



Centre for
Alternative
Technology

KEEPING COOL IN SUMMER

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Conventional air conditioning systems cool a building by using refrigeration technology similar to that in a fridge. They take heat from the air in the room and transfer this heat to the outside air.

A difference of about 5 degrees C is usually aimed for in air conditioning - this makes the building feel suitably 'fresher' than outside. However, too much of a temperature drop is not ideal; if the temperature inside is more than 7 degrees C lower than outside it can lead to sore throats & coughs for occupants.

Air conditioning units use lots of electricity, and so as well as giving you high fuel bills will also lead to increased emissions of greenhouse gases from power stations - so making climate change worse! A report in the March 2005 issue of 'Energy in Buildings and Industry' magazine stated that air conditioning adds typically 50% to the energy consumption of a building.

At the moment, only about 5% of European homes have air conditioning, compared to two-thirds of homes in the USA. A recent report by the Association for the Conservation of Energy (ACE) estimated that 16% of UK homes will have air-conditioning by 2020. This will be mainly in the South-east, where the report authors predict that 84% of homes will have units installed by 2020.

There are several ways to avoid the use of air conditioning:

- Avoid internal heat gains from lights and appliances;
- Insulate the building well;
- Put in some shading of windows;
- Have lots of 'thermal mass', kept cool with night-time ventilation.

Avoid Internal Heat Gains

There will be many sources of heat within the house, and addressing these will help to reduce the need for air conditioning. Conventional incandescent light bulbs generate light quite inefficiently, giving off waste heat in the process. Low energy fluorescent lamps (CFLs) convert electricity to light much more efficiently, so putting in these will help reduce overheating as well as saving money.

Most electrical appliances will give off heat, whether directly as part of their operation (e.g. cookers, fridges) or indirectly from transformers on the plug or in the appliance. Switching off appliances when not in use will prevent indirect heat gains.

You can usually easily avoid using the oven on a cooker during very hot weather, which will help. Make sure that fridges or freezers are well ventilated at the back (by the heat sink), and if possible put a freezer out in a garage or utility room so the heat given off does not go into the main house.

Make sure your hot water cylinder (if you have one) is well-insulated and that all hot water pipes are insulated against heat loss. Uninsulated pipes can easily lead to more heat loss than a modern, efficient cylinder.

Shading

Blinds can be used to reflect incoming short wave solar radiation back out as long wave radiation. However, modern windows that have 'low-e' glass (standard in most new windows) will stop long wave solar radiation going

through the glass - so the blinds will be less effective. They will still reflect some of the incoming sunlight as short wave radiation, so will still have some effect.

Otherwise, external shading is the most effective. This can be window shutters or an awning or other type of overhang to prevent sunlight coming through the windows. Shelter from vegetation can be planned in advance, by growing deciduous trees, or having plants on a trellis over windows. Shutters can be difficult on modern outward opening windows, but are easier for traditional sash or sliding windows. An awning is often the simplest - it can be retracted or removed outside of summer.

A permanent overhang is another option - it needs to be carefully sized to allow in low winter sun but not high summer sun. Page 70 of CAT's 'Energy Saving House' book gives advice on calculating the optimum roof overhang. You may need to check with local planners before adding external shading, especially in designated areas like National Parks.

Insulate and Ventilate

As well as keeping a house warm in cold weather, decent levels of insulation will also keep it cool in the summer. It will complement the other measures outlined here, as once you have avoided internal heat gains and brought in cool air overnight, a well-insulated building will keep the this cool air inside the building.

Opening windows during the day will bring refreshing air in, but this incoming warm air will gradually heat up the building. It is best not to leave windows open if rooms are empty - but this needs to be in conjunction with some shading to prevent heat gain through the glass. In an occupied room, opening a window for just a few minutes will bring some fresh air in.

This works best in houses that have lots of 'thermal mass' - which means thick

stone or brick walls, or exposed solid floors. These materials will take a while to either heat up or cool down, so in summer you want to keep them cool as much as possible. So use the above methods to minimise gains during the day, and ventilate at night to allow the mass of the buildings to cool down as much as possible. For optimum night cooling you would need to open about 25% of the total window area, while opening only 5 to 15% during the day. Roof windows are a very good way to provide secure ventilation overnight.

If all else fails, and air-conditioning must be used, then get a properly installed and sealed system, and not a mobile unit with an exhaust hose going out of the window - these are the most inefficient type.

Further Information

CAT runs many **residential courses** on energy efficiency and eco-design.

Tel: 01654 7054952

Web: www.cat.org.uk/shortcourses

The Energy Saving House is a guide to reducing energy use in the home.

The Whole House Book (by Cindy Harris and Pat Borer) is a complete reference guide for self-builders and architects, giving comprehensive advice on choosing materials and designing a healthy, efficient, and low-impact home.

These, and more eco-building books, are available from **CAT Mail Order:**

Tel: 01654 705959

Web: <http://store.cat.org.uk>

You can contact **CAT's Information Service** with any further questions.

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