



Helpu Cymru i leihau
ei Hôl Troed Carbon
Help Wales reduce
its Carbon Footprint



Llywodraeth Cynulliad Cymru
Welsh Assembly Government

The background is a collage of images: a blue sky with clouds at the top, a close-up of green grass in the middle left, a brick wall in the middle right, a stack of yellow items (possibly cheese or bread) in the bottom right, and a wooden structure at the bottom left.

Improving your home A Climate Change Guide

Improving your home **A Climate Change Guide**

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Climate change is happening now

Climate change is one of the biggest challenges facing the world. The greenhouse gases we produce through our everyday activities contribute to climate change. Warming temperatures and melting ice caps are clear evidence that climate change is happening now.

In Wales we are likely to see more frequent and extreme weather conditions. This might include very hot days, drier summers, heavy rain, storms and rising sea levels.

Climate change and its affects on us

These changes in our climate might mean that more homes may be more susceptible to the risk of flooding. There are more days when it is extremely hot making our homes very uncomfortable. There might also be times when our water supplies are stretched to the limit.

You can make changes to your home to help to keep it comfortable even with a changing climate. You can also protect your home from the possible impacts of climate change which will help to reduce your insurance costs.

Reducing your carbon footprint will cut your fuel bills

We all need to do our bit to help tackle climate change by making changes in the way we live and reducing the amount of CO₂ that our homes produce.

Find out about your carbon footprint and ways you can reduce it at: www.wales.gov.uk/climatechange

If you reduce the CO₂ emissions from your home you will also cut your fuel bills. With higher fuel prices it has never been a better time to improve the energy efficiency of your home. Most measures to save energy will pay for themselves within a few years.

Get a free energy report by clicking on the tab on the left-hand side at: www.energysavingtrust.org.uk/home_improvements

How to use this guide

This guide is for people who have plans to improve their homes. If you are doing work on your house, with builders and scaffolding on site, it often requires only a little bit extra to make big cuts in your CO₂ emissions, big savings on your fuel bills and to protect your home from climate change.

The guide is organised in three main sections:

1 Projects

describing typical home improvement projects where you can help tackle climate change. Each has a checklist of specific measures you should/can do.

2 Measures

describing specific measures e.g. 'Lighting' and giving the options you might consider with an idea of:

Cost (of installation):

low: under £100 medium: £100-£1000 high: more than £1000

Skill (required to install):

Simple DIY: anyone should be able to install this measure

Competent DIY: people confident in using tools and having basic technical skills should be able to install this measure

Professional: for safety reasons or level of complexity installation should be left to a professional contractor

- **Impact on reducing your carbon footprint and saving on fuel bills**

Some measures will have more impact than others on cutting emissions and fuel bills. **Look for the reading on the meter:**



high impact
on cutting CO₂ and
saving on fuel bills



medium impact
on cutting CO₂ and
saving on fuel bills



modest impact
on cutting CO₂ and
saving on fuel bills

All the measures listed are worth considering; while some will only have modest impact and only save a little on your fuel bills these are also often the cheapest and easiest to do.

Some measures are highlighted because they are bad things to do, they will increase CO₂ emissions and they use a lot of fuel. **These are shown when the meter points to the black like this:**



- **Comfort and safety in a changing climate**

Some measures are listed because they could make your home more comfortable and safe in a changing climate. **They are graded by the use of these symbols:**



high impact
on comfort or safety



medium impact
on comfort or safety



modest impact
on comfort or safety

3 Further information and funding

sets out where to get more detailed information about the measures described in this guide and what funding support is available.

Energy Performance Certificates – the value of your home

If you are selling your home or want to rent it out, you are now required to have an Energy Performance Certificate issued by an accredited assessor. This will tell the potential buyers or tenants how energy efficient your house is and its environmental impact based on CO₂ emissions, with a report on how these factors can be improved. So the more you do now, the better your rating will be and this should be reflected in the sale or rental value of your house.

Planning Permission and Building Regulations

Some of the projects that involve external alterations described in this guide may need planning permission. If you have any doubt, contact your local planning authority which will be your local council or the National Park Authority if you live in one of Wales's National Parks. There are more planning restrictions for people living in conservation areas, National Parks, and areas of outstanding natural beauty or whose homes are listed buildings.

Many of the measures will require approval under the Building Regulations. You or your building contractor should contact the Building Control section of your local council for approval for your planned improvement.

You can also download 'Planning – a guide for householders' by going to: www.wales.gov.uk/planning or pick up a copy at your local council's planning department.

Information is also available on the Planning Portal www.planningportal.gov.uk.

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Projects

1 Adding an extension to your home

Building an extension is probably the biggest change you are likely to make to your home. Taking climate change into account will help to keep running costs low, provide a comfortable environment, and protect your extension against climate change impacts. It could also be the most cost-effective time to improve the performance of the rest of your home as builders, plumbers and electricians will be on-site, as well as scaffolding and specialist equipment.

You should also look at

- Project 4** Replacing your heating system or boiler – as this might be a good time to consider doing this as well [13](#)
- Project 7** Refitting your kitchen or bathroom – if you are going to include a bathroom and/or kitchen in the extension [16](#)
- Project 9** Replacing your existing windows – so that they match the glazing and window frames in your extension, and give the same higher performance [19](#)

Ways to cut carbon emissions and save on fuel bills

- ✓ Orientate the extension to get free warmth from the sun by having bigger, taller windows on any southerly facing sides and fewer, smaller windows on northerly facing sides.
- ✓ Ask for high levels of insulation in walls, floors and roofs. Go beyond the minimum required by the current Building Regulations. It may also be a cost-effective time to upgrade the insulation levels in the rest of your home.
- ✓ With good insulation you will minimise the need for heating. You do need to consider whether your current heating system has the capacity to be extended.

Ways to make your home comfortable and safe

- ✓ Consider how you will keep rooms cool in very hot weather. It is important to be able to shade and ventilate south facing rooms.
- ✓ If you are in a flood risk area, consider how you might design your extension to minimise damage from flood waters or severe storms.

Checklist

- M1 Roof insulation 22
- M2 Wall insulation – cavity walls 23
- M4 Floor insulation 25
- M6 Double and triple glazing 26
- M8 Heating 29
- M14 Lighting 35
- M16 Cooling and ventilation 37
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2 Building a conservatory

Conservatories can provide extra space and a pleasant warm area to sit inside. They will always be a few degrees warmer than the temperature outside. However they can also be very energy inefficient, overheating in summer and losing heat in winter. Ensure that there are well insulated walls and/or double glazed windows and doors between the conservatory and the rest of the house. Careful use of a conservatory, e.g. shutting doors to the rest of the house when the weather is cool or very hot, is also important.

You should also look at

Project 9 Upgrading your existing windows – at the same time to improve their efficiency [19](#)

Ways to cut carbon emissions and save on fuel bills

- ✓ Consider the orientation of your conservatory; south facing conservatories will tend to overheat and may need extra shading and ventilation; east and west facing ones will gain the most heat in the mornings/evening; north facing ones will gain least heat.
- ✓ Insulate the walls, windows and doors to a high standard, as you would with your house in order to have comfortable temperatures for the maximum amount of time in the day and year.
- ✓ Accept that a conservatory will be comfortable to use mainly through the spring, summer and autumn but not in cold weather.
- ✓ Avoid installing a permanent or temporary heating system in your conservatory as this can waste large amounts of fuel, significantly increasing your heating bill.

Ways to make your home comfortable and safe

- ✓ Ensure your conservatory has low and high level opening vents and blinds so that you can keep it cool in summer.
- ✓ Consider using a ‘conservatory’ space to provide passive solar gain for your house, helping to heat it in winter and cool it in summer. This requires heat regulated ventilation into the rest of the house and to the outside.

Checklist

- M2 Wall insulation – cavity walls 23
- M4 Floor insulation 25
- M6 Double and triple glazing 27

- M16 Cooling and ventilation 37
- M20 Planting 42

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3 Converting your loft

Constructing extra rooms in your loft is an effective way of increasing the size of your home without necessarily increasing your energy demand or CO₂ emissions. A loft conversion may involve erecting scaffolding, which makes it a good opportunity for considering other measures up on the roof.

You should also look at

- Project 4** Replacing your heating system or boiler – as this might be a good time to consider doing this as well [13](#)
- Project 9** Upgrading your existing windows – so that they match the glazing and window frames of your loft conversion, and give the same higher performance [19](#)

Ways to cut carbon emissions and save on fuel bills

- ✓ Improve the levels of roof insulation.
- ✓ Use the most up-to-date glazing in windows and skylights.
- ✓ Consider installing solar energy systems such as solar water heating or photovoltaic panels for generating electricity.

Ways to make your home comfortable and safe

- ✓ Consider how you will keep loft rooms cool in very hot weather.
- ✓ If you live in an exposed position, seek advice about the most resilient form and materials for your new roof.
- ✓ Consider if there is a need to increase the capacity of gutters to deal with heavy rainfall.
- ✓ If your loft conversion includes a flat or low pitched roof, consider having a 'green' or planted roof.

Checklist

- M1** Roof insulation [22](#)
- M6** Double and triple glazing [27](#)
- M8-12** Heating [29](#)
- M13** Electricity from sun and wind [34](#)
- M14** Lighting [35](#)
- M16** Cooling and ventilation [37](#)
- M17** Drainage, surfacing and green roofs [38](#)
- Household and building waste [43](#)

4 Replacing your heating system or boiler

There are usually four elements to your heating system: the boiler (or equivalent equipment) which provides the heat, a hot water storage cylinder, the system that takes the heat around your home (e.g. pipes and radiators), and controls that ensure your home is kept at a comfortable temperature when you are using it. A conventional gas or oil central heating boiler usually needs to be replaced after about 15 years but other parts of the system should normally last much longer. A range of new low-carbon technologies for heating your home and providing hot water are now becoming available.

Ways to cut carbon emissions and save on fuel bills

- ✓ If you live in an area with a gas supply, you should choose a gas condensing boiler. Micro CHP (Combined Heat & Power) is a new low-carbon option, fuelled by gas that is now becoming available.
- ✓ If you live in an area without a gas supply, or want to reduce your reliance on fossil fuels, consider one of the new low-carbon technologies for heating your home and water such as ground source heat pumps or a wood fuelled boiler.
- ✓ Whatever your type of boiler, good temperature and heating controls are essential.
- ✓ Consider solar water heating for providing part of your hot water requirements.
- ✓ Make sure you have done the low cost, simple measures such as insulating your hot water pipes and hot water cylinder (if you have one).

Ways to make your home comfortable and safe

- ✓ If you live in a flood risk area, consider locating your boiler, associated electrics, pumps and controls above any potential flood level.

Checklist

M7 Pipe and cylinder insulation 28

M8 Conventional fuel heating systems 29

M9 Ground source heat pumps and Micro CHP 30

M10 Solar water heating 31

M11 Heating with wood 32

M12 Temperature and heating controls 33

M19 Flood and storm protection 40

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5 Building a garage or shed

Whilst a garage or shed should make little impact on your CO₂ emissions it may enable you to collect rainwater. A garage or shed built as a 'lean-to' on your home could also shelter the shared wall and hence reduce heat loss from your house.

Ways to cut carbon emissions and save on fuel bills

- ✓ Install efficient lighting and switches that automatically turn the lights off when not in use.
- ✓ If you intend to heat the garage or shed, insulate it as well.
- ✓ If your home does not provide a suitable southerly facing roof, a shed or garage roof can sometimes be used to mount solar water heating or photovoltaic panels.

Ways to make your home comfortable and safe

- ✓ Collect the rainwater that falls on the roof by using a water butt.
- ✓ Ensure any driveways or paths leading up to the garage or shed utilise permeable materials to allow rainwater to drain through to the ground.
- ✓ If your shed or garage has a flat or low pitch roof, consider using a 'green' or planted roof.
- ✓ If you live in a flood risk area, consider putting any wiring, electric points and fittings above any potential flood level.

Checklist

M10 Solar water heating 31

M13 Electricity from sun and wind 34

M14 Lighting 35

M17 Drainage, surfacing, and green roofs 38

M18 Water saving 39

M19 Flood and storm protection 40

M20 Household and building waste 43

6 Building a driveway or patio

If you own a car and need off-road parking, use permeable materials that allow rainwater to pass through them and to drain slowly into the ground rather than quickly running off into drains and increasing the risk of flooding. Using different materials and avoiding concrete or tarmac on your patio can also help to keep gardens cool in summer.

Ways to cut carbon emissions and save on fuel bills

- ✓ Do not use patio heaters, which can produce up to 4 tonnes of CO₂ per year, the same as a large car.
- ✓ Install energy efficient lights, such as solar-powered lights with movement sensors, where it is necessary to light driveways and patios.

Ways to make your home comfortable and safe

- ✓ Consider using green planting on driveways. Not only can they be more attractive, they also remove pollution from the air and absorb rainwater. Plastic lattice products stabilise grassed areas and prevent green driveways becoming compacted and muddy.
- ✓ Consider the use of other permeable surfacing, such as gravel and pebbles.
- ✓ Use FSC (Forestry Stewardship Scheme) certified timber for decking on patios and for garden furniture – wood that has been certified by the Forest Stewardship Council is managed in a way that protects the environment and the lives of forest-dependent people.

Checklist

M13 Electricity from sun and wind 34

M14 Lighting 35

M17 Drainage, surfacing and green roofs 38

M20 Planting 42

M21 Household and building waste 43

7 Refitting your kitchen or bathroom

These are the two rooms in your home where large quantities of energy and water are consumed. Refitting them provides the opportunity for significantly reducing your carbon emissions and conserving water resources, both of which could reduce your energy and water bills. Your kitchen contains some of the most expensive and energy-hungry appliances in your home and is the place where the most waste is generated. Kitchens and bathrooms are wet environments where you might be experiencing condensation and mould problems. A combination of improving insulation, heating and ventilation can effectively deal with such problems.

Ways to cut carbon emissions and save on fuel bills

- ✓ Upgrade the insulation levels in the walls and the floor (if kitchen or bathroom is on the ground floor) and the roof if it is single storey.
- ✓ It is advisable to have some form of mechanical ventilation in kitchens and bathrooms which are automatically triggered by high levels of humidity.
- ✓ Choose energy efficient cookers, refrigerators, freezers, dishwashers and washing machines – look for energy labels to guide your choice.
- ✓ Include space for sorting and storing your waste and for recycling/composting bins when designing your kitchen layout.

Ways to make your home comfortable and safe

- ✓ Choose water efficient taps, showerheads, appliances and dual-flush toilets.
- ✓ Install a shower in your bathroom as a more energy and water efficient alternative to a bath but avoid energy-hungry power showers.
- ✓ Consider installing non-return valves on mains drains and other measures to stop flood water entering your home.
- ✓ For ground floor kitchens and bathrooms, if you live in a flood risk area, choose stainless steel or plastic cabinets in preference to chipboard or wood.
- ✓ Consider ceramic or vinyl flooring materials and raise white appliances and all electrical services above potential flood levels.

Checklist

- M1 Roof insulation 22
- M3 Wall insulation – solid walls 24
- M4 Floor insulation 25
- M5 Draught-stripping 26

- M14 Lighting 35
- M15 Appliances 36

- M16 Cooling and ventilation 37
- M18 Water saving 39
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8 Replacing your roof

This project is a key opportunity for upgrading the insulation levels in the roof. This is particularly important for flat roofs or 'rooms in the roof' where there is no access to the roof space. Remember that while you have scaffolding up for this project you might consider installing other measures such as solar energy.

Ways to cut carbon emissions and save on fuel bills

- ✓ Upgrade the insulation levels in the roof and consider going beyond the levels specified by the current Building Regulations. (i.e. 300mm depth is optimum)
- ✓ Consider installing solar energy such as solar water heating or solar PV panels or tiles to generate electricity.
- ✓ Consider installing skylights or sunpipes to give more natural daylight in the rooms below the roof.

Ways to make your home comfortable and safe

- ✓ If you are replacing a flat roof or one with a shallow pitch, consider the possibility of creating a 'green' or planted roof.
- ✓ Make use of the rainwater falling on the roof by collecting it in a water butt or rainwater recycling system. You can use this water to water the garden.
- ✓ If you live in an exposed position, seek advice about the most wind resistant shape and materials for your new roof.
- ✓ Consider if there is a need to increase the capacity of gutters to deal with heavy rainfall.

Checklist

M1 Roof insulation 22

M6 Double and triple glazing 27

M10 Solar water heating 31

M13 Electricity from sun and wind 34

M17 Drainage, surfacing and green roofs 38

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9 Upgrading your windows

Windows allow the sun's light and warmth into your home. Skylights are particularly effective at bringing daylight inside which will save on electric lighting. Remember there will be times when you will need to reduce the sunlight entering your home to keep cool. Heat passes easily through single glazed windows so it is important to upgrade this type of window. All new glazing should be at least double or triple glazed. Timber window frames are the most environmentally friendly choice. However if your existing frames are still in sound condition it may be more cost-effective to apply secondary glazing and draught-stripping than to completely replace the frames. This can also be a good option on listed buildings and in conservation areas where you may not be allowed to change the style of the frames.

Ways to cut carbon emissions and save on fuel bills

- ✓ Consider if it is possible to apply secondary glazing and draught-stripping to your existing windows frames.
- ✓ If not, consider the various options for replacement with new high-performance double or triple glazing.

Ways to make your home comfortable and safe

- ✓ Choose windows frames with trickle vents that allow you to ventilate your home at night during hot weather without compromising the security of your home.
- ✓ If you live in a flood risk area, do not choose wooden window frames for ground floor rooms.
- ✓ Particularly on south-facing windows, consider how to reduce strong sunlight entering your house in hot weather by the use of shutters, blinds or awnings.

Checklist

- M5 Draught-stripping 26
- M6 Double and triple glazing 27

- M16 Cooling and ventilation 37

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10 Re-rendering your walls

Rendered finishes on walls come in a variety of forms, such as 'pebbledash' or a smooth sand/cement render which is often finished with coloured masonry paint. These need to be replaced when they become cracked in order to stop water getting in. Rendered walls are common on homes that have solid walls with no cavity. There is considerable heat loss through uninsulated solid walls. It is possible to substantially reduce this heat loss by adding external insulation in special finishes. For houses with solid walls, this should be a top priority measure which will substantially reduce your fuel bills and CO₂ emissions.

Ways to cut carbon emissions and save on fuel bills

- ✓ If you live in a home with solid walls, using external wall insulation as an alternative to conventional render.
- ✓ If you are thinking of replacing your windows, do this before re-rendering, as the external insulation or conventional render will butt up against the window frames.

Ways to make your home comfortable and safe

- ✓ Remember that improving insulation will keep your home warm in winter but will also keep it cool in summer.
- ✓ Choosing a pale coloured finish will also help to keep your home cool in hot weather.
- ✓ If you live in a flood risk area, you may want to consider the range of measures to stop flood water entering your home prior to re-rendering.

Checklist

M3 Wall insulation – solid walls 24

M6 Double and triple glazing 27

M16 Cooling and ventilation 37

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Measures



1 Roof insulation

Roof insulation can reduce heating costs by up to 20%, (or more if there is no existing insulation), with a significant CO₂ saving through better energy efficiency. Particularly if your walls are not insulated, loft insulation is generally the most cost-effective insulation to install.



Using insulation quilts or loose fill material the best depth for loft insulation is between 250-300mm (with no real benefit of using more than this). Insulation quilts are laid both between and over the joists and so also reduce the amount of heat conducted through the timber joists. Insulation quilts can be made of mineral wool but more environmentally friendly options include sheep's wool, hemp, jute or recycled denim jeans! Loose fill material made from recycled newspaper is available but needs professional installation.

Cost: **Medium** Skill: **Competent DIY / professional**



Call in a specialist roofing contractor to insulate a flat roof with insulation laid either between the roof deck and waterproof covering (using polyurethane, polystyrene or high density mineral wool), or on top of the waterproof covering (using extruded polystyrene and polyurethane). Cork board is a more sustainable and renewable alternative to foamed plastics.

Cost: **Medium** Skill: **Professional**



Consider replacing a flat roof where the waterproof covering is beginning to fail (their lifespan is usually 15 – 20 years depending on materials used) with a pitched roof with more insulation.

Cost: **High** Skill: **Professional**



Insulate the rafters of the roof either from the inside or from the outside (this is called Sarking insulation). Ceiling joists can be hung from the rafters to give the required depth for insulation.

Cost: **High** Skill: **Professional**

Safety: Roofing work should be carried out by a roofing professional / Loose fill materials should only be installed by a specialist National Insulation Association contractor, go to: www.nationalinsulationassociation.org.uk or phone **01525 383313** / Ensure that any water tanks and piping in attics are also insulated to avoid freezing and burst pipes.

2 Wall insulation cavity walls

A poorly insulated home can lose up to 25% of its heat from the walls. You can tell whether your house has cavity walls because bricks or stones will generally be placed lengthways in the wall. Most cavity walls can be filled with insulation, significantly reducing this loss of heat, and as a result saving you substantial amounts on heating bills, as well as reducing the amount of CO₂ emitted from heating your house. Installing cavity wall insulation could mean that a smaller boiler or heating system could be installed next time it is replaced. Check for and remedy any damp problems before work begins. It is recommended that cavities of less than 50mm should not normally be filled and you should consider options listed under Measure 3 Wall Insulation – solid walls.



Install cavity wall insulation using a proven system and installer. The National Insulation Association holds a register of cavity wall systems and installers, go to: www.nationalinsulationassociation.org.uk or phone **01525 383313**.

Cost: **Medium** Skill: **Professional**

Safety: Cavity wall insulation should be installed by a specialist contractor who can provide a Cavity Insulation Guarantee Agency (CIGA) guarantee, or a manufacturers guarantee for injected polyurethane.



3 Wall insulation solid walls

A poorly insulated home can lose up to 25% of its heat through the walls. Solid walls lose even more heat than cavity walls, often more than double that of an un-insulated cavity wall. Most pre-1930's houses have solid walls, with bricks or stones generally laid head-on and lengthways. Solid walls can be insulated on the inside or outside of the wall. It should be a top priority for cutting both fuel bills and CO₂ emissions.



Install internal solid wall insulation, using insulated studwork, rigid insulation board, combined dry-lining methods or flexible thermal linings. These methods are cheaper than external insulation and there is no disruption to the outside of the house. Internal insulation is particularly useful for houses only heated in the mornings and evenings as the wall surfaces warm up quickly. However, installation is more disruptive and room size will be reduced. Skirting boards, door frames and electrical fittings all need to be re-positioned following installation.

Cost: **Medium** Skill: **Competent DIY**



Install external solid wall insulation, where the walls are sound or can be made so. Insulation can either be a wet-render system or a dry-cladding system which may give a better appearance. Disruption is minimised because work is carried out outside the house, and room sizes are not compromised. However, costs can be high unless work is undertaken alongside remedial work, and the external disruption is significant.

Cost: **High** Skill: **Professional**

Safety: External insulation must be installed by a professional. The Insulated Render and Cladding Association (INCA) holds a register of proven systems and installers, go to: www.inca-ltd.org.uk or phone 01428 654011.

4 Floor insulation

Poorly insulated floors lose heat, especially around the perimeters, at the joint between the skirting boards and floor and between floor boards. This increases heating bills, makes floors uncomfortable and draughty and increases the CO₂ emissions from heating your home.



Insulate timber floors using mineral or sheep's wool quilts (100mm or more), rigid insulation boards or blown insulation. This work is most cost effective if undertaken when floorboards are already being lifted for other work.

Cost: **Low** Skill: **Competent DIY**



Insulate solid floors from above using polystyrene, polyurethane, phenolic foam, or cork with chipboard or another finish placed on top. A downside of this method could be that it will raise the floor level.

Cost: **Low** Skill: **Competent DIY**



Underlay under carpets or laminate flooring, though less effective than the options given above, will reduce heat loss through your floor and should be considered if the other options are impractical.

Cost: **Low** Skill: **Simple DIY**

Safety: Be careful not to seal or block under floor air bricks as joists and floorboards will rot without air circulation.

5 Draught-stripping

This is one of the simplest and cheapest ways to reduce your CO₂ emissions and your fuel bills. Most homes and particularly older Victorian properties can have gaps caused by poorly fitting windows and doors but don't forget that draughts also get in through gaps in the floorboards, between floors and skirting boards, through your loft hatch, and through your letter box. Modern double-glazing in new frames has integral draught-stripping making any additional work unnecessary.



Draught-stripping existing doors and windows.

Kits are available at most DIY stores and can be attached with pins or are self adhesive.

Cost: **Low** Skill: **Simple DIY**



Fill the gaps between wooden floorboards and skirting boards with a tube sealant or install a layer of hardboard under carpets or lino.

Cost: **Low** Skill: **Simple DIY**



Letter box draught excluder fitted on the inside of your letter box.

Cost: **Low** Skill: **Simple DIY**

Safety: Do not cover up air bricks or vents in rooms with wood stoves, gas fires or open fires as adequate ventilation is essential for good combustion and for preventing the formation of poisonous carbon monoxide gas.

6 Double and triple glazing

Installing modern double or triple glazing will cut the heat lost through your windows and new frames will have integral draught-proofing. It is an expensive measure and you may wish to consider the cheaper (but less effective) option of secondary glazing. The most environmentally friendly option for new frames is high quality wood. Frames can also be made of aluminium or PVC. PVC windows are common but their benefits are often exaggerated and they are made from a polluting material. British Fenestration Rating Council (BFRC) Window Energy Rating gives a rating of A-G for different types of window – look for these labels and choose windows with a rating of C or above.



Triple glazing and gas filled double glazing are the options that provide the greatest level of insulation. You should bear in mind that triple glazing is heavy and so frames need to be stronger and rebates deeper. Gas filled double glazing is less effective but lighter in weight. The very best gas filled glazing uses Xenon gas in the gap between the panes but Argon gas is more common.

Cost: **High** Skill: **Professional**



Low-E coating can be included on triple or double glazing and is a special layer added to the inner pane to help reflect radiant heat back into the room. So glazing that includes this will perform even better and reduce heat losses even more.

Cost: **High** Skill: **Professional**



Secondary glazing and draught-stripping is the cheap alternative to new double glazing and is particularly useful for sound insulation. You can obtain kits from DIY stores, which usually comprise of sheets of clear plastic and some means of fastening this to the inside of existing window frames. Some fastenings allow easy removal for cleaning. There are more expensive systems that use glass in metal frames. A very cheap form of secondary glazing is a film plastic which is applied with a hair drier, but this has a limited life.

Cost: **Low** Skill: **Competent DIY**

Safety: Ensure that vents in windows providing ventilation to wood stoves, gas fires or open fires are retained as they are essential for good combustion and preventing the formation of poisonous carbon monoxide gas.

7 Pipe and tank insulation

The simple step of insulating your hot water pipes and your hot water cylinder can be one of the most cost-effective measures you can take to reduce your fuel bill and CO₂ emissions. It will also reduce over-heating in your home in the summer. New hot-water cylinders come already covered in foam insulation but many older ones only have a thin layer of insulation or no insulation at all.



Insulated cylinder jacket. Any cylinder with less than 80mm of insulation would benefit from an additional jacket. These are available at most DIY stores for a few pounds. Ensure that the jacket is fitted snugly round the cylinder with no gaps.

Cost: **Low** Skill: **Simple DIY**



Insulate pipes. The most important pipes to insulate are those carrying hot water from your hot water cylinder to your taps and between your boiler and the hot water cylinder. You can buy foam pipe insulation from DIY stores.

Cost: **Low** Skill: **Simple DIY**

Safety: Take care working on hot pipes – wear protective gloves.



8 Conventional fuel heating systems

The majority of Welsh homes are heated with natural gas which if used to fuel a condensing boiler or condensing combination boiler will provide heat and hot water with relatively low carbon emissions. If you want to reduce your reliance on fossil fuels or if you live where there is no gas supply and are currently using oil, bottled gas or LPG, energy efficient condensing boilers are available but you might want to also consider alternative technologies (see Measure 9 and 11). If you are currently using solid fuel (coal, coke and other smokeless fuels) or electric heating you would be strongly advised to consider alternatives which offer lower carbon emissions.



Condensing boilers have now become the standard boiler, cutting heating bills and resulting CO₂ by up to a third when replacing an old non-condensing boiler. They will deliver space heating through radiators or under-floor heating and hot water which is stored in a hot water cylinder.

Cost: **High** Skill: **Professional**



Condensing combination boiler is also a very efficient type of boiler providing space heating through radiators or under-floor heating. The main difference is that water is heated instantly and delivered directly to your taps without any hot water cylinder. The 'combi' boiler is particularly suitable for smaller houses and flats where space is limited.

Cost: **High** Skill: **Professional**

Safety: Gas boilers must be installed by a CORGI accredited contractor.

9 Ground source heat pumps and Micro CHP

These are new technologies that are now becoming available for space and water heating as alternatives to conventional electric, gas, oil and solid fuelled central heating systems. Both technologies function with low carbon emissions.



Ground source heat pumps use the useful amounts of heat which are available 2-3 metres deep in the ground. An electrically powered pump is used to transfer this into heat for use in the home. Systems typically produce 3 units of heat for every unit of electricity used to power the pump. The heat is extracted from the ground by means of a network of pipes under the surface of the ground or a deep bore hole. This is a technology best suited to homes with no gas supply, typically with a large garden and/or in a rural location.

Cost: **High** Skill: **Professional**



Micro CHP (Combined Heat and Power) usually powered by gas and about the size of small domestic refrigerator, these units provide space heating and hot water just like an ordinary central heating boiler. But in addition they generate electricity and it is possible sell any surplus electricity back to the grid and so reduce your electricity bills. Micro CHP is most useful in small well insulated homes with modest heat requirements. Newer technologies include Fuel Cell CHP which uses hydrogen energy.

Cost: **High** Skill: **Professional**

Safety: Gas boilers must be installed by a CORGI accredited contractor.

10 Solar water heating

Solar water heating uses the sun to heat water for the home. It is a renewable technology that is usually used to supplement your current central heating system. A solar water collector will pre-heat the water, with a conventional boiler bringing it up to the required temperature if necessary. Some central heating boilers, such as combi-boilers, are unsuitable for use alongside solar water heating. Using solar energy to heat your water may involve having an extra hot water cylinder or replacing your existing one – this requires space. Sometimes it just requires a second coil in your existing cylinder. You need a southerly facing roof to mount the collector. Solar collectors will function even in cloudy conditions but the brighter the sun the more heat is collected. There are two main forms of collector to choose from:



Evacuated tube collectors are the high tech option. They will heat up more quickly than a flat plate collector making better use of short bursts of bright light or sunshine. They are a series of glass vacuum tubes that contain metal strips which collect the heat. They are more efficient than flat plate collectors and can provide up to 60% of your annual hot water requirements. They are also more fragile.

Cost: **High** Skill: **Competent DIY / Professional**



Flat plate collectors are simpler technology and might be likened to having a black painted radiator in an insulated glazed box. The water in the radiator (collector) is heated by the sun and the heat is transferred to your hot water system. Modern flat plate collectors make use of specialist glazing materials and high performance heat absorbing coatings on the collectors.

Cost: **High** Skill: **Competent DIY / Professional**

Safety: You should not undertake a DIY installation without the use of scaffolding.

11 Heating with wood

Wood is a good choice in rural areas where there is no gas supply. Wood needs to come from a sustainable source, where trees are planted to replace those that are cut down, to be considered as a carbon neutral fuel. There is a choice between burning logwood chips or pellets. Burning logwood requires you to manually feed the stove or range. There are now a number of stoves and boilers available that burn chips or pellets and have automated feeds, making them much more like a conventional oil or gas central heating boiler. You do need to be near a wood pellet supplier to use this option. Using wood does require a dry, covered fuel store of sufficient size to accommodate this bulky fuel. Options for heating from wood include:



Wood Chip or Pellet boilers have automatic feed and control, allowing efficient operation for extended periods. They provide central heating and hot water. They represent the most energy efficient means of using wood fuel.

Cost: **High** Skill: **Professional**



Log boilers have automatic control and operation but need refills every 12 hours. They provide central heating and hot water. They are slightly less efficient than a pellet boiler.

Cost: **High** Skill: **Professional**



Log stoves require manual feeding and in their most basic form heat just one room. There are models that have back boilers enabling the stove to heat water and perhaps a few radiators.

Cost: **High** Skill: **Competent DIY / Professional**



Ranges usually require manual feeding with logwood. They have a hob and oven for cooking and often a back boiler to heat water and radiators.

Cost: **High** Skill: **Professional**



Open log fires, though attractive, are a very inefficient way to burn wood, with most of the heat going up the chimney. They are not recommended as a way of cutting carbon emissions.

Safety: Some wood fuel appliances have very hot exposed surfaces which may mean they are unsuitable for installation in homes with young children.

12 Temperature and heating controls

It is essential that there are good temperature and heating controls on your central heating system if you want to cut your fuel bills and CO₂ emissions. Having temperature and heating controls will enable you to heat your home only when necessary and to keep it at a comfortable temperature and not become over heated. The following controls and thermostats are appropriate for use with a standard central heating system comprising of a boiler with radiators.



Digital Programmers allow you to set the periods when heating and hot water is required. Modern digital programmers allow you to set timings over a whole week with different settings for each day.

Cost: **Medium** Skill: **Professional**



Zone control programmers perform the same function as standard programmers but allow you to have separate settings for different zones in your home. This is particularly useful in large houses where different parts of the house are in use at different times.

Cost: **Medium** Skill: **Professional**



Room thermostat turns your boiler and heating pump off when the room in which it is sited has reached the required temperature. You would normally have the thermostat in the living room or hallway. If you have a zone control programmer you might have more than one thermostat. Remember that turning the thermostat down by 1°C can reduce your heating bill by up to 10%.

Cost: **Medium** Skill: **Professional**



Thermostatic radiator valves (TRVs) can be fitted to radiators in rooms where there is no room thermostat. They will reduce the flow of hot water to the radiator when it has reached the required temperature. TRVs are useful in bedrooms where you might want a different temperature to living rooms.

Cost: **Low** Skill: **Competent DIY/Professional**

Safety: Programmers and thermostats should be installed by competent heating engineer.

13 Electricity from sun and wind

Electricity can be generated using free, renewable energy in the form of sunlight and wind but should only be considered after you have done all you can to improve the energy efficiency of your home. Small-scale wind turbines are suitable in rural, windy locations particularly where there is no mains electricity supply. For most of us living in built-up areas a far better choice for generating our own electricity is to use photovoltaic (PV) technology. With either wind or solar technology, it is very likely that the times when you need electricity will not always match the times when you are generating electricity, so electricity from the grid could still be needed to top-up up your supply. There will also be times when you produce a surplus of electricity and it should be possible to sell this back to the grid.



Roof mounted PV panel array. Using the most efficient type of PV cells (monocrystalline) you would need an array of about 8 square metres on a southerly facing roof to produce a third of the total electricity requirements of a small house. You will also need an inverter to convert the low voltage direct current from the PV cells to mains voltage alternating current for use in your home.

Cost: **High** Skill: **Competent DIY / Professional**



Solar roof tiles are where PV cells have been moulded into the shape of a roof tile enabling you to create an array by linking a large number of solar tiles together. They would look more like an ordinary roof and are a good choice if you are renewing your roof. They also require an inverter and control equipment.

Cost: **High** Skill: **Competent DIY / Professional**



Small 2.5kW wind turbine on a windy site, unobstructed by trees and other buildings would produce electricity equivalent to an average household's consumption. As with PV, an inverter and control equipment is required.

Cost: **High** Skill: **Competent DIY / Professional**

Safety: You should not undertake a DIY installation of wind or PV on your roof without the use of scaffolding. Wind turbines can be attached to a house but may cause vibration and potential damage in high winds. It is often preferable to mount them on a mast.

14 Lighting

Though the savings that can be achieved by each energy efficient bulb are small, if you replace most of your old bulbs the savings will stack up and if everyone does the same the national savings are very large. It is one of the easiest and cheapest ways to cut your CO₂ emissions. Make the most of natural daylight by putting desks and worktops where there is good access to daylight. But when you do need artificial light the main choices are:



LED lighting (light emitting diode) is the new ultra low energy form of lighting. LEDs are a more expensive lighting option to install but this is balanced by the fact that you don't have to replace any bulbs. LEDs are particularly good for directional lighting providing instant even white light.

Cost: **Low** Skill: **Competent DIY or Professional**



Strip fluorescent lighting is particularly good for illuminating working areas such as kitchens, a home office or a garage. The reflective fittings for the fluorescent tubes are integral to their efficiency.

Cost: **Low** Skill: **Competent DIY or Professional**



Compact fluorescent light bulbs are now the standard form of lighting and are available in a very wide range of sizes and light outputs. Many cannot be used with dimmer switches but are a good all round choice of low energy lighting and fit into standard light fittings.

Cost: **Low** Skill: **Competent DIY or Professional**



Halogen lighting is useful for spot lights and directional lights or where you want to use a dimmer switch. They are only a small improvement on old tungsten light bulbs.

Cost: **Low** Skill: **Competent DIY or Professional**



Tungsten bulbs will shortly cease to be sold. This is because they are very inefficient producing a great deal of unwanted heat as well as light. Any of the options given above are a better choice for lighting.

Safety: Some forms of lighting (e.g. strip fluorescent lighting) require direct wiring into your household supply and such works should only be undertaken by a qualified electrician.

15 Appliances

Appliances now account for a significant part of the electricity consumption in our homes. It is becoming much easier to identify energy efficient appliances in the showroom as most now carry a European energy label giving each appliance a rating from G to A for the most energy efficient (and now A+ and A++ for fridges and freezers) and specific information relevant to the type of appliance. You should choose an A rated appliance wherever possible in order to cut your fuel bills and CO₂ emissions. You should also look out for the 'Energy Saving Recommended' label which you will find on appliances of proven energy efficiency.



Fridges and freezers – as well as buying the most energy efficient model you can afford also consider the size you need. Don't buy a model larger than you really need as this will use more electricity than a smaller model. In planning your kitchen make sure you site your fridge/freezer away from heat sources like radiators and cookers.

Cost: **High** Skill: **Simple DIY**



Dishwashers and washing machines – as well as buying the most energy efficient model you can afford also consider water consumption. Choose dishwashers and washing machines that have low water consumption – if you are on a water meter this will save on your water bills and conserve our water resources.

Cost: **High** Skill: **Simple DIY**



Kettles are one of the most heavily used appliances in the home. Look for one with the 'Energy Saving Recommended' label. Choose one that has a gauge on the side allowing you to see how much water you are boiling. Remember to only heat up the amount of water you need.

Cost: **Low** Skill: **Simple DIY**



16 Cooling and ventilation

We are likely to experience an increasing frequency of very hot days during the summer when your home could become uncomfortably hot. Open windows during the evening or night to help keep your home cool and ventilated, but close them during the day to keep the heat out. Improving insulation will keep you cooler in summer. Even in winter it is necessary to ventilate your home to remove damp air from kitchens and bathrooms. To maintain comfortable temperatures and air circulation you could:



Install reflective blinds, awnings and shutters, on unshaded skylights and roof glazing to provide shade from the sun.

Cost: **Low/Medium** Skill: **Competent DIY**



Replace decorations with heat and light-reflecting materials. Replace carpets with wooden floors or tiles and paint walls and external walls with light-coloured paint to reflect light. Blinds and curtains should have white or reflective outer surfaces.

Cost: **Medium** Skill: **Competent DIY**



Install vents and extractor fans. Vents are cheap to install and don't require maintenance. Low-wattage extractor fans should be fitted in kitchens and bathrooms with humidistat controls (which will turn on when the air becomes humid). More sophisticated heat-recovery ventilators will help to keep your bathrooms airy but retain the warmth.

Cost: **Low/Medium** Skill: **Competent DIY/Professional**



Install passive stack ventilation (PSV) to provide greater control of temperatures and air flow throughout your house. Ducts bring fresh air in and remove moist air without noisy extractor fans. PSV is relatively simple to install but most suited to whole-house refurbishments or extensions.

Cost: **Medium** Skill: **Competent DIY/Professional**



Use plants and water to cool your home and garden.

Trees and plants can provide shade in the garden and reduce glare through windows. Houseplants, particularly leafy varieties help to oxygenate rooms.

Cost: **Low/Medium** Skill: **Simple DIY**

Safety: Extractor fans should not be fitted in rooms with open-flued heating appliances but there should be air bricks or window vents.

17 Drainage, surfaces and green roofs

More frequent and heavy rainfall will put pressure on your drains and increase the risk of flooding in your area. Help protect your own home and your wider community from flooding by maintaining and creating opportunities for water to drain into the ground, and ensuring good capacity of your drains. You can take basic measures to:



Slow down water drainage into the ground by using porous materials or open structures such as gravel on driveways and in the garden. Increase the coverage of trees and plants to help store water. Also ensure that surface water flows away from your house.

Cost: **Low to Medium** Skill: **Competent DIY**



Install a green roof to help reduce rainwater run-off from your roof and slow the passage of water into the drainage system. A green or planted roof is covered by turf or low growing plants (see also Measure 19 Planting) providing an additional green space on flat or low pitch roofs.

Cost: **High** Skill: **Competent DIY / Professional**



Make your drains big enough to cope with increased rainfall and flooding events by ensuring gutters and drains are of sufficient size and are always kept clear of leaves and debris.

Cost: **Low to Medium** Skill: **Simple DIY / Competent DIY**



Prevent back up of water by installing anti-backflow valves on drain outlet pipes of washing machines and dishwashers, one-way gate valves or stop valves on drainage systems, and an anti-siphon toilet or inflatable bladders with integral pumps in toilets to divert back-up water.

Cost: **Low to Medium** Skill: **Simple DIY**



Improve the soil's ability to drain away water with gravel and organic matter.

Cost: **Medium** Skill: **Simple DIY**

Safety: Do not use your toilet, bath, sinks or washing machine if an anti-backflow valve closes, as your property will be disconnected from the sewer. / Sealant should never be put down waste outlets to prevent backflow as this may block the drain. / When fitting pipe closers and valves the manufacturers guidelines should always be followed.

18 Water saving

Saving water helps tackle climate change by reducing the energy used in the treatment and transfer of water to our homes, whilst also reducing our water bills. There is an increased potential for times of water shortages as a result of climate change, making water saving measures all the more important. Use less water when washing yourself, your clothes, dishes and car and watering plants in the garden. Buy water efficient appliances (see also Measure 15 Appliances). You can also:



Fit water efficient devices to reduce water used. More efficient shower heads and low or dual-flush toilets can use a third less water. Fitting low flow taps in your bathroom or kitchen is cheap and simple to do, and can save around £10-15 per year on your water bill.

Cost: Low to Medium **Skill:** Competent DIY



Harvest rainwater from roofs to flush toilets, water gardens and feed washing machines. Purchase a water butt at low cost from some councils and water companies. More complex systems require installation of a storage tank and ultra violet (UV) systems to improve water quality.

Cost: Low to High **Skill:** Competent DIY / Professional



Reuse grey water from your showers, baths and wash basins by collecting it in a tank and using it to flush toilets, water your garden and for washing machines. Systems can reduce your water use and bills, but can be costly to install and maintain and use chemicals to stop the growth of bacteria.

Cost: High **Skill:** Professional

Safety: Water-efficient shower heads should not be fitted to electric showers as this can lead to overheating of the water. / Electrical appliances should be fitted by a qualified electrician and plumber. / Care must be taken when installing grey water recycling systems to ensure no cross-contamination of mains water. Further guidance is available at the Water Regulations Advisory Scheme (WRAS): www.wras.co.uk

19 Flooding and storm protection

The average cost of damage to homes that have been flooded is £30,000, and around 5 million people in 2 million properties live in flood risk areas in Wales and England. Check if you are at risk from flooding by visiting www.environment-agency.gov.uk/subjects/flood, register with the Agency's flood warning scheme, and store valuables and paperwork upstairs. Protect your home in one or two stages: first take measures to minimise damage to your home and second, it may be worth thoroughly sealing your home to keep the water out.

Stage 1 Minimise damage



Minimise the use of, or protect materials which would be damaged by flood water by using water-resistant paint for the lower portions of internal walls, using dry-bags to protect soft furnishings, fitting rising hinges so that doors can be removed, use steel or plastic kitchens rather than chipboard ones and replacing carpets with vinyl, ceramic tiles and rugs.

Cost: **Low to high** Skill: **Simple DIY**



Relocate electrical systems and equipment above a possible flood level, including raising electrical points with wiring from above, boilers, meters and white goods.

Cost: **Medium** Skill: **Professional**



Check the condition of your roof regularly and call a qualified roofer for necessary repairs to damaged or missing tiles. Keep overhangs of eaves and gable ends short, check condition of rafters and use steel straps on rafters in exposed areas.

Cost: **High** Skill: **Professional**

Stage 2 Keep the water out

Keeping water out of a home can be extremely difficult and a very thorough job needs to be done, otherwise your actions could make the situation worse rather than better. Consult a professional before taking these measures:



Seal entry points for water using drainage bungs for drains, sinks and toilets, weighing down manhole covers, installing air brick covers and sealing gaps around pipe and cable entries, and fitting non-return valves on mains drains. Installing demountable door guards and raising door thresholds will prevent water coming in.

Cost: **Low to Medium** Skill: **Competent DIY/Professional**



Repair damaged mortar on external walls and consider other measures to seal the walls such as applying waterproof render to walls and installing waterproof membranes.

Cost: High **Skill:** Competent DIY / Professional

Safety: Professional advice should always be sought when taking measures to keep water out of a house.

Note: If you are installing flood protection measures as part of the restoration costs following a flood, your insurance company may expect you to pay the extra cost of the alterations. But the extra cost should be offset by lower future claims and lower premiums.



20 Planting

Climate change will mean higher temperatures which will be worsened by a reduced rainfall potential in summer and drought conditions. Careful choice of plants can help to make our homes and environment more comfortable and safe by providing shading. Longer growing seasons, drought conditions in summer, and an increased risk of flood episodes means that planting choices may change.



Choose plants, especially trees which will provide shade both inside and outside. Deciduous trees provide shade in the summer whilst allowing light through in the winter. Trees and hedges, chosen and sited well, can help protect your property from storms.

Cost: Low to medium **Skill:** Simple DIY



Install a water butt. Your roof collects about 85,000 litres of rain each year which could fill 450 water butts with free water for plant watering. Establish a watering system from your water butt to water early or late in the day.

Cost: Low **Skill:** Simple DIY



Choose drought tolerant species of trees, shrubs and hedges which require less water. Enjoy growing fruits such as grapevines, apricots and figs.

Cost: Low **Skill:** Simple DIY



Install a green roof to help keep your house cool in summer, warm in winter and to reduce rainfall run-off from your roof. Green roofs can use ordinary turf or a drought-resistant, shallow-rooted species such as sedum. A wide range of other non-sedum species can be used such as Sheep's Fescue, Festuca ovina, and Hens and Chicks Jovibarba species.

Cost: High **Skill:** Professional

Safety: Make ponds and water features safe by checking them regularly, supervising young children in the garden and using a mesh or a grille to create a secure cover.

Household and building waste

The waste we produce contributes significantly to climate change, through the production of both methane and CO₂ which are both greenhouse gases. This is the result of the breakdown of biodegradable material such as kitchen and garden waste, and wood which is often thrown away as a result of construction work. The breakdown of plastic products derived from fossil fuels releases carbon when they degrade, as well as transport, storage, treatment and disposal of waste which all also emit greenhouse gases.

Reduce your waste. Reducing these emissions should always start with reducing the amount of waste produced. This means thinking twice before making purchases, only buying the amount actually needed, and choosing goods which use less packaging. The next options are reuse and then recycling of waste.

Reuse construction materials during renovation wherever possible, or buy already used or recycled materials. Recycled plastics for garden construction projects are now on the market and there is a very active trade in reused and scrap yard materials.

Carefully consider how you dispose of construction materials.

There is a thriving market for reused materials and local scrap yards and reclamation companies may be interested purchasing materials. You could give the materials away through schemes such as Freecycle, go to: www.freecycle.org. If you do need to throw items away, always separate them at the local waste disposal site rather than simply throwing it in a skip. Find out about your local disposal site from your local authority.

Separate your garden and kitchen waste and use a compost bin or wormery in your garden as methane produced as a result of land filling biodegradable waste accounts for about 2% of the UK total greenhouse gas emissions.

Help separate your other household waste, to ease reuse and recycling, by installing recycling bins in the kitchen for paper, cans, bottles and plastics. Contact your local authority waste department to find out what else can be reused and recycled locally.

Safety: When disposing of materials always do so at a waste disposal site run by your local authority. It is against the law to fly tip.

Sources of further information

Energy Saving Trust

Provides impartial advice on energy saving and reducing carbon emissions on its website at: www.energysavingtrust.org.uk where you can download leaflets and information about many of the measures described in this guide.

The Energy Saving Trust advice centre provides free and impartial advice as well as having information on the financial support available in your area.

Phone 0800 512 012

Energy Saving Wales

This Energy Saving Wales portal website provides links to publicly funded organisations that offer energy information, advice and support to householders, public sector and business.

www.energysavingwales.org.uk

Solar Clubs

There are five Solar Clubs covering the whole of Wales that provide support to people wanting to do DIY installations of solar hot water systems.

www.ecodyfi.org.uk/energy/dyfisolarclwb.htm

Centre for Alternative Technology (CAT)

Based in Machynlleth, Powys, CAT has full scale demonstrations of all the technologies described in this guide and much more with a bookshop carrying an extensive stock of useful publications. CAT also publishes its own information leaflets and booklets. www.cat.org.uk

Environment Agency

Is the national government agency with responsibilities that include water resources and flood protection. Provides information on what to do in a water shortage and how to save water:

www.environment-agency.gov.uk/subjects/waterres

Also provides information about risk from flooding and flood protection:

www.environment-agency.gov.uk/subjects/flood

Call the Flood Line on 0845 988 1188

Royal Horticultural Society

Has undertaken extensive research into the impacts of climate change on our gardens and has made available general advice to gardeners.

www.rhs.org.uk/research/climate_change

Waste Awareness Wales

Provides advice about managing materials and resources more sustainably, and reducing waste. www.wasteawarenesswales.org.uk

Funding

The easiest way to find out about funding support for energy efficiency measures and small-scale use of renewable energy is to phone the Energy Saving Trust advice centre on **0800 512 012**. They can provide information about all of the funding sources available in your area including those listed below.

Local authorities

Most councils have programmes supporting energy efficiency improvements in local housing. [Contact your council for details.](#)

Home Energy Efficiency Scheme (Wales)

This Assembly Government funded scheme offers support for people who are on low incomes or who are pensioners to improve the energy efficiency of their homes. [Free phone 0800 316 2815](#) or go to: www.heeswales.co.uk

Electricity and Gas Supply Companies

All energy suppliers have a statutory obligation to reduce carbon emissions by investing in measures in customers' homes. You will need to contact your energy supplier to find out details of what support they are offering. It could include support for any of the measures detailed in this guide. [You should find an energy efficiency advice telephone number on your electricity/gas bill.](#)

Low Carbon Buildings Programme

Householders can apply for grants of up to £2,500 per property towards the cost of installing a certified product by a certified installer. Technologies eligible for funding include:

- Solar photovoltaics
- Wind turbines
- Small scale hydro-electric
- Solar hot water
- Ground source heat pumps
- Wood stoves and boilers

www.lowcarbonbuildings.org.uk/how/householders

Water Companies

All water companies are encouraging their customers to conserve water and provide cheap offers on water butts and other water saving devices. [Look out for the leaflets that come with your water rates bill or phone your water company's customer service number \(which will be on your bill\) or go to: \[www.water.org.uk/home/resources-and-links/links/water-operators\]\(http://www.water.org.uk/home/resources-and-links/links/water-operators\)](#)

Glossary

Air brick Special brick with holes allowing air to pass through to provide ventilation. Commonly used in rooms with gas or open fires providing essential ventilation to ensure effective burning.

Anti-backflow valve Special valve to ensure water can only flow in one direction through a waste pipe from an appliance thus preventing flood water coming up the pipe.

Anti-siphon toilet Special toilet that allows waste to be discharged but prevents flood water in sewers coming up through the toilet waste pipe.

Boiler The part of a wet central heating system that provides space heating to radiators and hot water to taps.

Cavity wall Standard construction for walls on modern house consisting of two skins of brick or blockwork with a space between them which can be filled with insulation.

Cladding An outer surface on external walls which can be made of wooden planks, plastic or metal sheets. It is possible to have insulation underneath the cladding.

CO₂ Carbon dioxide gas which is produced when carbon based fuels are burnt. It is the most important greenhouse gas.

Combi (or Combination) boiler A boiler that provides space heating and instantaneous hot water and therefore does not require a cylinder to store hot water.

Condensing boiler A highly efficient form of boiler (typically 90% efficient compare to 60% for a conventional boiler) where additional heat is captured by condensing the flue gases.

CORGI Council of Registered Gas Installers – an accreditation scheme for installers.

Deciduous Trees or shrubs that drop their leaves in autumn.

Dual-flush toilet A toilet that can do a short flush or a long flush as required to conserve water.

Green roof Covered with vegetation and soil over a waterproof membrane to keep buildings cool in summer and warm in winter and slow down run-off of water from your roof.

Grey water Water that has been used for washing e.g. bathwater but could be reused for flushing toilets or watering gardens usually after treatment.

Hot-water cylinder A storage tank (that should be insulated) where water is heated and stored before it is used for baths, showers etc.

Humidistat An automatic switch that is sensitive to the level of moisture in the air. It will switch on when the air reaches a certain level of humidity and switch off when humidity drops.

Insulation (thermal) Any material that slows down the passage of heat. Most thermal insulation materials work by trapping pockets of still air.

Joist One of a number of parallel supporting beams used in floors and ceilings.

Mechanical ventilation Ventilation that uses a fan or pump to circulate air (therefore consumes energy).

Mineral wool An insulation material made from inorganic material.

No return valve A valve that can be fitted in drains that can prevent flood water coming up through the drains.

Oxygenate Supply oxygen – oxygen is the gas we need breath to keep our bodies functioning.

Passive stack ventilation A non-mechanical form of ventilation that uses the effect of air passing over a flue or duct to pull stale air out a building.

Permeable surface A surface that allows water to pass through into the ground e.g. loose gravel.

Polystyrene A plastic which when expanded with air into a white solid foam is commonly used for insulation and packaging.

Polyurethane A plastic which when expanded with air into an orange coloured solid foam is commonly used for insulation and as a filler.

Rafter Each of the sloping beams forming the framework of a roof.

Rainwater run-off Rainwater that falls onto hard surfaces and rapidly runs off – in extreme circumstances it exacerbates flooding.

Render A coating on walls commonly made of sand and cement on external surfaces or plaster on internal surfaces.

Secondary glazing Where an additional pane of glass or transparent plastic is added to an existing single glazed window.

Solid wall Old fashioned form of wall construction consisting of a single skin of bricks or masonry.

Trickle vent A small slot vent in the window frame that allows limited ventilation without the need to open a window.

Tungsten bulb An old fashioned standard light bulb which has a filament made of tungsten.

Ultra-violet Light of a particular wave-length which can be used to kill bacteria in water.