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# HOUSEHOLDER ENERGY EFFICIENCY MANUAL



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HOUSE TYPE

## Victorian Stone Villa



# How can you make your home more comfortable and efficient?

*This document provides specific guidance to those of us who live in **stone villa** type houses, and lists measures for saving energy, cutting fuel bills, making your home more warm and comfortable and reducing your environmental impact.*

Together this reduces our vulnerability individually and as a community to change - be that increasing energy prices or cold weather - whatever type of house you live in.

The energy saving measures are split into 3 groups:

- ▶ FREE, EASY TO DO
- ▶ LOW COST DIY MEASURES
- ▶ HIGHER COST OR INVESTMENT MEASURES

There are many effective changes you can make, either one by one over time, or all together.

## CONTENTS

● Introduction .....2	● Higher cost and investment measures ..... 9
● What is your house like now? .....3	● Fuel types ..... 11
● Hints and tips ..... 4	● Upgrade case study ..... 13
● Free and low cost measures .....5	● Where to get more information ..... 14
● Low cost and DIY measures .....6	

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**page 4** Insulation can be easy to install yourself

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**page 8** New low energy light bulbs can give great light.

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**page 12** Dry logs are a great low carbon fuel.

# What is your house like now?

*Before any upgrade, this type of house is usually built like this:*

- Stone construction for all the walls, with no insulation.
- No loft or coomb insulation.
- No insulation in the floor.
- Original single glazed windows.
- Oil condensing boiler.

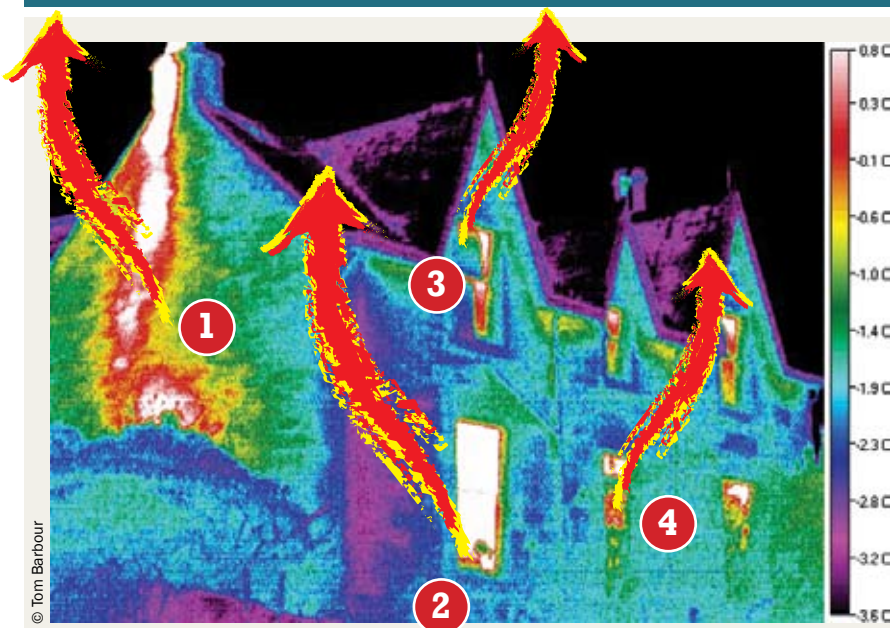
*The common problems with this house type are:*

- They can be difficult to heat.
- They can be draughty.
- They can be damp.
- As detached houses, they have a high proportion of external stone walls, through which a lot of heat is lost.



**A typical house of this size and type, before upgrade, would use about £890 of electricity and oil and emit about 10.3 tonnes of CO<sub>2</sub> per year. This is enough to form a layer of CO<sub>2</sub> 80cm deep over the whole pitch at Wembley stadium.**

## WHERE HEAT IS LOST: VICTORIAN VILLA



This image shows different temperatures of each part of the house, and where heat is leaking from the property.

- 1 Big heat loss through uninsulated gable, especially next to chimney flue
- 2 Biggest heat loss from kitchen window which is the warmest room in the house.
- 3 Heat loss through draughty windows.
- 4 Heat loss around uninsulated glazed door.

### HOUSE TYPE

Victorian Stone Villa

CASE  
STUDY  
1

# Hints and tips

## Draught proofing

Draught proofing your home is the single most effective measure you can carry out. Old properties are full of character, but are often draughty and can be cold. Ventilation is important in rooms such as the bathroom and kitchen, but you can save up to 15% on your heating bill by cost effective and easy to install measures stopping unwanted drafts.

## Cheap insulation

Many insulation types are heavily subsidised. DIY stores sell subsidised insulation and this can be easy to install yourself.

## New boiler?

If your boiler is more than 5 years old, upgrading it can improve it's efficiency dramatically, using less fuel overall. And if you are upgrading your boiler, why not consider changing to a different fuel?

## Saving water

Did you know that producing drinking water is one of the biggest electricity users in Scotland? Even though water there is plenty of untreated water in Kintyre, processing it is energy intensive and you can save energy and carbon by saving water.



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# Free and easy to do UPGRADES PART 1

*Compared to cities and suburbs, people in our area are more likely to adapt their homes and lives to changing circumstances than to move to a different house. There are many easy things that can save energy without costing you any money or making changes to the fabric of your house.*

## 1. UNDERSTAND WHERE THE ENERGY GOES

You can use a smart monitor to see how electricity is used in your home. You can often get these for free from your energy company. Typically an awareness of your electricity use can in itself help you to reduce your electricity bill by over 10%.

## 2. SETTING YOUR HEATING CONTROLS

Set your thermostat to the lowest comfortable temperature – usually between 18 and 21 °C – and you could save up to £65 per year.

## 3. AVOID STANDBY MODE

Leaving televisions, computers and other equipment on standby can account for nearly 10% of your annual electricity bill. To save this energy and cost, either turn it off, or alternatively you can get ‘powerdown’ switches at low cost which automatically save energy when the device is not in use.

## 4. DRAWING CURTAINS

Drawing curtains at dusk keeps the heat in when it is cold outside. Opening them in the morning lets the heat from the sun in. Thick, thermal curtains are best at this and thermal linings can be added to existing curtains.

## 5. LIGHTING

Turn off the lights when you are not in the room to keep electricity use down.

## 6. HEAT WHAT YOU NEED

Your kettle is a power hungry appliance – just heating the water you need and not overfilling the kettle can make a difference to your bills.



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### BEHAVIOURAL MEASURES

Measure	Disruption factor to install	CO <sub>2</sub> saving/tonnes per year	Saving in bills (£)/per year	Cost to install
Smart monitor	Low	0.31	24	0.00
Setting heating controls	Low	0.41	27	0.00
Standby mode	Low	0.28	22	0.00
Thermal curtains/shutters <sup>1</sup>	Low	0.31	27	0.00

1. Thick thermal lined curtain to single glazed window.

# Low cost and DIY UPGRADES PART 2

*Making changes to your house itself can be daunting, but many of the upgrades are easy to install and cheap. Each upgrade is explained below. The savings shown in the tables overleaf are for that measure alone, so you can compare different upgrades alongside each other. (Bear in mind that cumulative savings - i.e. from multiple measures - will be different from stand-alone savings.)*

## 1. DRAUGHT PROOFING & VENTILATION

*Draughts can make your house feel very uncomfortable and cold and is the most effective measure for you to tackle.*

*However, it is important to ensure you have good ventilation in your house. The key to this is ensuring you have ventilation where you want it – bathrooms, utility rooms and kitchens in particular.*

*Rooms that have damp air are harder and more expensive to heat.*



© Tom Morton

### DRAUGHT PROOFING

This includes measures that are straightforward to do as DIY projects, and the parts required are available at most DIY stores.

#### Draft proofing doors

Fitting draft proofing to letter boxes and draft proofing strips along the bottom of your front and back doors.

#### Sealing chimneys

If you have open fires, the flues can be very draughty. When they are not in use, you can seal these with chimney balloons, which can be bought

online and fitted by the householder. There are cheap, simple, safe and removable. Newspaper, pillows and other materials should be avoided as they can be forgotten about and pose a fire risk.

#### Draft proofing windows

There are a number of discreet systems to help seal the gaps in windows, and around doors. Some of these can be installed as DIY, or there are more permanent solutions that are usually installed by specialists. The latter are very durable although are more expensive.

**If you carry out these low cost and DIY upgrades, you can improve the comfort in your house and save 15-20% from your overall energy bills and your carbon emissions.**

**1 DRAUGHT PROOFING AND VENTILATION/CONTINUED****VENTILATION**

*Our energy audits and advice service identified a common problem in this area - many of our houses suffer from mould growth on walls. This is unsightly and can cause health problems. It is caused by damp in the air, from cooking, bathing and clothes washing, causing condensation on cold walls.*

**VENTILATION**

Good ventilation is important to help avoid this. Having warm, well-insulated walls also reduces damp and mould.

**Ventilation fans**

There should be ventilation fans in bathrooms, utility rooms and in the kitchen. These reduce in effectiveness with age, and it is important that these are checked regularly to make sure they work well, and are replaced when required. They are found in walls, roofs and

occasionally also windows. They must vent to the outside not to other rooms or attic spaces.

**Opening Windows**

Opening windows is also important, to get rid of damp air. As is making sure the trickle vents on windows are open is important to allow ventilation.

**Drying clothes**

Drying clothes outside, or in well ventilated covered areas also helps reduce condensation and mould growth inside the house.



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**2. INSULATING ROOFS**

This is often one of the easiest and most cost effective improvements you can make to your home. It is likely to be eligible for subsidy or grant funding whether you have no insulation to start with, or are topping up existing insulation to 270mm.



It is important to have the right materials and good workmanship to save the most heat and to avoid condensation problems.

**3. RADIATOR PANELS**

These are mounted on the wall behind your radiator, and they reflect the heat back into the room. They are cheap and easy to install yourself.

**4. INSULATING YOUR WATER TANK**

This is a very cheap and easy measure to install and can save you £30-£50 per year. Cylinder jackets can be purchased from DIY stores for low cost.

## 5. INSULATING YOUR PIPEWORK

Having effective insulation on the pipes that move hot water around your home means that the heat gets to where it needs to be with the minimum of wastage. This is another very cheap and easy way of improving the efficiency of your heating system.

### ELECTRICITY

We all use electricity to light our homes and power our household appliances. There are a range of measures we can do to reduce electricity demand and its carbon content.

## 6. EFFICIENT APPLIANCES

Modern electrical appliances are much more efficient than old ones. Replacing a 12 year old fridge-freezer with a modern A+ rated one will save up to £38 per year and 155 kg CO<sub>2</sub>. Look for the EU Energy Rating when buying a new appliance .

## 7. LOW ENERGY LIGHTBULBS

There is now a wide range of brightness levels and fittings in the new kinds of energy efficient light bulbs. Replacing all the lightbulbs in the house can easily and cheaply save 5% of your energy bills, and 6% of your annual carbon.



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### LOW COST/DIY MEASURES

Measure	Disruption factor to install	CO <sub>2</sub> saving/tonnes per year	Saving in bills (£)/per year	Cost to install (£)
Draught proofing <sup>1</sup>	Low	1.34	115	50-1,000 DIY very cheap, professional more but more durable
Radiator reflector panels	Low	0.05	4	50
Roof and coomb insulation <sup>2</sup>	Medium	1.03	88	600
Low energy lightbulbs <sup>3</sup>	Low	0.82	62	20
Insulating cylinder <sup>4</sup>	Low	0.52	44	15

1. Based on draught proofing windows, doors, floors and chimneys.  
 2. Based on - loft: maintaining ventilation essential. 270mm mineral wool. Coombs: maintaining ventilation. 2 layers Alreflex 2L2  
 3. From all standard light bulbs to 100% low energy.  
 4. Based on standard insulation jacket from DIY store.

HOUSE TYPE

Victorian Stone Villa



# Investment and higher cost upgrades

## UPGRADES PART 3

*Investing in your property is a big step, however can create dramatic improvements to your comfort and running costs.*

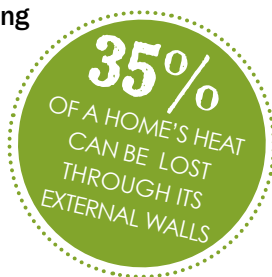
*If you carry out a combination of these investment measures you can cut your energy costs by 50% and your carbon emissions by more than 100% - meaning you are a net exporter of energy and your house can generate income for you annually. This is shown in the case study section at the end.*

### UPGRADING THE FABRIC OF THE HOUSE

This can often be combined with other works such as insulating the wall and floor when you are redecorating a room.

#### 1. INSULATING FLOORS

15% of a home's heat can be lost through its ground floor. This type of house usually has a timber floor. Often, as with this one, there is usually no way to access underneath without taking up the floorboards. This is very disruptive. Alternatively they can be insulated by putting a slim line insulation between the floorboards and the floor covering. Insulating the floors also stops draughts, which improves comfort more than would be indicated by the energy and cost savings.



#### 2. UPGRADING WINDOWS & DOORS

Older windows tend to be draughty and can leak heat from and through single glazing panels. Windows represent an opportunity to improve comfort in your home, as well as reduce your energy use. Changing your window type usually requires planning permission.

#### 3. INSULATING WALLS

There are two ways to insulate your walls – either inside, or outside. Insulation applied to the outside of your house will change the character of the house and will require planning permission. Insulating internally does not change the appearance of your house and will not require planning permission, but is very disruptive and is best done when you are renovating a room. Slimline insulation can be installed more easily on top of existing wall linings. You can spread the cost over time by doing one room at a time when doing internal insulation.



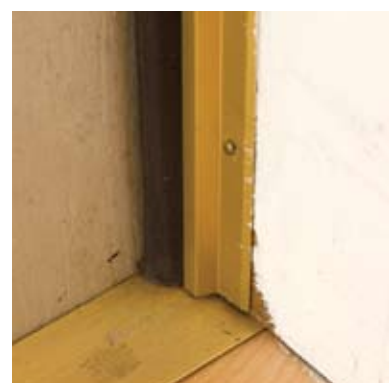
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#### HOUSE TYPE

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## INVESTMENT AND HIGHER COST UPGRADES/CONTINUED

**4. PORCH**

A heated and well ventilated porch acts as a draught lobby, reducing cold air getting into the house, and giving a great place to dry wet outdoor clothes. These can be added to your house, but does require planning permission.

**HEATING SYSTEM**

The efficiency of heating systems has improved a lot over recent years and replacing an old system can significantly reduce the energy used to provide heat and hot water, therefore reduce your bills.

**5. INSTALLING CENTRAL HEATING**

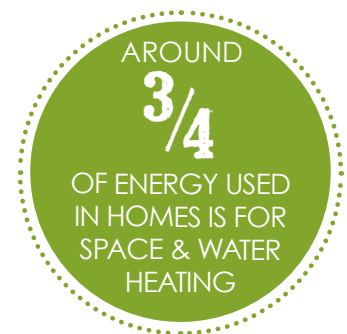
A full central heating system is one of the most cost effective ways of heating both your home and water. In some instances, grants are available to older people to have systems installed. The Energy Saving Trust can advise on this.

**6. REPLACING YOUR BOILER**

Replacing a 15 year old boiler with a new condensing model can reduce your fuel use by up to a third. If your household does not use a lot of hot water, you could consider installing a combi boiler, so you only heat the water you use. If you are considering changing your boiler you might also consider changing the fuel you use. Information about this is in the next section.



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**INVESTMENT - FABRIC UPGRADE**

Measure	Disruption factor to install	CO <sub>2</sub> saving/tonnes per year	Saving in bills (£)/per year	Cost to install (£)
Walls - internal <sup>1</sup>	High	2.68	231	23,000
Walls - external <sup>2</sup>	Medium	2.68	231	37,000
Floor - under timber <sup>3</sup>	Low	1.65	142	4,000
Floor - slimline <sup>4</sup>	High	1.44	124	6,000
Doors and windows <sup>5</sup>	Medium	0.52	44	19,500
Secondary glazing <sup>6</sup>	Medium	0.41	44	6,500

1. Based on 150mm insulation to timber frame, plasterboard finish, decorated.
2. Based on 150mm insulation, rendered. Note that planning permission will be required for this.
3. Based on 170mm mineral wool insulation between joists, boards lifted and relaid.
4. Based on 10mm Proctor Spacetherm on board.
5. Based on timber sash and case double glazed windows and insulated door. Please consult planning authorities to see if planning permission is required in your area.
6. Based on 'storm windows' secondary glazing to single glazed windows.

## HOUSE TYPE

Victorian Stone Villa



# Fuel types

*The Energy audits show that the majority of people in the Tarbert area use electricity to heat their homes. Only a small proportion of people use wood as their main source of heat, however more use it as a secondary fuel.*

The kind of fuel we use for heat has an effect on its cost and the amount of green-house gases it produces. The cost of oil and LPG has increased significantly over the last year, as has electricity. Renewable energy, on the other hand, can be almost entirely cost free to generate and produces very little emissions.

Generating your own electricity has become much cheaper – indeed profitable – with the introduction of the ‘Feed in Tariff’ where you are paid to produce your own electricity. Renewable heat is due to have a similar scheme introduced in spring 2011 through the Renewable Heat Incentive. To find out more, contact the Energy Saving Trust on 0800 512 012 or go to [www.fitariffs.co.uk](http://www.fitariffs.co.uk)

Our area uses predominantly expensive, high carbon fuels, but has a great opportunity to change to fuels such as wood, which is locally available and less likely to fluctuate in price. As well as logs, wood can be used as pellet fuel, which is made in Scotland and can be part of an automatic or semi automatic system.

Changing fuel won’t mean you reduce the amount of energy you need to heat your home, but it can reduce your emissions by up to 93%, dependant on your fuel choices.

## Calor gas and oil.

Many houses use one of these fuels as their primary fuel, but are keen to have a back up system in place, or to use it in conjunction with the likes of a wood stove to reduce costs, reduce reliance on fuel supplies and to reduce emissions.

Costs of these are rising dramatically, so reducing use through energy efficiency or fuel change is important to householders in our area.

## Coal

Coal has the highest emissions of all the kinds of fuels we use. In most situations, coal can be replaced by wood, which is cleaner and has much lower emissions. Open fires are really inefficient and can lose 85% of the heat up the chimney. Changing to wood burning stoves or central heating makes a big difference.



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CHANGING  
FUEL COULD  
REDUCE YOUR CO<sub>2</sub>  
EMISSIONS BY

93%

## FUEL TYPES/CONTINUED

**Wood burning stoves and wood availability**

Many of us have wood burning stoves, and others are interested in fitting them. Wood stoves are an efficient way of providing heat and, if fitted with a back boiler, can also heat water. Planning consent is not usually required if you are using an existing chimney, but will be if you need to create a new one.

**Pellet boiler**

If you are changing boilers it would be worth considering a wood pellet type. Pellets have very low emissions and can be supplied to our area. The boilers can be manually or automatically fed. They are very efficient and don't produce much ash and are particularly good as a replacement for oil boilers.

**Photovoltaic (PV) Panels**

PV panels are rapidly improving in cost effectiveness and efficiency. They need to face roughly south and can be mounted on a

roof, wall or on the ground. The electricity they produce can be eligible for the 'Feed In Tariff', which will significantly increase the savings to that shown below. Within the conservation area, planning permission will be required.

**Solar thermal panels**

Solar thermal panels generate hot water and are usually mounted on south facing roofs. In the conservation area, you will need planning permission for these.

**Air Source Heat Pumps**

Whilst these can be efficient, they are not well suited to older properties which are not airtight. This is reflected in the running cost in the table below which shows an increase in energy costs.

*Please note that you should check with your planning authority whether planning permission is required in your area. Some technologies don't require this in some areas, but do in others, for example if you are in a conservation area or your house is listed you will require permission.*

## HEATING SYSTEM

Measure	Disruption factor to install	CO <sub>2</sub> saving/tonnes per year	Saving in bills (£)/per year	Cost to install (£)
Upgrade boiler <sup>1</sup>	Medium	3.09	266	3,000-5,000
Photo voltaic panels <sup>2</sup>	Medium	1.37	1200	8,000
Solar thermal <sup>3</sup>	Medium	0.31	27	6,000
Biomass <sup>4</sup>	Medium	8.86	89	7,000

1. To modern condensing oil boiler.
2. 2.2kW PV panels.
3. 4m<sup>2</sup> solar panel.
4. Semi automatic pellet boiler.



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© On Site Generation



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## HOUSE TYPE

Victorian Stone Villa

CASE STUDY  
1

# Overall upgrade - case study



Doing a package of work to your house, from all three levels of the upgrades - free, low cost and investment - could reduce your energy bills by 50% and create an income of up to £2,000 per year for generating your own renewable energy as well as reducing your carbon emissions by over 100%. This means you would become a net exporter of energy over the year.



You *can* create a warm, comfortable house that generates income annually like this:

## Free and easy upgrades

To reduce your bills.

- Understand and reduce your electricity use.

## Low cost and DIY

To reduce the draughts and reduce the damp air and condensation.

- Draught proof your doors, windows, chimneys and floor and ensure you have good ventilation.
- Install loft and coomb insulation.

THIS WOULD COST YOU UP TO **£1500** TO DO THE LOW COST AND DIY MEASURES.

## Investment upgrades

*These are upgrades to the house itself to make it warm, easier to heat and to further reduce draught.*

- Install internal insulation.
- Install loft and coomb insulation.
- Upgrade your windows to modern standard sash and case double glazing.
- Insulate under the ground floor.

TO DO THE LOW COST AND FABRIC UPGRADES THIS WOULD COST ABOUT **£49,000**.

And upgrading the services to an efficient and easy to use boiler, reducing your carbon footprint and making money from your property by generating renewable energy:

- Change to a biomass boiler system using local logs or pellets from oil.
- Install a 2.2kWpeak PV panel system.

DOING ALL THE WORK TO THIS HOUSE WOULD COST ABOUT **£65,000** IN TOTAL, EXCLUDING VAT.

This table compares energy cost and carbon before and after upgrade, and compares this to a modern eco home built locally.\*

UPGRADE COMPARISONS				
	Cost of energy per year/£	Total CO <sub>2</sub> emissions per year	Cost of energy per year (£) per m <sup>2</sup> floor	Cost of emissions per m <sup>2</sup> floor area
Before upgrade	890	10.3 tonnes or 10,300kg	10.00	0.08 tonnes or 800kg/m <sup>2</sup>
After upgrade	330	Minus 0.11 tonnes or 110kg**	5.00	Net zero emissions annually
Local modern Eco house	908	4.6 tonnes or 4600kg	4.50	0.02 tonnes or 20kg/m <sup>2</sup>

\* Remember that the eco home is a larger property - it's best to compare the cost and emissions values per m<sup>2</sup>.  
 \*\* This means that you are generating more energy than you use and by selling this to the grid, you save more carbon than you generate.

For more information about the eco home please refer to Case Study 6.

# What can you do next?

## Want to find out about grants?

Further information about this can be found via the Energy Saving Trust: [www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk)

## Who supplies the items I need to do these upgrades?

The BGT blog has an up to date list of local suppliers. Please look here for information.

BGT blog: <http://greentarbert.wordpress.com>

## How can I use this information?

Because heating patterns and bills vary so much, the best way to check the energy saving percentage against your own bills to get an idea of savings.

This is a simplified system and should be taken as a broad brush indication. However it is here to give you a clear indication of the difference between the options, allowing you to make informed decisions.

Also, some people can carry out many of the measures as DIY, whilst others will ask tradesmen to do the work.

When considering individual measures, one thing to be aware of is that if you carry out several upgrades, the savings cannot be added together directly. Of course, doing more upgrades will save more money and carbon, but the amount you save per additional measure is less. All costs are approximate and are based on the case study house.

## Further information

For updates to this manual please visit the Big Green Tarbert blog: <http://greentarbert.wordpress.com>

Energy Saving Trust: <http://www.energysavingtrust.org.uk>

The Eco-House Manual: how to carry out environmentally friendly improvements to your home.

Nigel Griffiths. ISBN 9781 84425 4057

Energy Heritage: A guide to improving energy efficiency in traditional and historic homes. Changeworks. 2008.

Can be downloaded for free at: <http://www.changeworks.org.uk/projects/energy-heritage/544/>

Renewable Heritage: A guide to microgeneration in traditional and historic homes. Changeworks. 2009.

Can be downloaded for free at: [http://www.changeworks.org.uk/uploads/Renewable\\_Heritage\\_Programme.pdf](http://www.changeworks.org.uk/uploads/Renewable_Heritage_Programme.pdf)

## Energy Modelling Assumptions

All projections are based on SAP 2005 modelling of changes. Overall the figures should be accurate as a broad indication, but any individual house will vary. You can compare your own bills and potential savings pro rata. There were high discrepancies found between modelled and actual fuel bill data – for example one of the properties was shown as having fuel bills of £690 annually and emitting 8 tonnes of CO<sub>2</sub>e when modelled in SAP, but fuel bill data indicated an annual energy spend of £2240 and CO<sub>2</sub>e emissions of 12.6 tonnes.

## Copyright

This Energy Efficiency Manual is copyright of Arc Architects. You are free to reproduce it for non-commercial purposes, so long as the source is credited. Please be aware that it has been developed in the context of the Tarbert and Skipness area and figures and comments are related to this geographical and climatic context so may not apply directly in other places.

**BIG GREEN TARBERT** 

