How would we approach increasing efficiency and reducing carbon emissions of old building?

A User Guide for Personal Use: The energy hierarchy

Where should you start? The answer to this question depends on many things including your budget, the history and character of the building you live in and the current condition of your home. Perhaps the best place to start thinking about these issues is the energy hierarchy. This recommends that you think first about low impact, low cost, energy-saving options and think last about the high impact, high cost, energy-generating options. In the middle there are many possibilities but the key question is always the same: *is there something simpler, less invasive and more cost-effective that I can do first?*

First, reduce your need for energy

This is the simplest and least disruptive level of action but it typically involves some behaviour change which not everyone is willing to do. For example, you could:

- Wear a jumper in the winter and turn the heating down
- Have quick showers instead of long baths (install a high quality aerating shower if necessary)
- Use a clothes airer or washing line and keep the tumble dryer turned off
- Store food in a larder or cool room (if you have one) and keep a smaller fridge
- Turn off the radiators in any room you rarely or never use and shut the door

Second, stop throwing energy away

This is where the big opportunities lie. There is plenty that can be done at zero cost:

- Learn to use your heating controls properly so the heating isn't on when you don't need it
- Close your curtains or shutters in the winter whenever practicable
- Don't boil a kettle full of water for one cup of tea
- Turn appliances off at the wall socket when you don't need them
- Close doors within your home to protect the heat in the rooms where you spend most of your time

- For relatively little cost, the following will all deliver significant energy savings:
- Install low energy lighting
- Put an insulating jacket (or two) on your hot water cylinder
- Draught-strip your doors, windows and floors and install chimney balloons
- Line your curtains with thermal interlining or install thermal blinds
- Install seasonal secondary glazing
- Install thermostatic radiator valves so that you can maintain different rooms at different temperatures
- Insulate your loft
- Install energy efficient appliances when your current appliances need replacing

The following options are costly but effective:

- Reinstate your missing shutters
- Insulate your ground floor
- Install an energy efficient boiler
- Upgrade your windows with permanent secondary glazing or new double glazing

This leaves the most expensive and disruptive option:

- Install wall insulation (interior or exterior)

Third, switch to low carbon or renewable energy

The options are limited in a sheltered city such as Bath but you could:

- Install solar thermal (hot water) panels
- Install solar photovoltaic (electric) panels
- Install a wood burner, if you have a good source of fuel
- Install a ground source heat pump
- This list is only a basic guide.

Table 1. The cost, carbon cost-effectiveness and disruption during installation of a selection of home energy improvement measures. Adapted from the Construction Product Association's *Low Carbon Domestic Refurbishment Guide* with permission of the author (see www.constructionproducts.org.uk for more details)

Measure	Cost	Carbon cost-effectiveness	Disruption
Low energy lights	£	☺☺☺☺☺	●
Draught-proofing	£	☺☺☺☺☺	●●●
Loft insulation	££	☺☺☺☺☺	●●
Floor insulation	££	☺☺☺☺☺	●●●●●
Internal wall insulation	££££	☺☺☺☺☺	●●●●●
External wall insulation	£££££	☺☺☺☺	●●●
Upgrading heating controls	££	☺☺☺	●●
Replacement gas boiler	£££	☺☺	●●●
Low energy appliances	£££	☺☺	●
Replacement windows/doors	££££	☺☺	●●●
Wood pellet boiler	££££	☺☺	●●●●
Solar hot water panel	£££	☺	●●
Micro wind turbine	£££	☺	●●
1 kW solar electric panel	££££	☺	●●
Air source heat pump	££££	☺	●●●●
Ground source heat pump	£££££	☺	●●●●

Key	
£	up to £100
££	£100 - £1,000
£££	£1,000 - £5,000
££££	£5,000 - £10,000
£££££	over £10,000
☺☺☺☺☺	pays for itself
☺☺☺☺	< £10/tonne CO2
☺☺☺	£10-£100/tonne CO2
☺☺	£100-£500/tonne CO2
☺	> £500/tonne CO2
●	you will hardly notice
●●	briefly intrusive
●●●	takes longer but you can live with it
●●●●	very disruptive with installers everywhere
●●●●●	you may have to move out

Key points to consider	Solar hot-water panels	Solar electric (photovoltaics)	Heat pumps	Micro wind turbines	Biomass	Hydroelectric
Wherever possible, equipment should be installed away from the main historic building or key feature of a site. Principal elevations or dominant roof slopes should be avoided.	•	•	•	•	•	
Consider structural impact of heavy equipment on a historic building.	•	•		•		
Consider impact on the setting of a historic building or monument.	•	•	•	•	•	•
Consider cumulative visual impact of more than one installation on a building or group of buildings.	•	•				
Consider impact of colour, texture and finish of equipment against the fabric of a historic building.	•	•			•	
Excavation or drilling work required to install pipes or cables may disturb buried archaeology. Seek advice from your regional archaeological trust.	•	•	•	•	•	•
Storage batteries require the protection of a well-ventilated room or shed away from living areas where there is no health risk and no danger of damaging the historic fabric of a building.		•		•		•
When installing cables or pipes in a building, choose routes that will cause the least amount of damage.	•		•			
Ensure that equipment is easily accessible for future maintenance without disturbing the fabric of a historic building; also, that it can be removed or replaced without causing damage.	•	•	•	•	•	
Consider environmental impact on natural habitats. Seek advice from the Countryside Council for Wales or Environment Agency.	•	•	•	•	•	•
Discuss proposals with the planning and building control sections of your local authority at an early stage to check whether any form of consent is required.	•	•	•	•	•	•