



Centre for  
Alternative  
Technology

# ENVIRONMENTAL BUILDING

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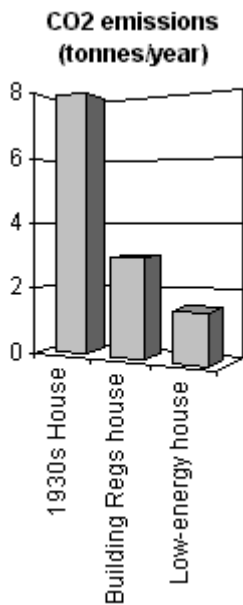
<http://info.cat.org.uk/ecobuild>

Eco-building is one of CAT's key areas of work. If you want to either build your own home or take on the renovation of an existing property, we can help in several ways. We demonstrate many building materials and techniques at our visitor centre, we publish practical guides and we run hands-on residential courses.

This sheet gives an overview - for much greater detail see the publications sold in the CAT shop (details overleaf).

## Energy Efficiency

Energy use in houses accounts for 30% of all UK carbon dioxide (CO<sub>2</sub>) emissions. By increasing levels of CO<sub>2</sub> in the atmosphere, we're changing the Earth's climate - leading to rising sea levels, and more frequent flooding, storms or drought.



As three-quarters of domestic energy use is for heating, the self-builder has an ideal opportunity to minimise carbon emissions by maximising efficiency - which will of course also lead to lower fuel bills. It's possible to reduce your impact still further by using renewable energy sources (which do not contribute to climate change) such as solar power or wood fuel to meet your remaining

energy needs.

The main considerations are high standards of insulation and draught-proofing and adequate ventilation without heat loss.

Spending a little extra on insulation leads to big fuel savings over time.

Good-quality detailing around doors and windows will minimise draughts and heat loss. Argon-filled double-glazing with a 'low-e' coating is the most efficient, and timber

frames have a much lower environmental impact than uPVC or aluminium.

In our mild climate, it is usually appropriate to have some form of passive ventilation, with warm air rising through the building, and replacement fresh air coming ideally through a 'buffer' space, such as a south-facing conservatory.

Underfloor heating gives a comfortable, even heat and is also efficient, running at about 35°C, rather than the 60 to 70°C of conventional radiators.

A low-energy house can meet some heating needs and create a pleasant living space with 'passive solar' design methods. These make the best use of available sunlight, by careful orientation of windows and doors.

## Renewable and Healthy Materials

Sustainable building materials will be from either an abundant source (e.g. earth) or a renewable source (e.g. timber from well-managed woodland). Think about what will happen at the end of the building's life. Can the components be readily reclaimed? Many common materials cannot be reused or even recycled. In the UK, construction waste produced per person is more than double collected household waste!

**Wood** is natural, versatile, and beautiful. To be sure of sustainably-harvested timber, look for the FSC mark (see contacts). Chemical treatment is rarely necessary - problems can be avoided by using good-quality seasoned timber, and designing a well-drained and ventilated structure.

**Straw** is abundant around much of the UK, and of low value. Building with bales is quick and easy, and they're excellent insulation.

**Earth** can be used unfired, for example as rammed earth or in cob building. Locally quarried sub-soil is a low-energy material.

Look also for natural paints and stains made from plant-based resins, oils and dyes. They will biodegrade on disposal, and little energy goes into their production.

## Embodied Energy & Pollution

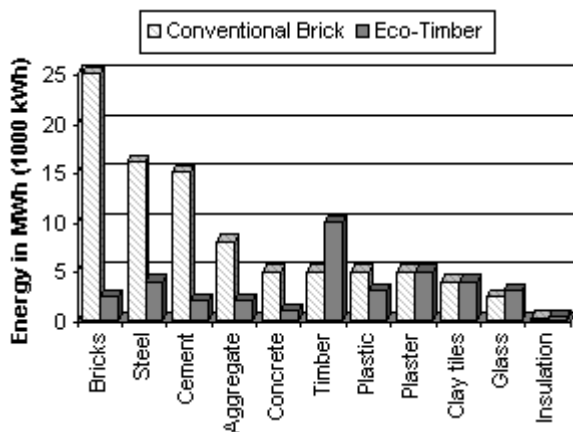
Once the energy needed in the day-to-day life of a building has been minimised, then the energy used in construction becomes a bigger proportion of the building's overall energy use. So it makes sense when planning an energy efficient house to make careful choices about the materials used.

The 'embodied energy' of a building includes the energy used to extract, manufacture, and transport all the materials used.

Harvesting and processing timber uses only a small amount of energy, so if you can buy local timber, the embodied energy will be quite low. You can reduce it still further by using locally reclaimed timber.

Some building methods need particular specialist materials, so it's a matter of balancing the benefits of a particular method against its impact. For example, a home built to passive solar design principles could have a concrete floor to absorb and store solar energy, and the energy gain from this may outweigh the impact of the materials.

This chart compares the embodied energy of key materials for a standard brick house, to those in a well-insulated 'eco-timber' home:



Because of the high temperature to which it must be heated, and the associated chemical reaction, emissions of CO<sub>2</sub> and other pollutants from cement manufacture and use are extremely high. Alternatives are available - mostly based on lime. This has a much lower impact and gives other benefits, being both flexible and breathable.

PVC (polyvinyl chloride) is versatile and widely used, but creates pollution in both manufacture and disposal. Alternatives such as polybutylene and polyethylene have a much lower impact and are recyclable.

## Planning & Construction

Self-build does not necessarily mean doing the physical work yourself, just overseeing the project and the finances. You can find an ecobuilders & architects through the AECB or Passivhaus Trust (see below). However, many eco-building methods can be readily undertaken by amateur builders. For example, straw bale and timber-frame building are both simple methods that can be learned fairly easily and quickly.

### Further Information

Many publications on different building techniques and materials are available from **CAT mail order**, along with many books about options for heating and providing electricity to a house:

<http://store.cat.org.uk> or 01654 705959

CAT's residential **short course programme** includes timber frame self-build, earth and strawbale building, and eco-refurbishment:

<http://courses.cat.org.uk> or 01654 704966

For those interested in learning about eco-building and low energy buildings in much greater detail, we offer master's degree courses through our **Graduate School**:

<http://gse.cat.org.uk> or 01654 705953

**CAT's free information service** can give advice on low-impact building methods and materials, details of suppliers and installers, and advice on how renewable energy systems and water efficiency measures can be very effectively integrated into buildings: 01654 705989 or email: [info@cat.org.uk](mailto:info@cat.org.uk)

### Contacts

You can find environmentally aware builders and architects in your area though:

**AECB - Sustainable Building Association**  
Tel: 0845 456 9773; Web: [www.aecb.net](http://www.aecb.net)

### Passivhaus Trust (UK)

Web: [www.passivhaustrust.org.uk](http://www.passivhaustrust.org.uk)



### Forest Stewardship Council

Certification mark for sustainable

timber: [www.fsc-uk.org](http://www.fsc-uk.org)

Other useful websites include:

[www.greenspec.co.uk](http://www.greenspec.co.uk)

[www.greenbuildingforum.co.uk](http://www.greenbuildingforum.co.uk)

[www.lowimpact.org](http://www.lowimpact.org)