

Making ColGlen Warmer

This case study is one of a series produced by **Warmer ColGlen** to show how Colintrave and Glendaruel residents can make their homes more energy efficient - giving them a warmer home, saving them money on their energy bills and reducing their carbon footprint. We hope the case studies will demonstrate what is possible and encourage others to take action too. You can find out how to save energy in your home further on in the leaflet.

Case Study 1. Traditional Stone House



Couston, Colintrave

**£1,660
savings
per year**

*“We’ve gone from using 3,000 litres of oil a year, at today’s price costing £1,890, to around £230 a year for heating fuel, achieved by a combination of insulation and replacement heating using logs. **That’s a great saving!**”*

Improving energy efficiency

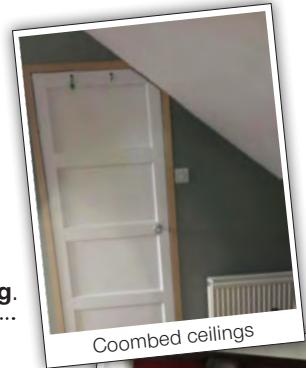
Couston, is a traditional stone house in Colintrave (built circa 1750). The main building has a slate roof – there is also an extension (the old dairy) with a corrugated sheeting roof and a felted flat roof dormer. As the house already

had double glazing, the main focus for improving the energy efficiency was insulating the walls, floors, roof and changing the heating system. It was previously heated by an oil boiler, an oil-fired Rayburn and two open fires.

Improvements

Loft and roof:

- Installed 300mm of **loft insulation**.
- **Insulated the coombed ceilings** in the ‘room in the roof’ (where there is no loft) using 100mm Kingspan and Celotex. It was then covered with plaster board.
- On the roof of the old dairy, the corrugated sheeting was replaced with reclaimed **insulated profile sheeting**.



Heating and hot water:

- The old inefficient oil boiler was replaced with a **multi-fuel boiler**, which uses wood logs as the main fuel. This is a multi-fuel boiler stove (see photo), which heats nine radiators and the hot water. A full set of thermostatic radiator valves already existed.
- Back-up for the hot water is provided by the existing Rayburn in the kitchen (which was originally solid fuel, converted to oil in 1962, now reverted back to solid fuel, which uses logs and some coal) and an electric immersion heater.



Walls and ceilings:

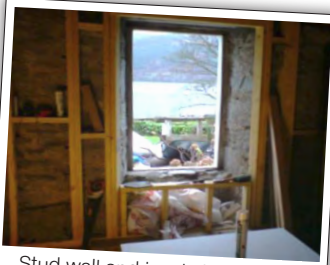
- The walls were originally a combination of lath and plaster, internal dry lining and plaster. These were stripped back and **stud walls** were constructed, between which **insulation** was fitted. The walls were finished with plaster.
- Air vents under the floor were reinstated to allow the walls to breathe (to ensure no moisture builds up inside the wall).



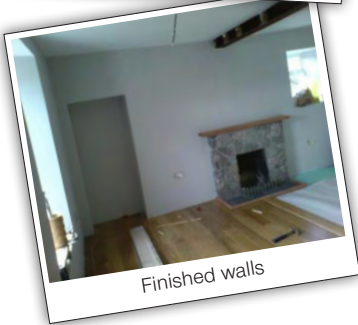
Floors:

- The suspended timber floors were fitted with **under floor insulation**. The whole floor was replaced as there were rotten timbers, due to no damp proof course under the floor.

Getting the work done



Stud wall and insulation (during construction)



Finished walls

- As the householders had the necessary skills, they carried out the work themselves. Taking this approach meant lower costs and also the satisfaction of doing it themselves.
- One drawback of the DIY approach was the length of time to complete. Each room took about 4 - 6 weeks to reach the decorating stage.
- The work involved renovating of the whole house, so there was considerable disruption. There was a lot of dust - particularly from stripping out the lath and plaster.
- One disadvantage of a DIY approach is that they did not use an accredited installer to install the boiler – and therefore will not be eligible for payments through the Renewable Heat Incentive (RHI) when it opens to households next year.

Costs

Measure	DIY Cost	Professional Cost
Internal insulation (insulation + timber)	£400 x 7 rooms	£1,600 x 7 rooms
Plastering	£400 x 7 rooms (contractor)	£400 x 7 rooms
Insulated profile sheeting	£0 (locally reclaimed sheets)	£3,080 (14 sheets at £220 each) plus labour to re-roof
Multi-fuel boiler	£1,400	£1,400 plus additional labour costs
Rayburn conversion	£400	£2,000 plus labour costs to replace range
TOTAL COST	£7,400 (plus labour and time)	£20,480 (excluding additional labour costs)
Payback*	4.5 years	12 years

*Number of years to 'pay back' installation costs through annual energy savings. Based on annual savings of £1,660 (see overleaf).

Save Energy in Your Home

This section provides information on how you can save energy in your own home – making your home warmer, saving you money and reducing your carbon footprint.

1. No Cost Energy Saving Actions

Start off saving energy with a few changes that are free and straightforward. Some of these actions will save you up to **£60** and **100kg/CO₂** per year.



Lights and appliances:

- Switch off lights when you are not using them
- Don't leave electrical appliances (such as the TV) on standby – always switch them off at the plug
- Unplug chargers when not in use (such as phone chargers) as they still draw electricity.



Heating:

- Your room thermostat should be set to 18–21°C (or lower if you are comfortable) – turning the room thermostat down by 1 degree could save you money
- Draw your curtains at nightfall.



Washing:

- Make sure you have full loads before using the washing machine or dishwasher – half loads are not efficient
- Wash clothes at 30°C or 40°C
- Dry your clothes outside or on a clothes horse instead of using a tumble drier.



Food and cooking:

- Only fill the kettle with as much water as you need
- Use lids on saucepans
- Let warm foods cool before putting them in the fridge
- Switch the oven off a few minutes before the food is cooked – the oven will stay warm for a while.



2. Energy Saving Improvements

This section outlines a range of improvements you can make in your home to reduce your energy bills. These are split by cost: low (under £100), medium (up to £500) and high (over £500). Unless otherwise stated, all savings and costs are from Energy Saving Trust¹.

Low cost improvements: under £100



Lighting: to reduce energy use, replace 'normal' (incandescent) bulbs with low energy bulbs (CFLs), and halogen spotlights with LEDs. These last a lot longer (up to 50 times as long) and are available in a variety of shapes and sizes, and as dimmable bulbs.



Energy monitors: these tell you how much energy you are using in your home – helping you to see what might use a lot of electricity. Monitors typically cost around £30-£40, but phone your energy supplier to see if they can provide one for free.



Hot water: reduce heat loss from your hot water system by fitting insulation around pipes (lagging), fitting a hot water tank jacket and a hot water tank thermostat (which should be set to 60°C).



Radiator panels: reflective radiator panels can be fitted behind radiators to keep heat in the room. They are most effective behind radiators on external walls and cost about £30 for a pack.

¹ www.energysavingtrust.org.uk/scotland

Measure	Cost	Energy bill savings per year	CO ₂ savings per year
Replace 1 bulb with CFL bulb	£2 – 10*	£3 (£55 over the lifetime of the bulb)	12kg
Replace 1 halogen light with a LED	£8 – 30*	£4 (£70 over the lifetime of the bulb)	16kg
Hot water tank jacket	£15 (DIY)	£40	170kg
Primary pipe insulation	£10 (DIY)	£15	60kg
Room thermostat	£120**	£70	280kg
Hot water tank thermostat	£80**	£30	130kg

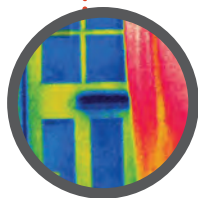
* Approximate cost from <http://www.thelightbulbshop.co.uk>

** Changeworks cost

Medium cost improvements: £100 - £500



Energy efficient appliances: choose the most efficient appliances (such as fridges, washing machines and TVs) when replacing them. 'A+++' is the most efficient rating (and 'G' is the least efficient). An efficient fridge freezer will use £86 less in electricity bills over its lifetime compared to an average model.



Reducing draughts: minimising cold draughts in your home can make it feel warmer and save you money. Draught-proofing doors, windows, letter boxes, loft hatches. In addition, gaps in floor boards can be sealed and draughts in chimneys can be blocked with a chimney balloon. There are many different ways of draught-proofing windows: more information on these can be found in the 'Further Information' section at the end of this document.

Cavity wall insulation can be fitted if the property has cavity walls, by injecting insulation into the cavity.



Loft insulation is cheap and easy to install – it should be 270mm (10 inches) deep, so ‘topping up’ existing loft insulation is also worth doing. Pitched roofs without a loft room in roof can be insulated (with rigid insulation boards attached between the roof rafters), and flat roofs can be insulated from above: these measures will cost more than standard loft insulation.



Heating controls – a central heating system should have a full set of heating controls including a room thermostat and thermostatic radiator valves (TRVs).



Floor insulation – can be fitted underneath the floorboards either DIY or professionally. Fitting from below is the cheapest and simplest option. Solid floors can be insulated from above and can require more work.

Measure	Cost	Energy bill savings per year	CO ₂ savings per year
Draught-proofing (all windows and doors) - DIY	£120	£55	220kg*
Draught-proofing (all windows and doors) - professional	£240	£55	220kg*
Filling gaps between floor and skirting board	£20	£25	100kg
Insulating timber floor - DIY	£100 (DIY)	£60	240kg
Insulating timber floor - professional	£770	£60	240kg
Loft insulation (if none)	£100 - £350	£175	720kg
Loft insulation (from 50mm)	£100 - £350	£25	110kg
New fridge freezer	£200 - £600	Up to £40	135kg

* Changeworks estimate

High cost improvements: over £500



Windows: upgrading single glazed windows to double glazed will make your home feel warmer and reduce energy use. If double glazing is not appropriate, secondary glazing (an additional sheet of glazing fitted to the inside of the window) may be fitted. Again, there are many different options and more details can be found in the 'Further Information' section at the end of this document.



Solid wall insulation: this can either be external wall insulation (insulation attached to the exterior of the house and covered in render or cladding) or internal (a variety of techniques are used to attach insulation to the inside of the wall).

Fit an 'A' rated boiler: old boilers can be inefficient, so installing a new efficient boiler will save energy.

Measure	Cost	Energy bill savings per year	CO ₂ savings per year
New boiler (replacing previous G rated boiler)	£2300	£300	1,220kg
New boiler (replacing previous E rated boiler)	£2300	£200	810kg
Internal wall insulation	£5,500 – £8,500	£445	1.8 tonnes
External wall insulation	£9,400 to £13,000	475	1.9 tonnes
Installing double glazing (where single before)	£400 – 800 per window*	£165	680kg

* Changeworks estimate

3. Renewable Energy Systems

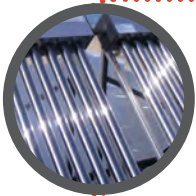
There are a variety of technologies you can install into your home to generate renewable energy. These reduce your carbon footprint and your energy bills. In addition, most technologies are available to receive Government subsidy as long as you use accredited installers and products. This includes:

- **Feed-in Tariff (FITs):** a payment for every unit of electricity generated (includes PV and wind turbines)
- **Renewable Heat Incentive (RHI):** a payment for every unit of heat generated (includes solar hot water, air source heat pumps, ground source heat pumps and biomass boilers). This is due to start in summer 2013.

Some technologies will require planning permission, depending on the circumstances.



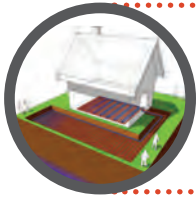
Photovoltaic (PV) panels generate electricity for your home. Roofs facing south are ideal, but east or west facing roofs will work.



Solar hot water/solar thermal produce hot water for your home. They are best suited to homes with a lot of hot water demand (e.g. families), but do not tend to work if the boiler is a combi boiler (as there is no hot water tank). Most hot water is provided in the summer months.



Air source heat pumps (ASHPs) absorb heat from the outside air to heat a house or provide hot water. The technology is similar to a fridge, but it works the opposite way around (fridges extract heat from its inside), so they even work at low temperatures. They work best with large radiators or under-floor heating, or can be used with 'warm air vents'. They still require electricity to work, but should save carbon and money in off-gas properties (i.e. those heated by oil, solid fuel or electric). Homes need to be well-insulated to work well with ASHPs.



Ground source heat pumps (GSHPs) work in a similar way to ASHPs but they absorb heat from the ground via pipes inserted into the garden (either vertically or horizontally). They are more expensive to install than ASHPs but can be more efficient.



Biomass (wood) – can be used either in a room stove or in a boiler for the whole central heating system. Back-boilers can also be added to stoves to heat some hot water. Both systems can use logs or wood pellets. If wood is sourced sustainably (this means that felled trees are replaced with new ones, and from a local source), wood is a low carbon fuel.



Wind turbines generate electricity. Free-standing turbines (the bigger the better) are the best approach, especially in rural areas with high wind speeds. Roof mounted turbines are available but these tend to be ineffective.

Technology	Installation cost	Previous heating fuel	Fuel bill savings per year	CO ₂ savings per year (tonnes)
Solar PV	£7600	n/a	£98*	1.4
Solar hot water	£4800	Electricity	£80	0.5
ASHP	£6,000 - £10,000	Oil Electricity	£80 - 310 £380 - 610	0.8 – 1.6 4.4 – 5.3
GSHP	£9,000 - £17,000	Oil Electricity	£180 - 310 £480 - 610	1.2 – 1.6 4.8 – 5.3
Biomass stove	Pellet - £4,300 Logs - £2,150	n/a	n/a	n/a
Biomass boiler	£11500	Oil Electricity	£280	4.0
Wind turbine	£22500	n/a	£580	7.5

* Based on using 25% of electricity generated from 3.5kWp system

*** For a 6kW system. A 2.5kW system would cost about £15,000

4. Further Information

The following references provide further information on making your home more energy efficient:

Big Green Tarbert/ARC Architects published guides for five typical house types found on the West coast of Scotland (2011): visit greentarbort.wordpress.com and search for **Household Energy Efficiency Manual**

Changeworks (2009) Renewable Heritage: A guide to microgeneration in traditional and historic homes: visit changeworks.org.uk/publications

Changeworks (2008) Energy Heritage: A guide to improving energy efficiency in traditional and historic homes: changeworks.org.uk/publications

Energy Saving Trust Scotland, general information on saving energy: energysavingtrust.org.uk/scotland

Energy Saving Trust Scotland, information on home renewables: energysavingtrust.org.uk/scotland/Generating-energy

Historic Scotland Inform: Improving Energy Efficiency in Traditional Buildings: conservation.historic-scotland.gov.uk/publication-detail.htm?pubid=6947

Historic Scotland, Short Guide – Fabric Improvements for Energy Efficiency in Traditional Buildings, visit: conservation.historic-scotland.gov.uk/publication-detail.htm?pubid=9550

Historic Scotland, Technical Papers (including research on double glazing and case studies), visit: historic-scotland.gov.uk/technicalpapers

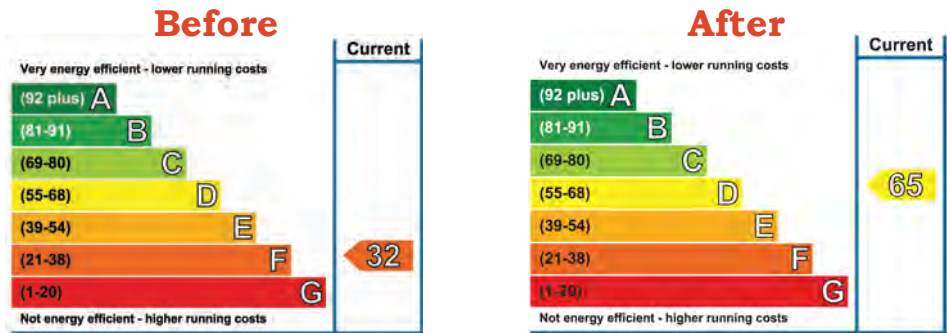
North Howe Transition Toun, Energy toolkit: Our top 40 energy saving ideas for your home, visit: nhtt.org.uk/wp-content/uploads/2010/03/TOOLKIT-SMALL2.pdf

Sustainable Uist (2010-2) Research on Hard to Treat Houses: visit: sustainableuist.org/hard-to-treat-houses/

Cutting costs and carbon

The householders have made considerable savings as a result of the improvements made to their house:

- ✓ **£1,660 per year** - energy bills reduced from £3,070 to £1,410 (including heating fuels and electricity).
- ✓ **8.2 tonnes of CO₂ per year** – reducing their CO₂ footprint by almost 60%, from 14.1 to 5.9 tonnes of CO₂ (wood emits no CO₂ if it is from a local and sustainable source).
- ✓ They have also improved the energy efficiency rating of their home from an **‘F’ to a ‘D’ rating**, as shown below in the Energy Performance Certificates (EPCs).



Warmer ColGlen is a Colintrave and Glendaruel Development Trust project, funded by the Scottish Government's Climate Challenge Fund. It helps householders to reduce their home energy use - saving them money and also reducing their carbon footprints.

Find out more

For more information about the project go to:

www.warmercolglen.cgdt.org

or contact Sara on sara@cgdt.org or 01700 841298/358

Registered office: The Village Hall, Colintrave, Argyll, PA22 3AS

This leaflet was created with support from environmental charity Changeworks ~ Inspiring change for people and the environment

www.changeworks.org.uk

