1 Saving Energy in the Home

Introduction

The energy we use in our homes has a large impact on the environment. Almost all the energy we use in heating, lighting, cooking, and powering our computers and household appliances comes from **fossil fuel** sources such as gas, coal and oil. Burning fossil fuels releases **CO_2** which contributes to **climate change.**

By properly insulating our homes and altering the way we do things we can reduce our energy demands and create more comfortable homes in which to live. Straightforward measures ranging from closing curtains at dusk to installing condensing boilers and low energy appliances can reduce your household's energy use and CO_2 emissions significantly. And it pays to make these changes; reduced energy use can mean lower energy bills!

Once your home is properly insulated, your heating system is running efficiently and you've got into good energy habits, you might want to consider installing a renewable energy system to generate your own heat and light.

Some of the measures mentioned in this section may involve building work or change how your home looks, which may require inspection or need special permission. These are highlighted with a (P) symbol. You can find out more about these measures on page 13.

Keep Heat Indoors

Insulation is one of the most important of all energy saving measures. Heat is lost through the roof, walls, floor and windows. The more heat that is lost from a building, the more energy and money is needed to keep it warm.

Insulate Your Roof and Loft Space



Image: www.lyndseyyoung.co.uk

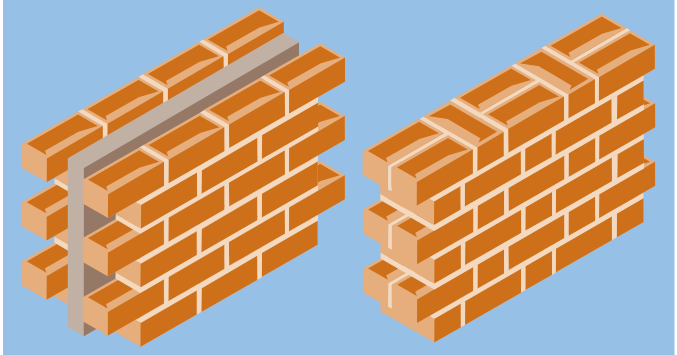
Fitting proper loft insulation is the most cost-effective way of saving energy. The current recommended depth of loft insulation is 270mm (10.5 inches). The cheapest option is to fit the insulation yourself (wear protective gloves and a mask). Alternatively have a professional installer do it for you. Prices vary depending on the amount needed and the type of material used, e.g. **mineral wool** or sheep's wool. You may be eligible for discounted insulation through the Government's Green Deal initiative.

See page 12 for more information.

Insulate Your Walls

Walls are probably responsible for the largest amount of heat loss (up to 50%), depending on other insulation and the shape of your home and windows. Wall insulation should be carried out by a qualified installer. The way you can insulate depends on the type of walls your home has – either cavity wall or solid wall insulation.

Wall Types



Cavity Wall Solid Wall

Cavity Wall means the wall has a gap between the inner and outer wall. Insulating the gap is a cheap way of reducing heat loss. Most homes built after 1930 will have cavity walls, but an insulation installer can check that for you for free. Their work should be guaranteed for 25 years under the CIGA guarantee (Cavity Insulation Guarantee Agency), and they should provide you with a certificate on completion of the work.

For more information, visit www.ciga.co.uk



Image: Aran Services

Solid Wall insulation is more complicated and expensive, and can be achieved through internal or external wall insulation. Internal wall insulation involves fitting battens and plasterboard on the internal side of the wall, which will mean you lose a few inches of floor space in those rooms and they will need re-decorating.

External wall insulation involves adding a layer of weatherproof render or cladding to the outside of the wall. P

Many homes in Cambridge are of solid wall construction. Transition Cambridge has a useful page answering frequently asked questions about solid wall insulation on its website.

For more information, visit www.transitioncambridge.org and go to the page on Energy.

Top tip:

If you have radiators on outside walls you should have some reflective foil behind them to reflect heat into the room, rather than into the wall. You can buy thin insulating panels with foil backing quite cheaply from DIY stores, or even kitchen foil stuck to cardboard would do.

Insulate Your Hot Water Tanks and Pipes

If you have a hot water tank, make sure it is insulated to keep the water hot for longer. If your tank has less than 75mm of insulation, fit another jacket over the existing one, or replace it with a newer, thicker jacket.

Modern, efficient hot water tanks often come with a layer of sprayed-on foam insulation, usually green-coloured. If your tank looks like this then it won't need an extra jacket.

Insulate pipes if you can – especially between the boiler and the hot water cylinder, and pipes in the loft to stop them freezing and bursting in very cold weather.

Ventilation

Ventilation is essential to help prevent condensation and to cool your home during hot spells. Basic ventilation (opening windows or trickle vents in double glazed windows) is usually sufficient for bedrooms and the living room.

Extractor fans are recommended for kitchens and bathrooms, especially for en-suite bathrooms or in flats where there isn't a window in the bathroom.

Draught Proofing

Draught proofing is a cost effective way to reduce heat loss. Draughts are most common around doors and windows, between floor boards, behind skirting boards and anywhere there is a pipe or cable going through to the outside of the building.

Top draught-proofing tips:

- Fix brush seals to exterior doors and letterboxes, and tape to ill-fitting interior doors
- Seal gaps between floor boards or under skirting boards with draught strip or tube sealant
- Seal up holes in walls where electricity cables, gas or plumbing pipes go through



Image: StopGap

Windows

Windows control how much of the sun's heat and light is let into your home, but they can also let a lot of heat out when temperatures are colder outside than inside.

Top tip:

Keep windows clean to let in as much free light and heat energy from the sun as possible.

Reduce heat loss through draughty, single-glazed windows relatively cheaply and easily by fitting draught-proofing strips; sealed blinds; heavy curtains or secondary glazing.

Double glazed windows with broken seals causing condensation and damp problems can be repaired, but it may be more cost effective to replace the entire window with a new double glazed unit. Double glazing can cut heat loss through windows by 50%, reducing the need for room heating. They can also cut down on noise and condensation. P

Double glazing typically uses **low-e glass**, which can significantly reduce heat loss. The transparent coating fused to the inner side of the glass reflects heat back into the room, acting like a thermal mirror, keeping warmth inside during the winter and heat outside during the summer. Low-E glass also screens out the sun's ultraviolet rays, which helps to reduce fading of carpets and curtains.

Take Control

Heating controls allow you to control the temperature in different parts of your home. These can include an electronic timer control for your boiler; a room thermostat for your main living area and thermostatic radiator valves (TRVs) on your radiators. A background temperature of between 18 and 21 degrees should be comfortable for most healthy adults. Adjust the temperature according to how active people are in the house, and how old they are; small children, the sick and elderly people may have difficulty regulating their body temperature.

- Time your heating and hot water to come on when you need them
- If you are healthy, try an extra layer of clothing or a hot drink before turning up the heating
- Install a water tank thermostat and set it at 60°C. You must heat your water to 60°C regularly to kill harmful bacteria, e.g. legionella

Radiators

It is very important that your radiators are working well, because they deliver heat into your room. Fix air locks, i.e. a 'cold spot' often felt at the top of the radiator, by turning off the heating and slowly releasing the air using a bleeding key on the bleeding valve.

The radiator pipe circuit can sometimes get 'silted up', making the system less efficient in delivering heat around the home. A heating engineer can flush the system and add a chemical to the water to prevent it silting up again.

In the Living Room

- Don't rely on stand-by, switch things off. That includes the TV, DVD, CD player and games consoles. Fit a 'Power Down' plug to a main device and when you turn it off, other devices connected to it, e.g. a TV and DVD player or PC and printer, are automatically turned off too.
- Unplug mobile devices from the mains once they are fully charged.

In the Kitchen

- Keep fridges/freezers as far away from heat sources (e.g. boiler, cooker) as possible.
- Wait until you have a full load in the washing machine or dishwasher.
- Use lower temperature settings on your washing machine, and dry clothes outside if you can instead of using a tumble dryer.
- Only boil as much water in as you need in the kettle, and descale it regularly - limescale means the kettle uses more energy.

Lighting

- Make the most of natural light by adjusting blinds and curtains.
- Turn off lights in empty rooms. In most homes lighting makes up 10 to 15% of the electricity bill.
- Swap any old light bulbs for CFL (Compact Fluorescent Lamps) or LED (Light Emitting Diode) lights. Look for the Energy Efficiency Recommended Logo on new light bulbs or light fittings.

Energy can also be saved on domestic security lighting. A 150 watt bulb is adequate for responsive security lighting rather than 250-300 watt usually sold. Solar-powered outside lights are also now widely available.

Swap

Using appliances and systems that are more energy efficient is a simple and very effective way of reducing energy use in your home. Below are examples of easy changes you can make to save money and energy.

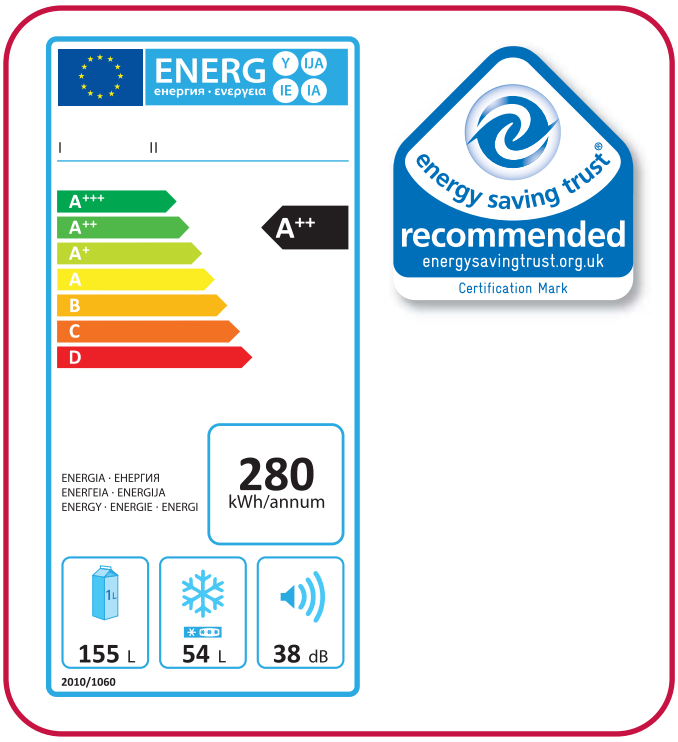
Condensing Boilers

Replacing an old boiler (more than 10 years old) with a high efficiency **condensing boiler** could reduce your heating bills by a third. The current lifespan of a boiler is 10-15 years, so a new condensing boiler would make a huge difference to your heating bills over time. An energy efficient condensing boiler converts more than 92% of its fuel into heat, compared with 'standard' boilers that convert 65% to 85% (*www.sedbuk.com*).

It is very important for your safety and the efficient running of your heating system to have your boiler serviced regularly by a qualified heating engineer.

Appliances

Modern appliances are generally more efficient than older models - they use less energy so they cost less to run. Look for the Energy Saving Trust Recommend logo or an EU Energy Rating Certificate on household appliances. Under the EU ratings you should look for an 'A' rating or better. For fridges and freezers there are now "A+++" rated models available. The most efficient models can be more expensive but they will cost less to run. The EU Energy Rating Certificate also tells you how much energy (**kWh**) the appliance will use in year.



Swap Energy Supplier

You could save money by switching over to a different energy supplier.

For free, impartial, independent pricing information on energy suppliers, visit www.uSwitch.com

You can also choose to change over to a supplier that guarantees an energy supply from renewable sources.

Collective Energy Switching

Cambridgeshire Energy Switch scheme, supported by Cambridgeshire County Council, uses the collective bargaining power of residents to bid for better prices for electricity and gas to save you money at a time of rising prices.

Residents who sign up to the scheme are collected together as one group or customer. Energy suppliers are given an opportunity to offer this collective group of residents a deal to provide their electricity and gas. There is no obligation to accept an offer from companies and the service is free of charge.

For more information email Cambridgeshire County Council via energy.switch@cambridgeshire.gov.uk or call the Big Community Switch free on 0800 0488285 weekdays from 8am until 5.30pm.

Make Your Own Energy

Renewable energy is obtained from sources that are essentially inexhaustible, unlike fossil fuels which are in limited supply. Renewable energy technologies in the UK include:

- solar photovoltaic (solar PV)
- solar water heating (solar thermal)
- heat pumps
- small scale wind turbines
- biomass heating systems.

Electricity and heating produced by fossil-fuelled power stations release high levels of **CO_2.** By comparison, a renewable or low carbon energy source has little or no CO_2 emissions.

Renewable and low carbon energy systems, when correctly specified, are as reliable as energy from more traditional sources and offer a number of positive benefits both for you and the environment:

- a local and reliable energy resource
- less dependence on fossil fuels
- lower emissions of carbon dioxide and other greenhouse gases
- a potential income through the Feed in Tariff and Renewable Heat Incentive (see the ‘Grants and Advice’ section for more information).

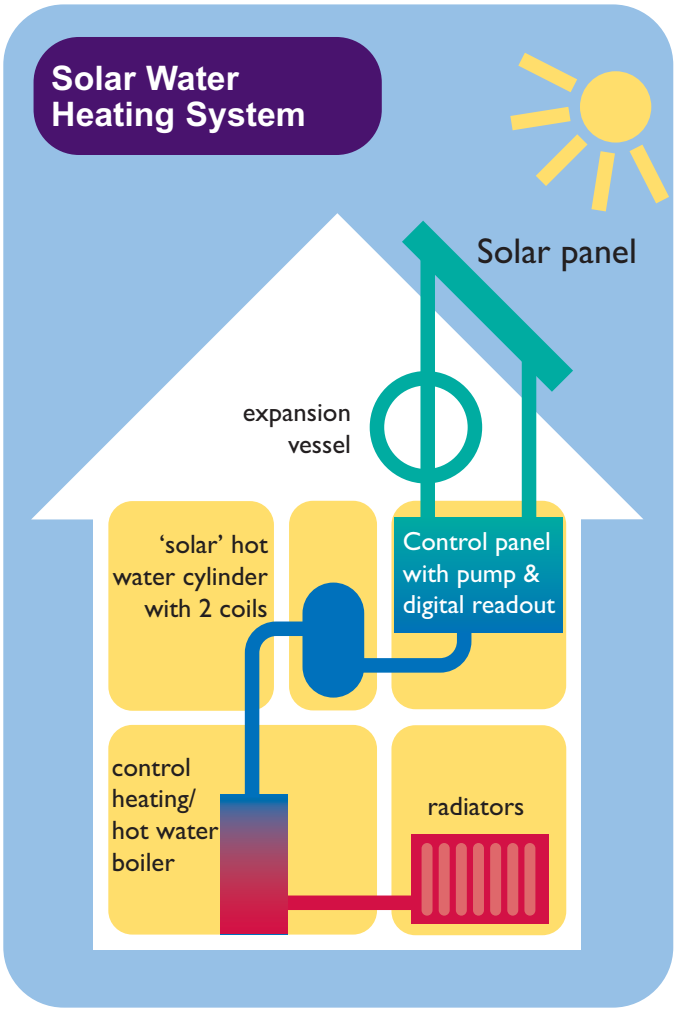
Solar Energy Systems (P)

You can make the sun work for you by installing special collectors to harness its energy. There are two main types of collector; solar thermal systems for heating water, and photovoltaic (PV) panels that generate electricity.

Solar Water Heating Systems

Solar panels fitted to your roof collect heat from the sun to heat up water stored in a hot water cylinder. A boiler or immersion heater can be used as a back-up to heat the water further to reach the temperature you want.

They are particularly appropriate in large family homes that use large quantities of hot water. A carefully designed system can provide up to 100% of your hot water needs through most of



the summer, and even in winter on a cloudy day could still provide up to 20% of the heat required for hot water. Current installation costs are around £3,000 per system (£1,500 if installed by DIY) but this is likely to decrease over time.

Photovoltaic Panels

Photovoltaic (PV) panels convert light energy into electric energy and need only daylight to work, rather than bright sunshine. PV systems vary, from grey 'solar tiles' that look like roof tiles to panels and transparent cells for use on conservatories and glass, providing shading and generating electricity.

For maximum efficiency PV panels should face south and away from any potential shading from chimneys, trees or neighbouring buildings.

Current costs for a roof panel system range from £5,500 to £9,500. Costs have fallen significantly in recent years with the introduction of the Feed in Tariff, and vary between installers and products, so get quotes from at least three installers.

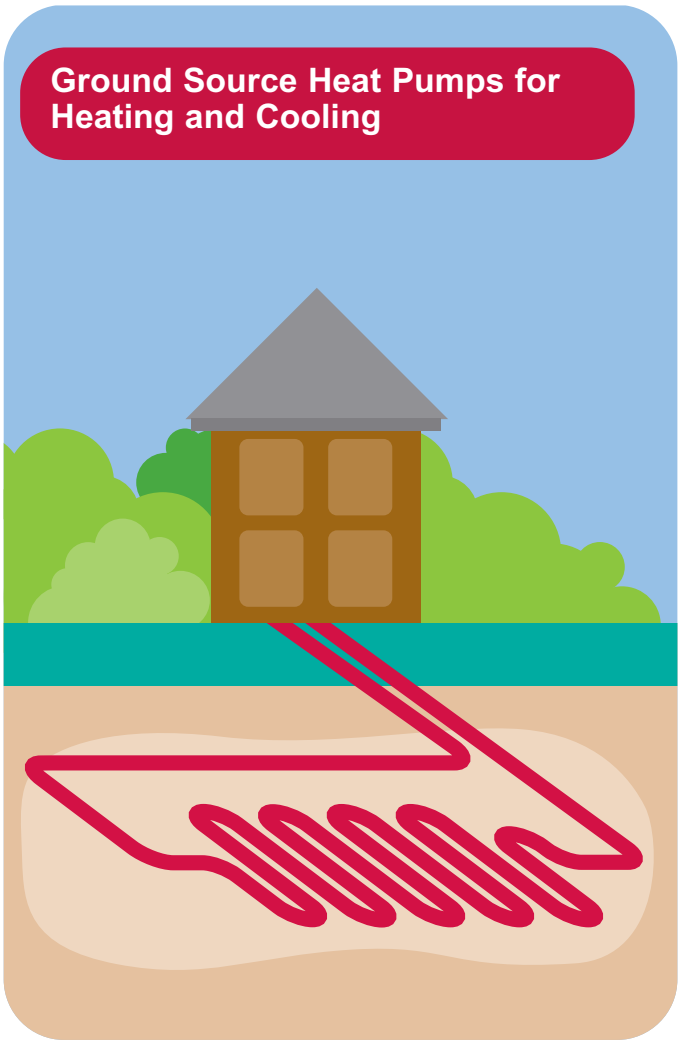
Low Carbon Energy

Ground Source Heat Pumps

Several metres below the surface the ground keeps a constant temperature of 11 to 13°C. In winter, this temperature is warmer than the air above it. Ground source heat pumps (GSHPs) use a loop of pipes filled with water and antifreeze buried in the ground to absorb this heat and transfer it through a heat exchanger into the heat pump, which delivers the heat around the building.

Once installed the systems are invisible and virtually maintenance free. For every unit of electricity used to pump the heat, three units of heat are produced. Installation costs vary between £9,000 and £17,000.

Environment Agency consent may be required for some types of ground source heat pumps. For more information, visit www.environment-agency.gov.uk



Air Source Heat Pumps

Air source heat pumps act in a similar way to ground source pumps, but absorb heat from outside air. This heat can be used to heat radiators, under floor heating systems or warm air convectors and hot water in your home. A typical air source heat pump system costs around £6,000 to £10,000 to install.

Both types of heat pump have some impact on the environment as they need electricity to run. In terms of lowering fuel bills, they are best used where they replace conventional electric heating or oil fired boilers. For the heating system to be effective it is essential that your home is insulated and draught-proofed. P

Biomass

Biomass can be logs, wood pellets and chips or pellets made from non-wood products. CO_2 is released when biomass burns, but this is balanced by the CO_2 absorbed while the material grows, resulting in a nearly **carbon neutral** process (processing and transport usually involve some fossil fuel and CO_2 emissions).

Biomass stoves provide local space heating fuelled by logs or pellets. Some models can be fitted with a back boiler to provide water heating. Stoves can be used as supplementary heating to reduce the need to run your central heating system or you can use them to provide all of your heating.

Biomass boilers connected to central heating and hot water systems may use pellets, logs or chips. Log burners require manual loading, while pellet and wood chip systems are automatic, but can be more expensive. Current costs range from between £1,500 and £3,000 for stand-alone room heaters to between £4,000 and £12,000 for automatic hot water/central heating boilers. Biomass boilers are typically 80% efficient or more.

If you are thinking of installing a biomass boiler, consider the following points:

- The flue must be specially designed for wood fuel appliances
- Ensure you comply with all safety and Building Regulations (see Part J of the Building Regulations)
- Check whether you are in or close to the city's Smoke Control Area – *visit www.cambridge.gov.uk/smoke-pollution for details.* P



Image: Cambridge Carbon Footprint

Please note that this information is correct at the time of publication and could be subject to change, so it is always advisable to check with the Planning Department.

Wind Energy

To work efficiently, wind turbines require a smooth, steady air flow. Their performance is dramatically affected by the local terrain, e.g. trees or buildings in the path of the wind. Wind energy potential can be low in most urban areas and this is certainly the case in Cambridge. The low average wind speeds we experience in the city make wind turbines an unsuitable alternative energy option for most householders.

When considering installation of any type of energy system, always get at least three quotes from experienced contractors, and ask for references. The performance of some

technologies can be severely restricted through poor specification and installation. All of the systems mentioned also require a degree of maintenance, the level and cost of which varies between technologies.

For more detailed information about the different technologies, visit the 'generating energy' section of the Energy Saving Trust website www.energysavingtrust.org.uk or call 0800 512012.

Local Advice

If you want to make your home more energy efficient, or install renewable energy technologies but don't know where to start get practical, impartial advice from other Cambridge residents through two of our most active environmental groups – Cambridge Carbon Footprint and Transition Cambridge.

Cambridge Carbon Footprint (CCF) is an award-winning environmental charity working to raise awareness of climate change issues and promoting practical solutions to help people live more sustainably. CCF offers friendly support and advice through its many innovative projects and programmes.

For more information visit www.cambridgecarbonfootprint.org, email info@cambridgecarbonfootprint.org or call 01223 301842.

CCF runs Open Eco Homes, an annual showcase of new and existing homes in and around the city that use the different energy saving measures and technologies mentioned in this publication. You can visit the properties and talk to the residents about all the aspects of installing efficient heating, lighting, insulation and renewable technologies.

For more information, and to see case studies of some of the properties, visit www.openecohomes.org.

Transition Cambridge aims to help Cambridge residents make the transition to ways of life that are more resilient in the face of rising energy prices and a changing climate.

For more information, visit www.transitioncambridge.org or email transitioncambridge@gmail.com.

Grants and Advice

Action on Energy

Action on Energy is a new council-backed scheme for Cambridgeshire, introduced to support the Government's Green Deal scheme, providing accredited assessments of homes, measures and installers. It gives householders access to the Green Deal offering to install a range of measures which could help to reduce their energy bills and make their homes more comfortable.

As many as nine out of ten homes in Cambridge could benefit from a range of home energy upgrades such as better loft and wall insulation, more efficient boilers, or a move to renewable energy.

Making the change to a warmer and cheaper-to-run home does not have to cost the earth. Action on Energy provides access to a variety of insulation grants that are not always income related. Those in receipt of a range of qualifying benefits may be able to use ECO (Energy Companies Obligation) funding to upgrade their homes at no or minimal cost. Under the Green Deal, householders can take out a loan to help pay for the measures and make repayments through bill savings.

For more information on Action on Energy, visit www.actiononenergy.net or call 0800 093 3303. Please quote 'AoECamCity003' when you email or call.

action on energy Cambridge

Feed In Tariff

The Feed in Tariff was introduced in April 2010 for renewable electricity technologies such as photovoltaic panels. Under this scheme, energy suppliers make regular payments to householders and communities who generate their own electricity. It guarantees a minimum payment for all electricity generated by the system, as well as a separate payment for any electricity exported to the grid. These payments are in addition to the bill savings made by using the electricity that you have generated yourself.

Renewable Heat Incentive

The Renewable Heat Incentive (RHI) is a Government scheme promoting renewable heat technologies such as solar hot water systems and heat pumps among householders, communities and businesses. The phase of the scheme covering homes was launched in the Spring of 2014. Similar to the Feed in Tariff, this scheme will provide regular payments to householders and communities who generate their own heat from renewable sources. The level of tariff will vary according to the technology used. To qualify for the RHI your system must be installed by an accredited installer and you must have an Energy Performance Certificate (EPC) for your house of grade D or above.

For further information on the Feed in Tariff and RHI visit the Energy Savings Trust website www.energysavingtrust.org.uk (P)

Planning Permission and Permitted Development

If you are carrying out development works to your home you may need planning permission from the Council, if:

- External wall insulation render or cladding will alter the appearance of the house
- You want to install windows of a different design to the existing ones
- Solar panels are installed above the ridgeline of the roof and project more than 200mm from the surface
- Ground level solar panels are more than 4m high; installed less than 5m from any boundary; or the overall size of the panels is more than 9m^2
- The height of a chimney flue (e.g. for a biomass boiler or wood-burner) would exceed the highest part of your roof by 1m or more.

In some cases, small domestic extensions and loft conversions to houses are 'permitted development' and so do not need formal planning permission. Permitted development rights may be affected if your property is a Listed Building or located in a Conservation Area.

Building Regulations

Whether or not you require planning permission for your work, you will usually need to obtain Building Regulation consent. This includes energy efficiency issues of:

- sound and thermal insulation
- ventilation
- flues and boilers
- conservation of fuel energy

While some elements of Building Regulations can be 'self-certified' by contractors, you may wish to check with the Council's Building Control department prior to carrying out any works.

For more information on permitted development rights and planning permission, visit the planning pages on the Council's website http://cambridge.jdi-consult.net/expsys/ or the national Planning Portal website www.planningportal.gov.uk/permission/commonprojects/extensions/

Informal officer advice is available from the Council's Building Control team via the duty planning officer system, from 10.30am-3pm every weekday at the Customer Service Centre in Mandela House, Regent Street, Cambridge CB2 1BY. Call 01223 45700 or email enquiries@cambridge.gov.uk

Listed Buildings and Conservation Areas

A number of the ideas in this guide can be used to enhance the environmental performance of historic buildings. However, the special character of these buildings, particularly those that are listed, needs to be considered. Some measures may not be appropriate for traditional buildings, e.g. modern insulation might affect the 'breathability' of a building.

English Heritage has developed the 'climate change and your home' website, which provides a range of practical advice for saving energy in older homes.

Visit www.climatechangeandyourhome.org.uk/live to learn more.

Any works that alter the character of a listed building require Listed Building consent, a separate process to obtaining planning permission. This would include internal works; re-facing external walls; replacing windows and installing external boiler flues.

Seek advice from the Council's Design and Conservation Team before you embark on any projects on listed buildings or those in conservation areas. Email planning.conservation@cambridge.gov.uk or call 01223 457200.

Further Information

The Building Research Establishment

The Building Research Establishment is an independent and impartial, research-based consultancy, testing and training organisation, offering expertise in every aspect of the built environment and associated industries. BRE can provide advice on integrating renewable energy sources into buildings.

Tel: 01923 664000
Email: enquiries@bre.co.uk
www.bre.co.uk

The Centre for Alternative Technology

The Centre for Alternative Technology is an education and visitor centre which demonstrates practical solutions for sustainability, covering all aspects of green living.

Tel: 01654 705950
www.cat.org.uk

Top10 Energy Efficiency Guide

The Top10 Energy Efficiency Guide provides an independent and impartial source of information on the most energy efficient products available in the UK. Using the Top10 guide will save you energy and money whenever you're shopping for an energy-using product in-store or online.

consumer.info@top10energyefficiency.org.uk
www.top10energyefficiency.org.uk

HETAS

The official body recognised by Government to approve biomass domestic heating appliances, fuels and services including the registration of competent installers and servicing businesses.

Tel: 01242 681270 or 0845 634 5626
Email: info@hetas.co.uk
www.hetas.co.uk

National Energy Foundation

National Energy Foundation provides information on how individuals and organisations can reduce their carbon emissions through energy efficiency and the use of sustainable energy sources. They have useful tips on energy efficiency and steps you can take to reduce your carbon footprint.

Tel: 0800 111999
www.nef.org.uk

Low Impact Living Initiative

Low Impact Living Initiative (LILI) provides factsheets on how to reduce your energy consumption and has specific information on ground source heat pumps, solar panels and solar water heating systems.

Email: lili@lowimpact.org
www.lowimpact.org