heating systems (as explained in Module 2), reducing heat losses and improving the energy efficiency of the building fabric is often considered more important.

Prioritising the energy efficiency of the building fabric is known as the 'fabric first' approach. This approach involves maximising the performance of the components and materials that the building itself is made of, such as the walls, floors, roof, windows and doors, before considering the efficiency of the systems and electrical appliances used in the building. This approach can be more cost effective, save more energy and also reduce the need for maintenance during the building's life. There's no point having a really efficient heating system if all the heat produced simply leaks out through the building fabric!

Measures to stop the heat leaking out of buildings are not only a way to save energy, money and carbon; they are also an investment in warmth and comfort. Leaky homes that are hard to heat and have cold draughts coming in can be an uncomfortable place to live. In extreme cases, a cold and leaky home can lead to health problems such as cardiovascular, respiratory and rheumatoid diseases, hypothermia and poorer mental health, or even cold-related deaths. Those at most risk of the health problems associated with cold homes are households who are in fuel poverty. A household is considered to be in fuel poverty if:

1. they have required fuel costs that are above average (the national median level)
2. were they to spend that amount they would be left with a residual income below the official poverty line

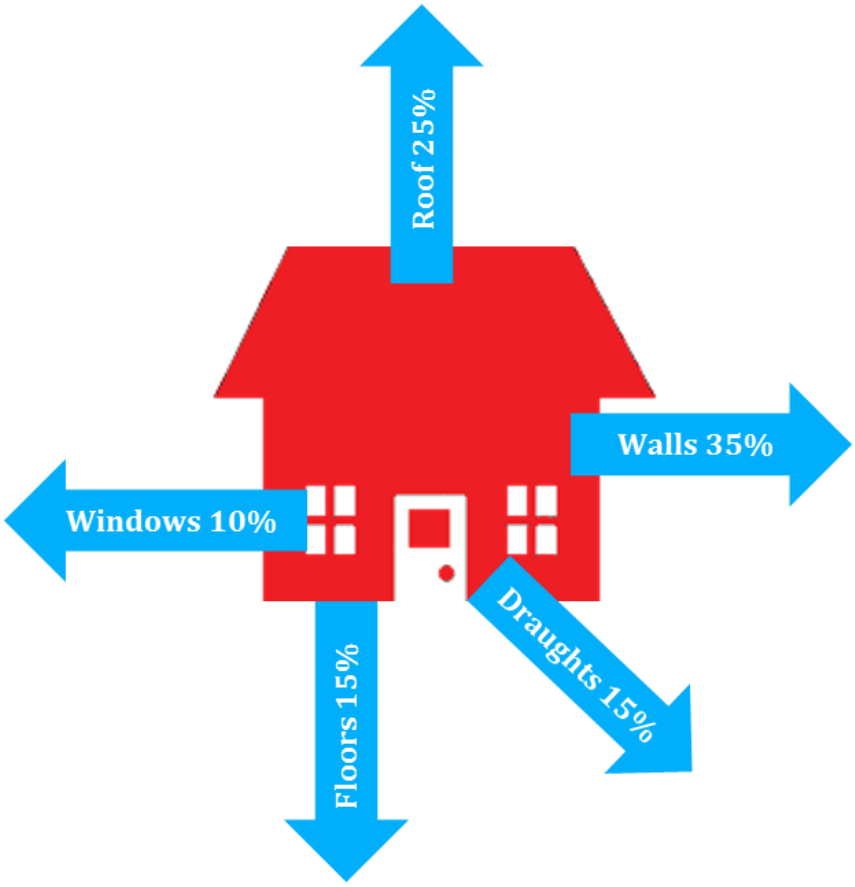
Improving build fabric efficiency is therefore often the best way for all of us to save energy, money and carbon, but can be especially important for vulnerable people who are in fuel poverty.

Where heat is lost from buildings

Figure 1 below shows where heat tends to be lost from buildings. When we are trying to find ways to save energy, we should tackle the parts of the building where most heat escapes from first. This means we should consider reducing heat losses in the following order:

1. Walls
2. Roof
3. Floors / draughts
4. Windows

Figure 1: Where heat is lost from buildings



Can't we just build new energy efficient buildings?

While it is true that all new buildings must meet certain energy efficiency standards, new buildings make up only a tiny fraction of the total building stock. This means that even if all new buildings were built to the highest possible energy efficiency standards, this would only have a small impact on the energy consumed by all buildings as a whole.

For example, if we tried to replace our existing homes with new energy efficient homes at the current rate of housebuilding (around 0.6% increase in housing stock per year), it would take more than 170 years to replace them all. The process of constructing new buildings and producing the required materials also uses a lot of energy and carbon (this is referred to as the 'embodied' energy and carbon), not to mention money. Improving the energy efficiency of our existing buildings is therefore vital if we're to significantly reduce our energy consumption and carbon emissions.

ENERGY PERFORMANCE CERTIFICATES

Under the EU Energy Performance of Buildings Directive, owners, operators and developers of all buildings in the UK (both domestic and non-domestic, including factories, offices and retail premises) are required by law to provide an Energy Performance Certificate (EPC) for a building when it's constructed, sold or rented to a new tenant. Public buildings with a total useful floor area over 1,000m^2 that are occupied by a public authority or institution providing a public service are also required to have a Display Energy Certificate (DEC). DECs must be put on display so the public can see the energy efficiency of the building.

EPCs and DECs classify buildings on a banded scale from A (most energy efficient) to G (least energy efficient). They show the actual energy usage of a building, the operational rating and provide recommendations for improving the energy efficiency of the building. Other than when you a required by law, you might also want an EPC for your property simply to find out the energy performance of the building and to make improvements suggested in the report. You can compare the energy performance of your property with that of other properties free of charge using the EPC register website. You can also check how to make your home more energy efficient using the EPC adviser.

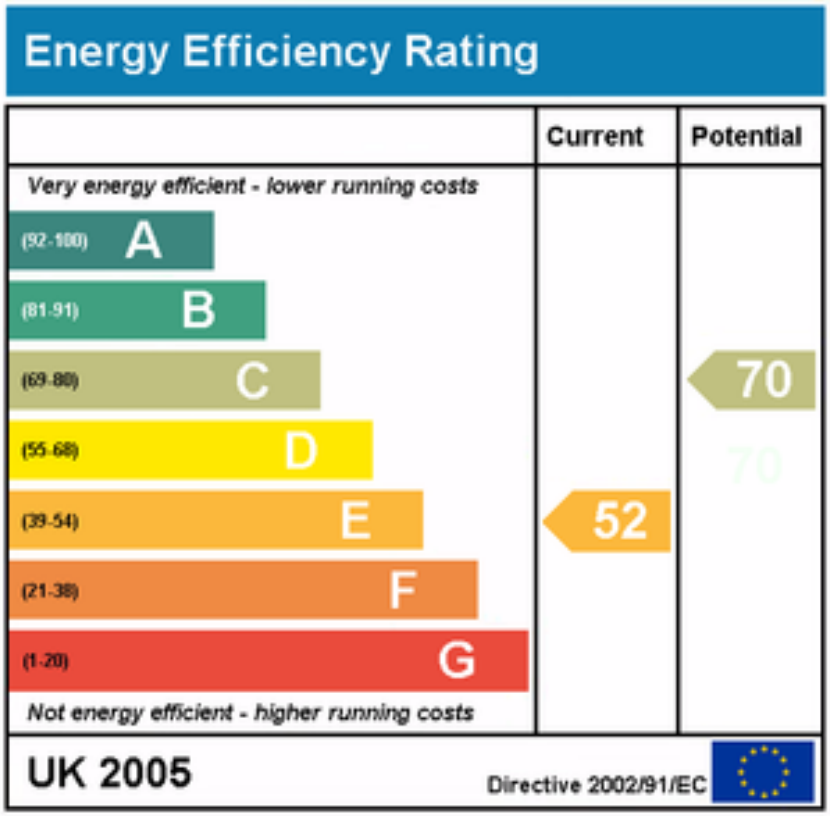
What will an EPC tell me?

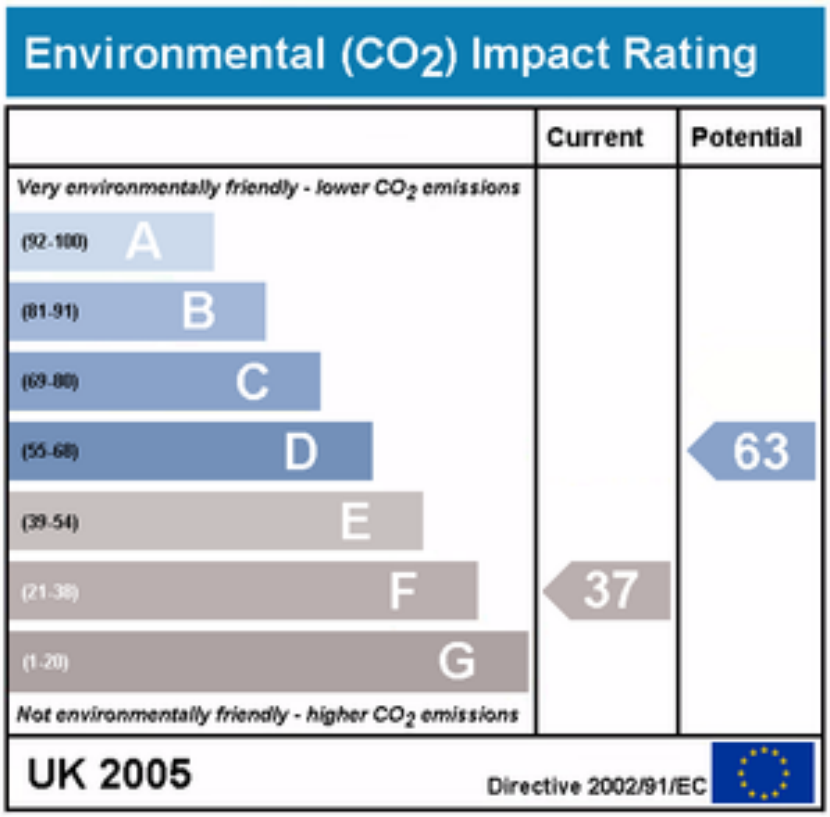
EPCs rate a building's energy performance in terms of:

- Energy use per square metre of floor area
- Energy efficiency based on fuel costs
- Environmental impact based on carbon dioxide (CO_2) emissions

This provides an energy efficiency rating and an environmental (CO_2) impact rating. There are seven bands for both of these ratings, from A (best) to G (worst). Figure 2 below shows how the energy efficiency and environmental impact ratings are displayed on an EPC. This tells you both the current (amount of energy used now) and potential (amount of energy used after installing the measures recommended in the EPC) ratings for the building. Each rating is associated with a letter, number and colour. The higher the numerical rating, the lower the fuel bills are likely to be. The average energy efficiency rating for homes in England and Wales is Band D.

Figure 2: EPC ratings





EPCs include a table that indicates how much it costs to provide lighting, heating and hot water to the building. This table includes the current costs and what the costs are likely to be if the recommendations in the EPC are followed. These figures are based on standardised assumptions about the building's occupancy, heating patterns and geographical location. Each of the buildings key energy performance-related features, such as the walls, roof, floor, windows, heating and hot water system and lighting, are then all rated from 'very poor' to 'very good' in terms of energy efficiency and environmental impact.

Of particular interest is the list of recommendations for cost-effective energy efficiency improvements. For each recommended measure, the EPC outlines the typical savings per year and the potential performance ratings that could be achieved if the measure is installed. The improvements are divided into 'lower cost measures' of up to £500 and 'higher cost measures' for larger amounts. Further suggestions, such as to install solar PV panels, are also included for those aiming for the highest possible standards.

For a full example of an EPC, click here.

FURTHER RESOURCES AND INFORMATION

- You can find out more about Energy Performance Certificates on the Energy Saving Trust website here: http://www.energysavingtrust.org.uk/domestic/energy-performance-certificates