



# Trade guide to whole house energy efficient refurbishment

This guide can be used to help you as the building professional to promote and grow the service you provide to clients by including energy performance measures, materials and systems in your refurbishment work.



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## What's in it for me and my business?

Offering your client energy efficient solutions could bring many benefits to your business. Some of the key positive effects from offering these additional services could be:

- Utilising your existing skills and knowledge to offer a wider range of services.
- Developing your business' reputation as informed and skilled in the growing market for home energy efficiency improvements.
- Increased demand for your services and securing a market share in a changing future.
- Investing and developing your employees skills and knowledge, and keeping them interested in your business.
- Offering your client future proof services and projects.
- Linking up with Government schemes like arbed, Nest and the Green Deal.

# 1. The basics

## Why would my clients want to refurbish more sustainably?

Research has shown that disruption to the home and lack of knowledge by home owners as well as cost, are the main barriers to people installing energy efficiency measures in their home. If you are completing a refurbishment project, then in many cases it may be easier than at any other time to secure more work with your clients by explaining the opportunity to add energy efficiency work to their plans.

This also offers you a unique opportunity to expand the value of your business and build a reputation in an area of work that will grow significantly in the future due to Government targets. Clients will often appreciate the opportunity to save money in the long term and be willing to pay you more for this service.

## Benefits to the client:

- **Improved comfort and warmth.**
- **Reduced fuel bills and more money in the pocket each month.**
- **Protection from continuing fuel price rises.**
- **An opportunity to do their bit for the environment.**
- **An investment in the value and desirability of their property.**

So whether you are quoting on or carrying out roofing, central heating, re-plastering or a complete refurbishment, any upgrade work offers an opportunity to make improvements in comfort, reduce bills and contribute to tackling climate change with minimum cost and effort on your client's part. The key is to talk through the options with your client as early as possible in the process.

This guide is full of impartial advice and guidance from the Energy Saving Trust and can be used to help simulate these discussions between you, and your clients.

The Climate Change Act sets out in law that the UK's annual greenhouse gas emissions should be reduced by 80% by 2050. Wales has reduced emissions by 10% since 1990, but there is still a long way to go.

Home energy use is responsible for over a quarter of emissions which contribute to climate change so work in the housing sector will be increasingly critical to achieving the national targets.

# Know the terminology

Just like household appliances, the energy performance of houses is now rated on an A to G scale. The closer your property is to an A, the less it will cost to run and the warmer and more comfortable your home will be.

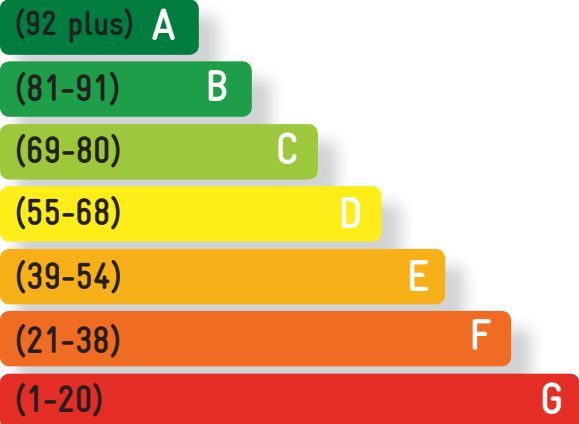
The chart to the right is what appears on an Energy Performance Certificate which all homes now need when sold or rented. By addressing energy performance as part of a refurbishment project, you will be helping to push the property up the scale – making it more desirable to live in.

Windows are also rated on an A to G scale. You should look for a door with a U-value of approximately 1 if it's solid or 1.5 if it's glazed.

**U values** – A U-value describes how much heat will pass through a particular object or surface. The lower the number, the more slowly heat passes through and therefore the better the performance.

**Energy** – Kilowatt hour is a unit of energy and is commonly used by electricity companies to show how much electricity has been consumed. Kilowatt hour is abbreviated to kWh.

If you have used 2 kilowatts of electricity for 5 hours then you will have consumed 10 kWh (2kW x 5hrs = 10kWh).



# Things you should consider as part of any refurb project

## Improving airtightness

Reducing unwanted cold draughts and minimising heat loss can save your clients money on their energy bills and increase the comfort of their home. Airtightness is a frequently overlooked aspect of energy efficiency, but one of the easier measures to carry out. Improving airtightness means installing draught-stripping, sealing gaps in walls and floors, and ensuring that windows and doors fit closely to the surrounding walls.

## 2010 Building Regulations Part L1B requirements

If a living area contains a combustion appliance (boiler or similar) that is not sealed to the room, airtightness works must ensure that adequate ventilation remains. Refer to Part J of the Building Regulations for more information.

## Methods and techniques

The table shows key areas and the places where air leakage can be a problem. Attention to detail is very important because small gaps can have a big impact on performance.

<b>Windows and Doors</b>	<p>Seal gaps around windows and doors to prevent air leakage via the reveals and thresholds.</p> <p>Apply an external mastic seal to all windows and door frames.</p> <p>Seal any internal gaps where the wall reveals/window boards round a window units or external doors with a bead of mastic.</p> <p>Repair any damage to window frames and ensure casements, sashes and top-lights close firmly. It may be necessary to replace closing mechanisms.</p> <p>Apply draught-stripping to gaps around window casements, sashes and top-lights.</p>
<b>Walls</b>	<p>Air leakage behind dry-lining can be reduced by injecting continuous ribbons of expanding polyurethane foam between the plasterboard sheets and the inner leaf blockwork.</p> <p>Make-good damage to mortar joints and fill holes in external walls.</p>
<b>Floor</b>	<p>Improve timber floors by laying hardboard sheeting over the top. Do not use plastic sheeting to cover timber floors as this may cause the timber to rot.</p>
<b>Services</b>	<p>Seal around the edges of the room and make good gaps around service pipes.</p> <p>Seal gaps around any service pipes and cables passing through external walls, ceilings and ground floors.</p>

## Thermal bridging

Thermal bridging (also known as cold bridging) happens when heat is conducted through the fabric of the building by a building material with a poor U-value such as a concrete or steel lintel or a support beam. It often occurs around structural elements that are harder to insulate, such as the junction where the wall meets the floor. Thermal bridging can cause cold spots and mould growth on walls. Eliminating these problems will give clear health benefits and reduce the cost of redecoration due to spoiled paintwork. Tackling thermal bridging will also reduce heating demand.

## Ventilation

Good ventilation can help ensure a healthy internal environment, and protect the property from risk of damp or mould. In the longer term, this should reduce the need for maintenance and help prevent damage caused by damp problems.

- Although extractor fans vary in efficiency, energy costs are likely to be fairly small.
- The main benefit of good ventilation is to protect the building from damp problems which may occur if excessive moisture is not removed.
- Ventilation will help to maintain a healthy indoor environment, as well as reduce redecoration costs due to spoiled paintwork and plaster.

# Ways to improve energy performance

## 1. Fabric upgrades

Attention to detail during installation is extremely important for insulation to perform effectively. Seal any gaps between walls/floors and ensure that any electric cables are fitted before insulation is installed and are rated correctly.

### Loft insulation

Increasing thickness from the current standard of 300mm (12") and going for 400mm (16") as well as insulating water tanks and pipework could save your client an extra 10% compared to normal standards. Three main issues to consider when insulating a loft space are :

### Condensation

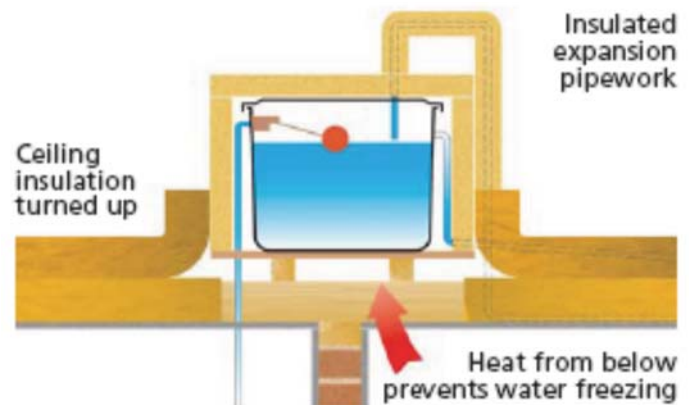
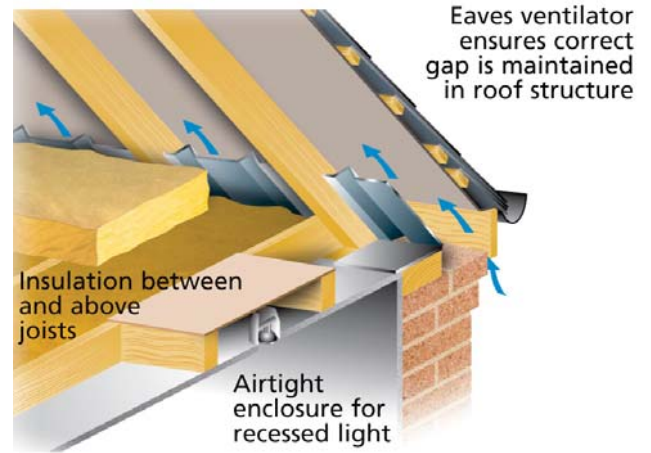
Best avoided by preventing moist air entering the roof from occupied parts of the home. Sealing any external service penetrations will help to stop water tanks freezing, do not insulate below the tank.

### Storage

This should be located close to the loft hatch. Higher performance insulation should be used below the storage area because insulation will be thinner.

### Wiring

It is very important that insulation is not laid over any existing cables. Where insulation is laid over cables, the continued heat could damage cables or even lead to fire. If cables have sufficient slack, they should be raised above insulation. If not, they may need to be replaced.



Remember to take a fabric first approach to your client's project - Improving the building fabric with simple insulation measures is the most cost effective method of improving the performance of a property and reducing fuel bills

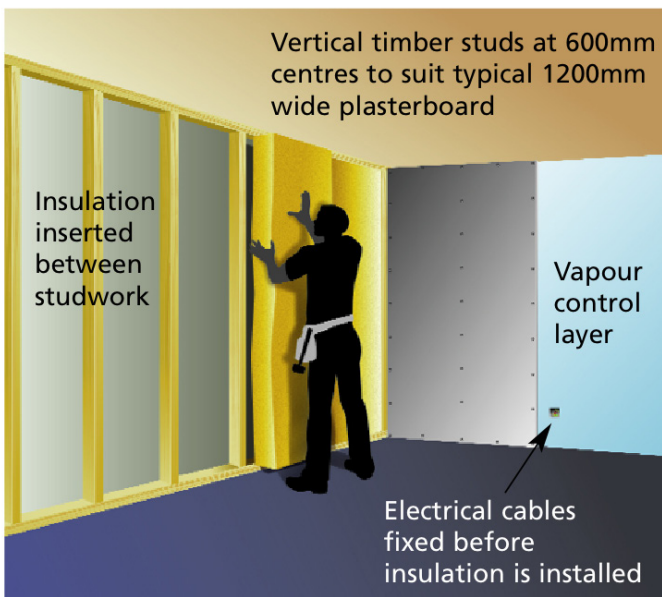


## Insulating external walls

Upgrading external walls can be carried out using various systems, products and insulation types in order to achieve a suitable standard. Blown cavity wall insulation is a simple and cost effective method with funding available, (see page 19 for more information) however if you are looking at solid wall or non traditional construction, alternative methods will need to be adopted. Below is an example of two alternatives to cavity wall insulation.

### a. Internal wall insulation

Insulation between studwork: held between a metal (or preferably timber) framing system, and finished with a vapour control layer and plasterboard or thermal laminate plasterboard.



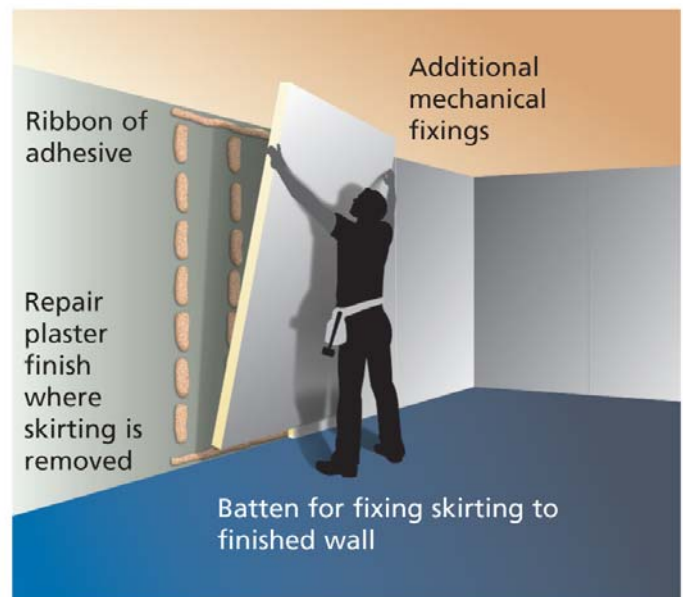
Typical thickness needs to achieve U value of 0.30  
(Based on insulating a 300mm solid wall)

130mm of mineral wool insulation between timbers studs  
(Insulation conductivity 0.038W/m<sup>2</sup>K)

85mm phenolic foam board insulation between timber studs  
(Insulation conductivity 0.025W/m<sup>2</sup>K)

Thermal laminate plasterboard: usually fixed to the surface of the wall. Joins between boards should be taped. Most types of thermal laminate provide better insulation than a comparable thickness of fibre-based insulation. Therefore, thinner insulation can achieve similar thermal performance.

Your clients could save around £365 per year on energy bills by installing internal solid wall insulation, and £385 per year by installing external solid wall insulation.



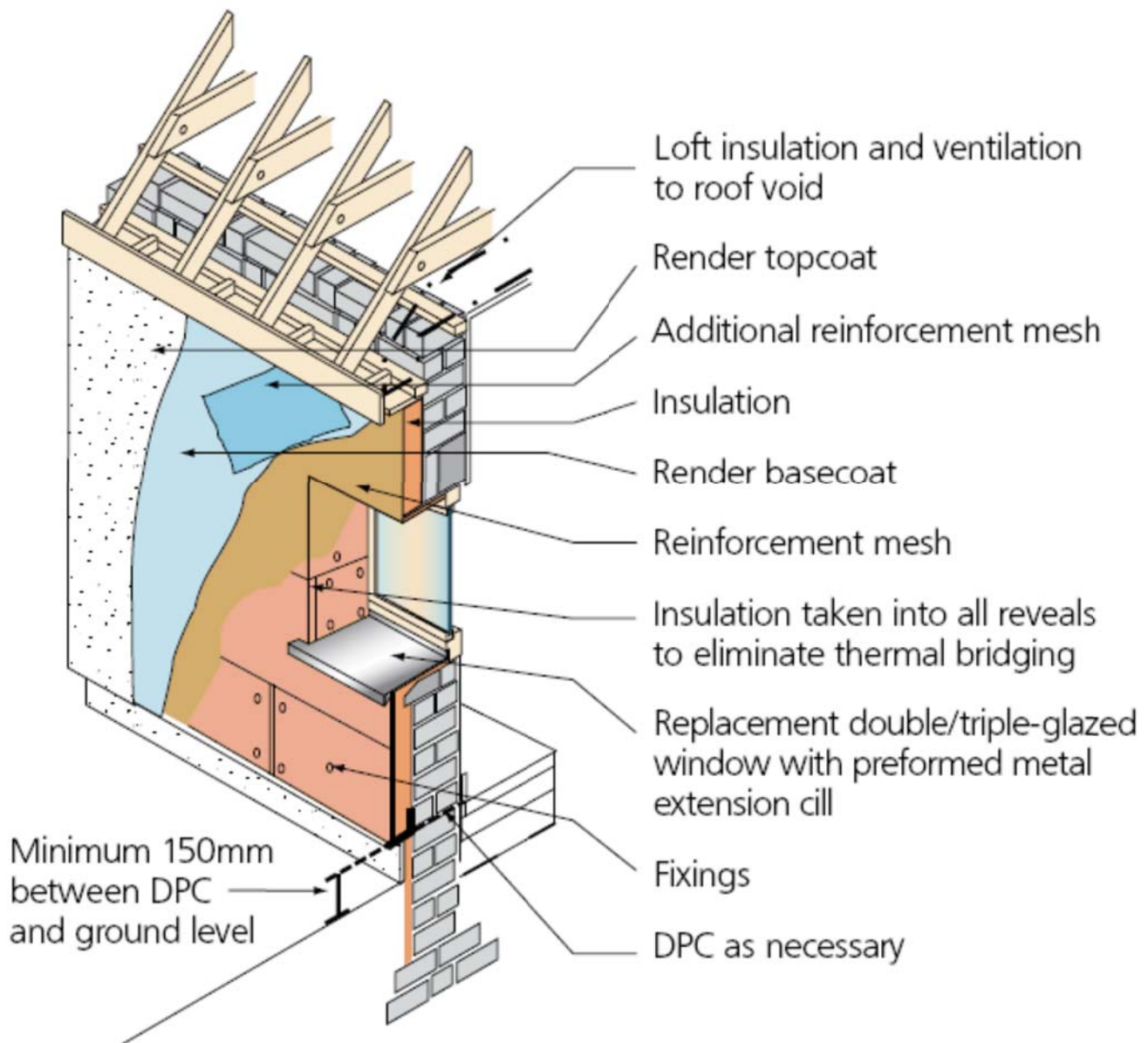
Typical thickness needs to achieve U value of 0.30  
(Based on insulating a 300mm solid wall and insulation bonded to 12.5mm plasterboard)

120mm plasterboard insulated with white expanded polystyrene insulation  
(Insulation conductivity 0.038W/m<sup>2</sup>K)

85mm plasterboard insulated with phenolic foam board insulation  
(Insulation conductivity 0.025W/m<sup>2</sup>K)

## b. External wall insulation

Another option is to use an insulated cladding or render system applied to the external wall, this also offers many advantages. The details below show how a basic system can be applied.



### Floors

15% of a home's heat loss is through the floor. Removing, renewing or upgrading an old floor can have a big impact. It can help to eliminate draughts and heat loss which can occur between the floor timbers and around the edges of the floor.

### 2010 Building Regulations Part L1B requirements

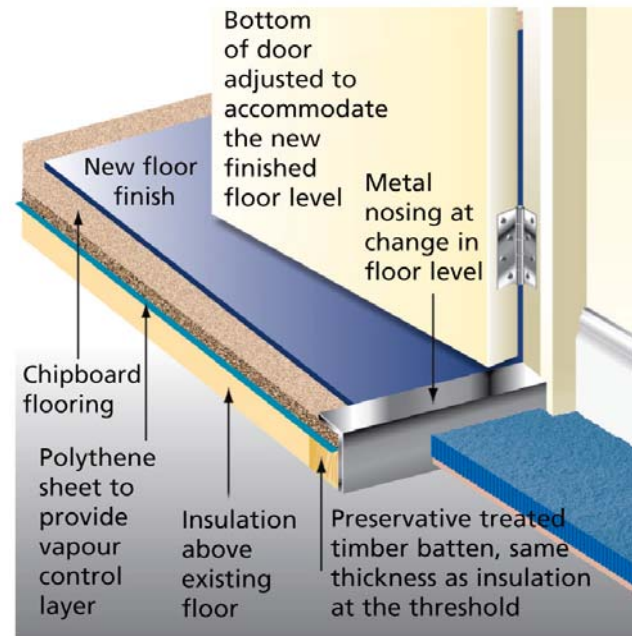
Where more than 50% of the floor is stripped down to the joists (timber floor), to replace large sections of timber floor boards, where more than 50% of the floor screed is replaced (solid floor) or when removing a damaged floor surface and re-levelling using a flooring compound then:

- The Building Regulations require that the floor is rebuilt to achieve a U-value of 0.25.
- This requirement is not triggered by work on cosmetic finishes, for instance tiling or carpets but may be of interest to your client since the room has already been disrupted for the cosmetic work.

## Methods and techniques

### Timber floors:

The floorboards may be lifted and netting stapled between the joists. Insulation may then be installed between the floor joists on top of the netting and the floor re-laid. Typically, it is only possible to install insulation to the depth of the floor joists. It is important to maintain an air gap beneath the joists to remove moisture and prevent rot. As a General rule of thumb - if the joists are 150mm deep, use mineral wool. If they're less than this, use polyurethane board in order to achieve a U value of 0.25.



### Solid floors

You can either lay insulated floorboards on top of the existing floor (this will raise the final floor level slightly) or, if your customer wants more extensive work carried out, you can remove the floor screed and add insulation to preserve the existing floor level.

If laying insulation on top of the existing floor, a single board of insulation will be the only feasible solution. Composite boards including a rigid finishing surface (typically around 90-100mm depth) are available.



## Windows and doors

Windows and doors are another major source of heat loss. If your customer is looking to replace windows and doors, triple glazed windows are now available. The benefits to your customer will include reduced heat loss, draughts and condensation.

### 2010 Building Regulations Part L1B requirements where new windows are required:

- They must achieve a Window Energy Rating band C or better; or a U-value of 1.6.
- If the original windows are fitted with trickle vents, then the replacement windows must also include these.
- If the original windows are not fitted with trickle vents, but the room has no other specific ventilation measures, the new windows must include them.
- Building Regulations do not apply to the installation of secondary glazing.
- All new doors must achieve a U-value of 1.8.



## Methods and techniques

For replacement windows and new doors, it is important to ensure the seal is fully airtight.

### For secondary glazing:

- Ensure the glazing has an airtight seal around the edge. Flexible rubber beading will fit closely to any uneven sections of wall.
- Polycarbonate sheeting may be preferable to glass. It has a warmer surface and is less prone to condensation.
- Secondary glazing should have a 'lock open' position to allow the internal section to be vented periodically.
- To reduce heat loss further, insulate the window reveals. Higher performance insulation (for example foamed board) is a good option. It combines good thermal performance with a relatively thin profile.

## 2. Materials

The performance of building materials is key to any low energy building strategy whether designing, specifying and building a new house or refurbishing an existing dwelling. Fabric insulation measures should always be considered first and renewable energy options only after heat losses have been minimised.

When selecting an insulation material, consideration should be given to the materials fire resistance, acoustic, moisture and environmental characteristics along with the thermal performance of the product. The table below shows the performance of the most common insulation materials and their energy performance.

Insulation Materials Chart		Environmental Rating <sup>2</sup> (BRE Green Guide)	Insulant thickness (mm) to achieve U-value = 0.25W/m <sup>2</sup> /K <sup>3</sup>	Range of Thermal Conductivities <sup>4</sup> (W/mK) Lower numbers indicate better thermal performance										
				0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08		
Highest performance	Vacuum Insulated Panels	-	30	0.008										
	Aerogel	-	50-55	0.013 0.014										
Polyurethane (PU)	Polyurethane with pentane up to 32kg/m <sup>3</sup>	A	105-115			0.027	0.03							
	Polyurethane soy-based	-	100-145			0.026	0.038							
	Foil-faced Polyurethane with pentane up to 32kg/m <sup>3</sup>	A	75 <sup>5</sup>			0.02								
	Polyurethane with CO <sub>2</sub>	-	130				0.035							
	In-situ applied Polyurethane (sprayed or injected)	-	80-100			0.023 0.028								
Polyisocyanurate (PIR)	Polyisocyanurate up to 32kg/m <sup>3</sup>	A	95-105			0.025 0.028								
	Foil-faced polyisocyanurate up to 32kg/m <sup>3</sup>	A	80-85 <sup>5</sup>			0.022 0.023								
	In-situ applied polyisocyanurate (sprayed)	-	80-100			0.023 0.028								
Phenolic foam (PF)	Phenolic foam	-	80-95			0.020 0.025								
	Foil-faced phenolic foam	-	75-85 <sup>5</sup>			0.020 0.023								
Expanded Polystyrene (EPS)	Expanded Polystyrene up to 30kg/m <sup>3</sup>	A+	115-165				0.03	0.045						
	Expanded Polystyrene with graphite (grey)	-	115-120				0.03 0.032							
Extruded Polystyrene (XPS)	Extruded Polystyrene with CO <sub>2</sub>	-	95-140			0.025	0.037							
	Extruded Polystyrene with HFC 35kg/m <sup>3</sup>	E	110-120			0.029	0.031							
Wool and fibre	Glass wool [up to 48kg/m <sup>3</sup> ]	A+	135-180				0.03	0.044						
	Glass wool [equal/greater than 48kg/m <sup>3</sup> ]	-	155				0.036							
	Stone wool [less than 160kg/m <sup>3</sup> ]	B to A+	150-160				0.034 0.038							
	Stone wool [160kg/m <sup>3</sup> ]	C	160-170				0.037	0.040						
	Sheep's wool [25kg/m <sup>3</sup> ]	A	150-215				0.034		0.054					
	Cellulose fibre [dry blown 24kg/m <sup>3</sup> ]	A+	150-190				0.035	0.046						
	Hemp fibre	-	165				0.039							
	Polyester fibre	-	150-180				0.035	0.044						
Alternative	Wood fibre (WF)	-	145-225				0.039				0.061			
	Hemp lime (monolithic)	-	260 <sup>6</sup>								0.067			
	Cotton	-	165-170				0.039	0.04						
	Cork [120kg/m <sup>3</sup> ]	A	155-200					0.041	0.055					
	Vermiculite	-	235				0.039				0.06			
	Perlite (expanded) board	-	190						0.051					
	Celular glass (CG)	C-D	140-185				0.038		0.05					
	Flexible thermal linings	-	n/a <sup>7</sup>					0.04			0.063			
Strawboard [420kg/m <sup>3</sup> ]	C	295										0.081		
Straw bale (monolithic)	A	175-235 <sup>6</sup>						0.047		0.063				

### 3. Services upgrades

#### Low energy lighting

Compact fluorescent lights (CFL) use less power, whilst providing equivalent performance to traditional bulbs. High-powered Light Emitting Diodes (LED)s are now widely available and have improved dramatically in recent years. They are particularly suited to task lighting and spotlights.

#### 2010 Building Regulations Part L1B requirements

When providing a new lighting circuit, 75% of all bulbs must be low energy (GLS tungsten filament lamps and tungsten halogen lamps do not comply).

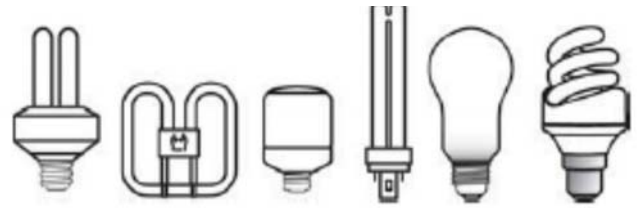
#### Techniques and best practice

- Low energy light bulbs can be fitted in exactly the same way as traditional bulbs.
- Your customer may wish to have task lighting as well as more general overhead lighting.
- To save energy, install separate switches for each type of light so they can be switched on/off individually. Also consider installing a master 'everything off' switch, for when the occupants leave the room.

#### Products

CFL bulbs now come in a whole range of shapes and sizes – including down lighters.

They can replace most common applications such as pendant fittings, down lighters and spotlights. LED lamps (or solid state lighting) are even more efficient than CFL technology. A 4W LED can offer the equivalent light output to a 40W incandescent bulb with a lifetime of over 20,000 hours – 20 times longer than an incandescent bulb. LED bulbs are fully dimmable too. The amount of light that can be produced by a single LED is limited. A mid-quality LED might produce 50 to 100 lumens, which is why LEDs are often clustered in bundles.



## 4. Other areas

### Water efficiency

#### Low flush WCs

These are specifically designed to reduce the volume of water consumed during flushing. They operate and look just like standard appliances.

#### Low-flow taps

Fit low-flow 5 litres per minute taps on wash basins.

#### Click taps

These allow a higher flow rate when fully clicked open but offer a reduced flow when partially opened, so use these for kitchen sinks or baths where a high flow rate is sometimes required.

#### Low-flow showerhead

Aerated shower heads produce a lower water flow as powerful as a standard shower head.

### Waste

#### On the job

Small one-off projects produce a limited amount of waste, but try to re-use or recycle wherever possible. Segregating waste streams instead of using mixed skips can work out cheaper overall.

#### In the dwelling

Making it easier to recycle household waste will have a big impact. For example, when remodelling kitchens think about creating a dedicated area for storing recycling.

#### Recommended products

The Energy Saving Trust manages a labelling scheme products of proven energy efficiency. The scheme currently covers:

- Domestic appliances
- Light bulbs and fittings
- Gas and oil boilers
- High performance hot water cylinders
- Heating controls
- Loft insulation
- Cavity wall insulation
- External wall and dry linings
- Windows and doors

These products carry the Energy Saving Trust

Recommended label, which marks the best 20% of products. Currently endorsed products can be found at [energysavingtrust.org.uk/compare](http://energysavingtrust.org.uk/compare).



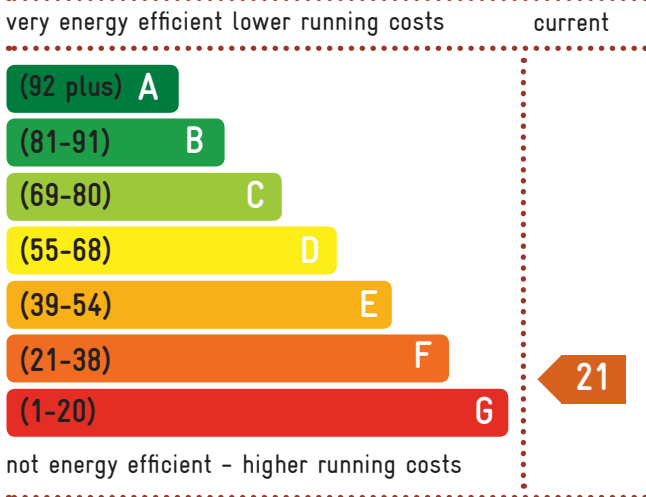
# Refurbishment of a typical solid wall detached house

## Savings and benefits to your clients

To help you promote the benefits of energy improvements and secure new work within refurbishment projects, the illustrations below show before and after refurbishment, and the consequent financial savings.

Note that to achieve the enhanced standards described here, it would require the use of unconventional materials and services resulting in higher project costs which has to be set against the potential savings and other benefits.

## Before refurbishment



Element	Fabric U-value
Uninsulated roof	0.30 W/m <sup>2</sup> K
Solid walls, 215mm thick brickwork	2.10 W/m <sup>2</sup> K
Uninsulated suspended timber floor	0.74 W/m <sup>2</sup> K
Windows, single glazed timber frames	4.80 W/m <sup>2</sup> K
Doors, unglazed solid timber	3.00 W/m <sup>2</sup> K

## Typical energy demand

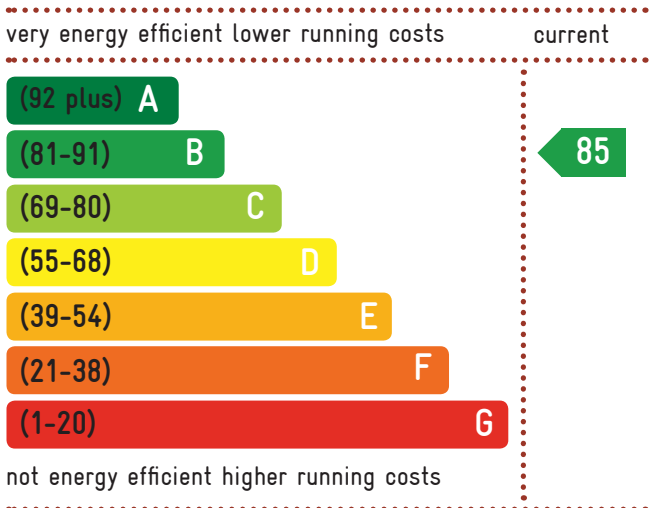
source	demand (kWh/yr)	kWh /yr/m <sup>2</sup>	
Gas	Main and Secondary Heating, and Hot Water	60,840	597
	Cooking	1,290	
Electric	Lights, fans and pumps	1,160	37
	Appliances	2,690	

## Natural ventilation

- Typical envelope air leakage rate for type of property – 15 m<sup>3</sup>/hr/m<sup>2</sup> @ 50Pa (15m<sup>3</sup> of air passes through each m<sup>2</sup> of surface area (average) each hour when the house is pressurised to 50Pa).
- Regular boiler 68% efficiency, programmer, gas fire secondary room heating.
- Water storage cylinder 160 litre capacity, no cylinder or pipe insulation.
- No dedicated low energy efficient light fittings.

Typical annual running cost of £2347

# After refurbishment

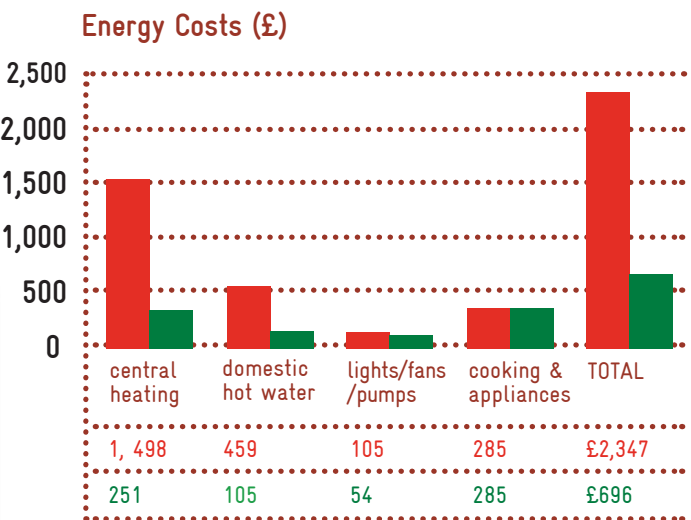


Upgrade an existing property to an EPC rating of at least band B by making the following improvements:

Element	Fabric U-value
Insulated roof	0.10 W/m <sup>2</sup> K
Solid walls, internal insulation	0.18 W/m <sup>2</sup> K
Insulated concrete floor	0.15 W/m <sup>2</sup> K
Timber windows to double glazed	1.50 W/m <sup>2</sup> K
Doors, insulated panel.	1.00 W/m <sup>2</sup> K

source	demand (kWh/yr)	kWh /yr/m <sup>2</sup>	
Gas	Heating and Hot Water	6,310	73
	Cooking	1,290	
Electric	pumps	1,020	36

- Mechanical ventilation with heat recovery 85% efficiency, specific fan power 1 W/l/s
- Air leakage rate reduced m<sup>3</sup>/hr/m<sup>2</sup> @ 50Pa.
- Regular condensing boiler 91% efficiency, programmer, room thermostat and thermostatic radiator valves (no secondary room heating needed).
- Water storage cylinder 160 litre capacity, 80mm factory cylinder insulation, all pipework insulated.
- 100% dedicated low energy efficient light fittings.



The potential savings which could be made if you achieved these enhanced standards is **£1651 per year**

These fabric and service upgrades result in an improved EPC rating from band F to B. The total CO<sub>2</sub> emissions have been reduced by 78% or 10.7 tonnes/yr.

### Is this achievable?

Yes, but this example involves extensive work that will have an impact on the project budget. It is intended to give you and your client an illustration of what can be achieved by going beyond the normal standards. However, the basic and simple measures can offer a significant benefit to your client, and therefore be an attractive proposition, included in the refurbishment contract. For example, insulating the loft to 300mm could save them £145 per year, and has the additional appeal of getting all disruptive work in the home completed in one go.

# Traditional pre1919 dwellings

A third of homes in Wales were built before 1919, so traditional construction types are very common. These types of homes were built in a certain way that needs to be considered when undertaking any refurbishment work or a project. Care must be taken not to damage the fabric of the building by using inappropriate materials and solutions. Condensation can be a particular problem in older homes. Areas that need to be considered include:

## Allowing the building to “breathe”

The way older properties were constructed means they need to be allowed to ‘breathe’ through the entire envelope (i.e. the external walls, floor and roof) so that moisture can escape and prevent damp. Consider each building’s fabric construction and moisture control features in order to avoid detrimental effects to the building’s breathability, caused by misguided material changes.

## Ventilation and draught proofing

Although draught proofing can help to reduce heating costs, reducing ventilation can lead to a build up of moisture levels and cause damp problems in older buildings. Mould growth and rot damage can therefore occur in buildings that have previously had no such problems. Typically, moisture from the walls and ground floors of these buildings, evaporates into the building itself, so heating and adequate ventilation is needed to allow the moisture to escape. All homes need some ventilation – the trick is to allow controlled ventilation at the minimum rate required rather than to have uncontrolled draughts that allow excessive heat loss.

## Cold-bridging

In older homes it is often not possible to achieve a uniform level of insulation around the building. This means that there are likely to be gaps known as ‘thermal bridges’ which need to be considered and designed out as far as possible. (See page 7)

## Material selection

There are advantages and disadvantages associated with particular insulation materials. Some (particularly organic materials) allow moisture to escape, but greater thicknesses may be required to achieve the same thermal performance as modern, man made, insulation materials. Choose your materials carefully and be aware of the potential benefits and pitfalls of each, bearing in mind the construction type of the building being insulated.

## Heating and services

Building services often mean that pipes and wiring need to penetrate the fabric of the building. Care should be taken to reduce the number of penetrations to the fabric (and therefore potential for draughts). All penetrations should be carefully sealed and existing services should be upgraded or repaired if possible.

Older buildings are simple to understand and are relatively easy to maintain if these basic principles are considered. However, problems can arise when ‘inappropriate’ materials are introduced and older buildings are treated in the same way as we would treat modern cavity wall construction buildings.

You can find out more about maintaining older buildings on Cadw’s Maintenance Matters web pages: [www.maintenancematterswales.org](http://www.maintenancematterswales.org)

# Traditional products

Below are some of the traditional products, insulation materials and systems that can be considered when carrying out refurbishment work to these types of properties:

**Types of low impact products and insulation include:**

- Sheep's wool insulation
- Hemp or flax insulation
- Woodfibre boards
- Wood wool boards
- Calcium silicate boards
- Lime hemp insulating plasters
- Insulated limecrete floors
- Recycled foamed glass
- Lightweight expanded clay aggregate
- Lime washes and breathable paints

**The properties of these materials and systems are different for every product but generally they can:**

- Absorb and release water vapour without compromising their thermal efficiency and are therefore highly suitable for use in old, solid wall construction or new timber-frame buildings
- Help to maintain thermal mass in old buildings, which regulates temperature, helping to keep them warm in winter and cool in summer
- Have a low embodied energy (energy used during their manufacture and delivery)
- Tend to be more durable (e.g. wool insulation can last 60 years or the life of the building in which it is installed)
- Store CO<sub>2</sub> during growth (hemp, flax, timber)
- Help UK farmers find a market for their wool, wood and/or hemp crops
- Be composted or incinerated for energy use at the end of their life

However, the costs and thermal properties of these materials do vary. The key properties to consider when choosing a material for use in an older home are:

- Thermal performance / U-value, and therefore the thickness of material that will be needed to achieve a chosen standard
- "Breathability" or hygroscopic properties (ability to absorb / release moisture)
- Ability to be recycled at the end of its life
- And obviously cost!

For further information with regards to these materials [www.lime.org.uk](http://www.lime.org.uk)



# Low/zero carbon technologies

## So what about renewable energy technologies?

After energy efficiency measures have been used to reduce the heat and electricity demand as far as is possible, low and zero carbon technologies like solar panels and biomass heaters can also be considered to improve the environmental performance and reduce costs even further. It is important to reduce energy demand as much as possible first because this will affect the size and cost of any low or zero carbon technologies used.

Some technologies are better suited to installation during refurbishment projects than at other times due to the associated infrastructure. Alterations to a property that would make any future installations easier and / or cheaper should also be considered when carrying out a refurbishment. For example, strengthening the roof structure to accept a solar thermal hot water system, increasing storage space for high volume water cylinders, or installing a compatible boiler.

For further information on renewable technologies and funding, see our **Trade guide to renewable energy technologies** available from your local building control department.



# Funding

## Nest

Nest is the Welsh Government's fuel poverty scheme which aims to help people in Wales reduce the impact of their fuel bills. Nest offers a range of advice through expert partners, as well as a full home energy assessment and home improvements for the most energy inefficient homes – at no cost to the householder. For more information call Nest on freephone 0800 512 012 or visit [nestwales.org.uk](http://nestwales.org.uk).

## Carbon Emission Reduction Target (CERT)

Energy suppliers are required by the UK Government to help reduce emissions from homes in Great Britain. All homes are eligible to receive subsidised or free measures under CERT (usually loft or cavity wall insulation). The energy suppliers can fund measures in any household, regardless of which company supplies them electricity and gas.

The Energy Saving Trust's advice centre Wales can provide further advice on funding for home energy improvement measures. Contact us on 0800 512 012.

## Further information on energy efficient refurbishment

Further information on all aspects of fabric and service improvements can be found in the Energy Saving Trust publication CE309 Sustainable Refurbishment which is available via the Energy Saving Trust website or from your local building control department

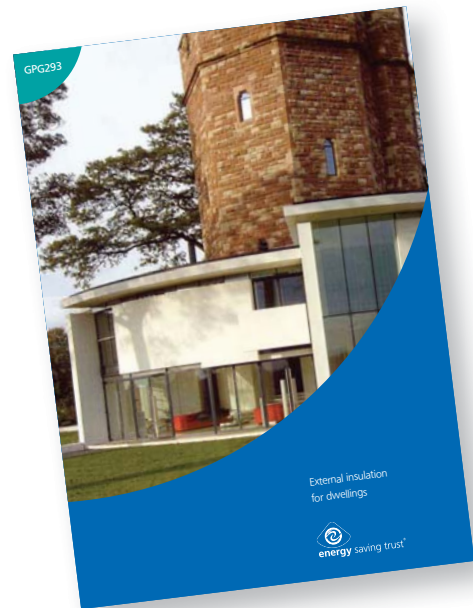


# Further reading

For trade and professionals, the Energy Saving Trust produces a wide range of technical guidance and solutions to enable industry to achieve high levels of energy performance.

The following publications may be of interest and can be found on the Energy Saving Trust website:

- External wall insulation for dwellings (CE118)
- Internal wall insulation in existing housing (CE17)
- Energy Efficient lighting (CE61)
- Windows for new and existing housing (CE66)
- Energy efficient ventilation in housing (CE124)
- Improving airtightness in dwellings (CE137)



# Regional Building Control contacts

**Blaenau Gwent County Borough Council**  
Enterprise House, Rassau Industrial Estate,  
Ebbw Vale. Gwent NP23 5SD  
Tel: 01495 355520 Fax: 01495 355598  
Email: [building.control@blaenau-gwent.gov.uk](mailto:building.control@blaenau-gwent.gov.uk)  
Web: [www.blaenau-gwent.gov.uk](http://www.blaenau-gwent.gov.uk)

**Bridgend County Borough Council**  
Civic Offices, Angel Street, Bridgend CF31 4WB  
Tel: 01656 643406 Fax: 01656 646972  
Web: [www.bridgend.gov.uk](http://www.bridgend.gov.uk)

**Caerphilly County Borough Council**  
Building Control, Caerphilly County Borough Council  
Pontllanfraith House, Pontllanfraith  
Blackwood NP12 2YW  
Tel: 01495 235158 Fax: 01495 235013  
Email: [buildingcontrol@caerphilly.gov.uk](mailto:buildingcontrol@caerphilly.gov.uk)  
Web: [www.caerphilly.gov.uk](http://www.caerphilly.gov.uk)

**Cardiff Council**  
Building Control, Cardiff Council, Room 154  
City Hall, Cathays Park, Cardiff CF10 3ND  
Tel: 029 2087 1528 Fax: 029 20871384  
Email: [buildingcontrol@cardiff.gov.uk](mailto:buildingcontrol@cardiff.gov.uk)  
Web: [www.cardiff.gov.uk](http://www.cardiff.gov.uk)

**Carmarthenshire County Council**  
Building Control, Building 16, St. David's Park,  
Jobswell Road, Carmarthen, Carmarthenshire SA31 3HB  
Main Switchboard: 01267 246001 Fax: 01267 246017  
Email: [Building.Control@carmarthenshire.gov.uk](mailto:Building.Control@carmarthenshire.gov.uk)  
Web: [www.carmarthenshire.gov.uk/building\\_control](http://www.carmarthenshire.gov.uk/building_control)

**Ceredigion County Council**  
Building Control Section, Canolfan Rheidol,  
Rhodfa Padarn, Llanbadarn Fawr,  
Aberystwyth, Ceredigion SY23 3UE  
Tel: 01970633484 Fax: 01970 615639  
Email: [hpw@ceredigiopn.gov.uk](mailto:hpw@ceredigiopn.gov.uk)  
Web: [www.ceredigion.gov.uk](http://www.ceredigion.gov.uk)

**Conwy County Borough Council**  
Council Offices, Conway Road,  
Mochdre, North Wales LL28 5AB  
Tel: 01492 574172 Fax: 01492 546734  
Web: [www.conwy.gov.uk](http://www.conwy.gov.uk)

**Denbighshire County Council**  
Environment Directorate, Caledfryn,  
Smithfield Road, Denbigh, LL16 3RJ  
Tel: 01824 706979, Fax: 01824 706709  
Web: [www.denbighshire.gov.uk](http://www.denbighshire.gov.uk)

**Flintshire County Council**  
County Hall, Mold, Flintshire CH7 6NF  
Tel: 01352 703631 Fax: 01352 703615  
Web: [www.flintshire.gov.uk](http://www.flintshire.gov.uk)

**Gwynedd Council**  
Environmental Directorate Consultancy Section,  
Penarallt Caernarfon, Gwynedd LL55 1BN  
Tel: 01286 682769 Fax: 01286 682771  
Web: [www.gwynedd.gov.uk](http://www.gwynedd.gov.uk)

**Isle of Anglesey County Council**  
Council Offices, Llangefni, Anglesey LL77 7TW  
Tel: 01248 752176, Fax: 01248 752232  
Web: [www.anglesey.gov.uk](http://www.anglesey.gov.uk)

**Merthyr Tydfil County Borough Council**  
Building Control, Merthyr Tydfil County Borough Council  
Ty Keir Hardie, Avenue de Clichy, Riverside Court  
Merthyr Tydfil CF47 8XF  
Tel: 01685 726263 Fax: 01685 382698  
Email: [building.control@merthyr.gov.uk](mailto:building.control@merthyr.gov.uk)  
Web: [www.merthyr.gov.uk](http://www.merthyr.gov.uk)

**Monmouthshire County Council**  
County Hall, Cwmbran, Gwent NP44 2XH  
Tel: 01633 644831 Fax: 01633 644878  
Web: [www.monmouthshire.gov.uk](http://www.monmouthshire.gov.uk)

**Neath Port Talbot County Borough Council**  
The Quays, Brunel Way,  
Baglan energy park, Neath SA11 2GG  
Tel: 01639 686820 Fax: 01639 686101  
Building Control Email: [building.control@npt.gov.uk](mailto:building.control@npt.gov.uk)  
Web: [www.npt.gov.uk/buildingcontrol](http://www.npt.gov.uk/buildingcontrol)

**Newport City Council**  
Building Control, Newport City Council,  
Civic Centre, Newport, South Wales NP20 4UR  
Tel: 01633 656656 Fax: 01633 232660  
Email: [building.control@newport.gov.uk](mailto:building.control@newport.gov.uk)  
Web: [www.newport.gov.uk](http://www.newport.gov.uk)

**Pembrokeshire County Council**

Department of Development, County Hall,  
Haverfordwest Pembrokeshire SA61 1TP  
Tel: 01437 775897 Fax: 01437 776496  
Web: [www.pembrokeshire.gov.uk](http://www.pembrokeshire.gov.uk)

**Powys County Council**

Neuadd Brycheiniog, Cambrian Way,  
Brecon, Powys LD3 7HR  
Tel: 01874 612290 Fax: 01874 612336  
Email: [buildingcontrol@powys.gov.uk](mailto:buildingcontrol@powys.gov.uk)  
Web: [www.powys.gov.uk](http://www.powys.gov.uk)

**Rhondda-Cynon-Taff County Borough Council**

Building Control, Rhondda Cynon Taf  
County Borough Council, Sardis House,  
Sardis Road Pontypridd CF37 1DU  
Tel: 01443 494845 Fax: 01443 494774  
Email: [buildingcontrol@rctcbc.gov.uk](mailto:buildingcontrol@rctcbc.gov.uk)  
Web: [www.rhondda-cynon-taff.gov.uk](http://www.rhondda-cynon-taff.gov.uk)

**Swansea Council**

Building Control, City and County of Swansea  
Environment Department, Room G.4.1, Civic Centre  
Oystermouth Road, Swansea SA1 3SN  
Tel: 01792 635622, Fax: 01792 635644  
Email: [bcon@swansea.gov.uk](mailto:bcon@swansea.gov.uk)  
Web: [www.swansea.gov.uk/bcon](http://www.swansea.gov.uk/bcon)

**Torfaen County Borough Council -**

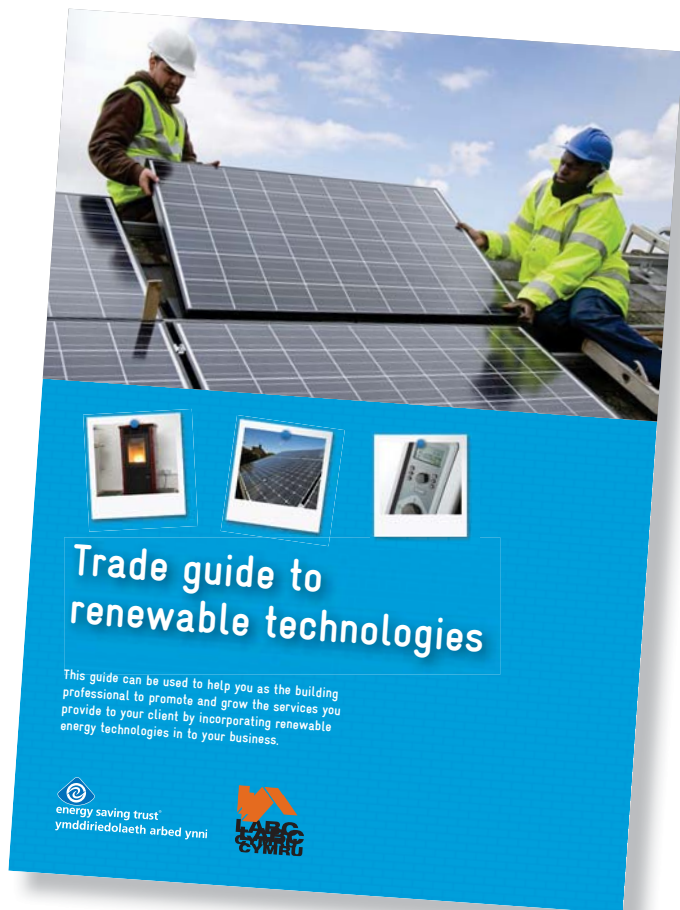
Planning & Public Protection Service,  
County Hall, Cwmbran NP44 2WN  
Tel: 01495 766922, Fax: 01633 648062  
Web: [www.torfaen.gov.uk](http://www.torfaen.gov.uk)

**Vale of Glamorgan Council**

Building Control, Vale of Glamorgan Council  
Dock Office, Barry Docks, Barry CF63 4RT  
Tel: 01446 704666, Fax: 01446 704843  
Email: [buildingcontrol@valeofglamorgan.gov.uk](mailto:buildingcontrol@valeofglamorgan.gov.uk)  
Web: [www.valeofglamorgan.gov.uk](http://www.valeofglamorgan.gov.uk)

**Wrexham County Borough Council**

Building Control Section, Wrexham County Borough  
Council, Council Offices, Lambpit Street  
Wrexham LL11 1AR. Tel: 01978 292000  
Email: [bc\\_admin@wrexham.gov.uk](mailto:bc_admin@wrexham.gov.uk)  
Web: [www.wrexham.gov.uk](http://www.wrexham.gov.uk)



Other publications in this range include **Trade guide to renewable technologies** which is available from your local building control department

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For further advice and support on refurbishing your property, contact your local building control department.

Energy Saving Trust  
1 Caspian Point, Caspian Way,  
Cardiff Bay, Cardiff, CF10 4DQ  
[energysavingtrust.org.uk](http://energysavingtrust.org.uk)  
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[labccymru.co.uk](http://labccymru.co.uk)

  
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