Eco retrofit beginner’s guide
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Why bother?

The variety in motives is only matched by the variety in homes. Reasons to do environmental improvements include:

- Making the home more comfortable
- Reducing fuel bills
- Bringing it up to date
- Helping to save the planet
- Investing for the future
- Increasing asset value
- Keeping tenants happy
- Keeping up with neighbours and friends
- Realising the dream of becoming carbon neutral
And homes vary tremendously:

- Old or quite new
- In need of much renovation or good condition
- Cold and draughty or warm
- Expensive to heat or normal
- In a conservation area
- In a block of flats or detached
- Unique or bog standard
- And usually with many individual features.

Whatever the motive, whatever the dwelling type and condition, eco retrofitting can satisfy the motives and improve the home, it can be done on a small or grand scale, it can be cheap or expensive, fast or slow. Here’s how to make a start!
Where to start?

You can either take a full approach with the intention of doing everything needed to make your home an eco-house or Superhome, or an opportunistic approach doing something or in some part of the building. Linking eco improvements to other works is always a good idea, it is likely to be cheaper and minimise disruption. Many people have extensive improvements carried out when they buy a new home, they have to adapt it to their lifestyle and this is the ideal time to consider all eco improvements. On the other hand, many useful eco retrofits can be opportunistic, when the boiler fails, when the roof leaks, when having a new kitchen or bathroom, when windows need replacing, when the walls need re-plastering and so on. When planning the work and talking to the architect or builder, that is the time to come up with the list of energy improvements that you want to see eventually in the whole house. What are they?
The wish list of eco improvements

It's not rocket science, but it is good science:

- Reduce heat loss through walls and windows, roofs and floors
- Stop draughts and control ventilation
- Generate required heat efficiently
- Distribute and control it efficiently
- Generate (and store) your hot water efficiently
- Minimise other electricity demands - for lighting, cooking and appliances
- Consider solar water heating and PV generation
- Install water saving devices
- Consider rainwater collection and use
- Educate all the home occupants not to waste energy (could be first on the list)
Ideally you should consider and take action, where appropriate and possible, on all the above points. Some will prove very easy, such as installing low energy lighting (if you have not already done it), buying the most efficient fridges and other appliances, setting the thermostat at the lowest level for comfort, etc.

Other improvements may be fairly straightforward and simple, such as changing the boiler, draughtstripping, insulating the loft, but still more can be disruptive and expensive, like replacing the windows and insulating solid walls. But then the benefits depend on the house itself, its condition and how you use it.

So, keep everything in mind and make logical decisions.
Choosing between options

Let’s start with the situation where you have bought an older new home or have one in which you want and are able to do, comprehensive improvements. A typical action list is:

- If you have a loft, insulate it with 300mm or more of insulation
- If you have cavity walls, fill the cavities and consider additional insulation
- If you have solid walls, consider external insulation where this will compliment the external appearance of your house
- If you have solid walls and an external appearance that should not be changed, add internal insulation
- Change all windows to double or even triple glazing, with argon fill and low-e coatings, these can be made to replicate the appearance of the current windows
- If you cannot change the windows for any reason, add secondary glazing.
- Add insulation to the ground floors, either from the cellar or by lifting floor board or building a new floor. Make sure it is sealed against air penetration.
- Draught strip all doors, loft hatch and all windows. Fill any other air leakage paths around pipe entries.
- Install humidity controlled extractor fans in kitchens and bathrooms.
- Make sure you have a modern condensing boiler (if on the natural gas network), a modern condensing boiler if using oil or LPG, wood burning boiler or stove, or an efficient heat pump, ground sourced if possible.
- Use a gas combination boiler for hot water, or a well insulated storage cylinder system.
- Fit a boiler controller, room thermostat and thermostatic radiator valves, on wet systems.
- Fit low energy lighting throughout, compact fluorescent or LEDs.
Fit appropriate water efficient taps, toilets and showers
Buy the most efficient kitchen and other electric appliances
Consider a solar water heating system for domestic hot water
Consider adding photovoltaic panels to generate electricity

There is no definitive best or “correct” order to install these measures, it depends on the dwelling itself, its condition, the money available and what other major changes you are making.

Your decision making, if you cannot address all issues, is best assisted using a computer energy programme such as the NHER, which will show the sequential energy savings from adding in different measures.
If you want to implement partial environmental improvement when carrying out other works, it is worthwhile considering the list above and seeing what could be integrated with those works. Almost any works can fairly easily include some components from the list and this, over time, can result in your house approaching “Superhomes” standard. You may equally be inspired to do specific energy conservation works instead of a comprehensive package, e.g. solid wall insulation or window replacement.
Eco-retrofitting can be more than energy efficiency

Water saving fittings and collection and use of rainwater have already been mentioned as good environmental ideas. Sustainable drainage where rainwater is allowed to percolate back into the soil rather than run off into the main drainage system is another. Other things you may like to consider are mostly about materials choice:

- Selecting recycled components or products made from recycled material e.g. cellulose insulation like Warmcell
- Choosing wood from sustainable sources, FSC (Forest Stewardship Council) certified timber
- Materials which fix carbon e.g. wood, hempcrete
- Paints and other materials that do not off-gas noxious fumes - water based paints mostly
- Avoiding oil based products e.g. PVC

By Simon Burton
And generally products with low embodied energy, low environmental impact in manufacture, locally sourced and recyclable at the end of their life.
How do I start and where can I get help?

At present we live in a time where knowledge and experience of sustainable refurbishment of houses does not exist widely and care should undoubtedly be taken to get it right. Thus, employing a specific expert sustainability advisor is like employing an architect, it will cost money but it will lead to a better, and overall better value for money, result in the long run. But the expert has to be good, so check references and speak to previous clients and visit completed dwellings if possible.

A list of experts is available on the Superhomes web site. There is no doubt that if you know what you want and understand the issues and options, your negotiations with the experts will be more fruitful. You could start with some of these:
You can bone up using numerous books, e.g. *Sustainable Home Refurbishment* by David Thorpe, *Handbook of Sustainable Refurbishment – Housing* by Simon Burton, both published by Routledge.

You can go on courses, for example at the Centre for Alternative Technology in Wales.

You can visit completed houses open house days. See Superhomes, Bristol Green Doors and Eco Open Houses Brighton & Hove.

Many local authorities have energy show houses which are full of information and relevant products.

Many product manufacturers, for example of wall insulation systems, have technical advice services which will supply information as they do not wish their products to be misused and given a bad name.

The Energy Saving Trust technical publications are available on-line and these are full of reliable information on every aspect of house energy.
renovation at a detailed level. See “Housing professionals” at: energysavingtrust.org.uk/publications/search

 Builders merchants such as B&Q stock lots of energy related products and can provide good ideas and advice

 There is of course the one stop shop of a really good builder, if you know one
Getting the work done

Some builders are getting into the sustainable refurbishment business, realising that it is the future and can be profitable. A builder who knows about eco refurbishment and has experience in fitting insulation, sealing air leaks, finding good windows, installing efficient heating systems and even renewable energy systems, is likely to be able to give the right advice, do the work at reasonable cost and give the best, reliable results. The Superhomes website has the “My green Builder” section.

Another route is to use companies who specialise in specific works such as external wall insulation, or cavity filling. They will have specialist equipment, proven techniques, reliable insurance backing and a large body of experience. Often you will find that your builder will subcontract to such specialists.
Who pays?

Not surprisingly, you will normally have to come up with the money to pay for the improvements. Specific loans from building societies can sometimes be obtained e.g. the Ecology Building Society, and it is hoped that the forthcoming government scheme the “Green Deal” will make loans available for energy renovation works which will be paid back automatically by fuel bill savings, and the loans stay with the house and will be transferred to the new owner if you sell. Some local authority grants may be available from time to time.

But you will get a cash payback, fuel bills will be reduced. Any energy calculation programme will estimate how much your fuel bills will be reduced by, depending on what actions you take and this will be hundreds of pounds every year. Payback of the capital spent can be less than 10 years and from then on the annual savings are simple profit. When you have your Energy Performance Certificate
done when you want to sell your house, it will have a higher rating theoretically adding to the value of the house.

The non-financial payback will often be significant, your house will be more comfortable to live in, it will heat up quicker and cool down slower, you won’t get cold radiation from solid walls and single glazed windows, nor cold draughts. If you want to live in a good quality home, a Superhome, you will never regret the effort spent on making it energy efficient and sustainable.
Is there a down side?

Parting with the cash and the disruption of having builders in your home, are likely to be the worst things you have to suffer. Your local planners may want to be consulted if you intend to change the appearance in conservation areas or with listed buildings, solar panels are sometimes a sticking point. Internal wall insulation will reduce room sizes slightly but the removal of cold areas near windows will effectively balance this out. External wall insulation may require moving gutters and drain pipes and losing a little garden space or moving plants close to the house. Sealing up old draughts may make the house stuffy at times, which is why we recommend extractor fans, but windows can always be opened.

When the works are complete there is nothing to fear. The improvements will be robust and long lived.
Last word

The last word has to be about how you and your family live in the home. An eco renovated Superhome makes it possible to minimise energy use but it’s the occupants that make all the difference. We are always being told how we should live to minimise our carbon footprint:

- Have the heating on only when we need it
- Keep windows closed unless you need ventilation
- Take showers rather than deep baths – and no power showers!
- Turn off lights when they are not needed, even low energy lights
- Don’t fill the kettle for a cup of tea, Boil only as much water as you need, use your microwave, don’t leave equipment on standby

And living in a Superhome is no different but it makes an energy efficient lifestyle much easier.