

Hard to Treat Homes Guide



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1 Hard-to-treat homes

The problem

Tackling fuel poverty is currently a high priority for the Government, with many national grant programmes providing basic insulation measures such as loft insulation, cavity wall insulation and draught-stripping for particular groups of vulnerable households. Some also provide gas central heating systems for a more targeted audience.

The UK Fuel Poverty Strategy identifies the issue of 'hard to treat homes' (HTTH) within its aim of eliminating fuel poverty among vulnerable households by 2010. Whilst it doesn't present specific solutions for this area, there is a clear consensus that targets will not be met without dealing with HTTH. The Trade & Industry Select Committee report on fuel poverty, published 10/9/02, summarises the position:

"Most energy efficiency schemes concentrate on comparatively easy and cheap techniques like insulation of roof space and cavity walls and on installation of (ideally mains gas) central heating. This is simply not possible in some homes because of building techniques. In others, the provision of more sophisticated heating systems simply increases the amount of energy used and can actually worsen the degree of fuel poverty experienced by their inhabitants. Technological advances, for example those aimed at improving properties with solid walls, might appear to offer limited benefit to relatively few inhabitants at high financial and other cost, but if they prove the only option for those sorts of properties then the nettle must be grasped."

Hard to treat homes clearly also present a challenge for the implementation of the UK climate change strategy. The technologies and the approaches to improve HTTHs are therefore designed to both reduce the impact of climate change through reducing carbon dioxide emissions and improve the comfort and well-being of many low-income householders.

What are hard-to-treat homes?

HTTH are defined as homes that for a variety of reasons cannot accommodate 'staple' energy efficiency measures offered under schemes such as England's Warm Front programme (and the equivalent government funded programmes in the devolved nations). They may include: homes that are off the gas network; homes with solid walls; homes with no loft space; homes in a state of disrepair; high-rise blocks; and any other homes where for technical or practical reasons these staple energy efficiency measures cannot be fitted.

Almost 9 million UK dwellings are of non-cavity wall construction¹ and around 3 million homes in the UK are outside the gas supply area. Of the latter group, approximately 1.7 million households are less than 23 metres from the gas mains, approximately 300,000 being classified as fuel poor. These all qualify for the standard Transco connection charge of £230 (plus approximately £100 for meter & suppliers admin charge)².

What can local authorities do?

Local authorities are in a unique position to improve HTTH both directly and indirectly. Where they still own housing stock, they are able to address difficult properties within their improvement, and to a lesser extent, maintenance programmes. They are also able to facilitate activity within their areas by the promotion and encouragement of energy efficiency, and also by offering financial incentives. Such a role has been well proven through the implementation of Home Energy Conservation Act³ and Local Agenda 21 strategies, and has been consolidated under the introduction of well-being powers⁴.

Local authorities are well placed to develop energy efficiency and fuel poverty initiatives and form partnerships with local and regional organisations, including housing associations active locally and

¹ Affordable Warmth in Hard to Heat Homes; finding a way forward, The Association for the Conservation of Energy, March 2002

² Hard to Heat Homes: The Fuel Poverty Advisory Group, Transco, December 2002

³ Home Energy Conservation Act 1995, <http://www.defra.gov.uk/environment/energy/heca95/index.htm>

⁴ Local Government Act 2000, England and Wales; Community Planning in Scotland

home improvement agencies. These activities complement existing HECA and fuel poverty reporting requirements⁵.

2 Social housing considerations

Local authorities that own and manage social housing have a direct influence on the energy efficiency of local housing and on the ability of tenants to afford to keep warm. They, as well as authorities without their own stock, also have opportunity to work closely with locally-active housing associations in improving the energy efficiency of social housing.

Policy of improvement

Refurbishment and repairs

Opportunities for improving HTHH are best undertaken as part of a long-term improvement programme. However it is also important that a repair and maintenance policy should be used to improve HTHHs. Implementing a rigid 'like for like' replacement policy is not helpful and, in any case, for boilers and glazing would not be allowable under the Building Regulations (England and Wales 2000, Scotland 2002). An easy to read checklist for replacement of items would be useful for maintenance staff.

Prioritise HTHH?

Consideration should be given within a long-term improvement programme as to whether HTHHs should be prioritised. Doing so may mean that limited capital funding for refurbishment may be diluted and a lower number of houses can be refurbished. Not doing so means that tenants in easier-to-treat homes are more likely to get their houses refurbished.

Which measures?

Within a limited budget, decisions to invest in more expensive measures need careful deliberation. The section on measures outlines the benefits and issues associated with each, and the central table gives a summary of costs and relative energy saving benefits.

In choosing measures, as with any major works, it is important that residents are consulted, being advised of the reasons for works, how decisions were reached, what disruption may be expected from the works and whether there are any options available to them.

Newark and Sherwood DC – 20 Year Investment Programme

Newark and Sherwood District Council has been addressing solid-walled properties since 1985. Following a pilot project, the Council has adopted a 20-year programme and a strategy which delivers affordable warmth to the most vulnerable householder in dwellings of a reasonable size (<100m²). This is achieved through a package of measures, centred around a high efficiency gas central heating system, or a high efficiency oil heating system in rural areas, and 'cost effective' insulation (pipe lagging and draft proofing).

Partnerships with housing associations

There are many opportunities for local authorities to form partnerships with housing associations which are active locally, for their mutual benefit in managing social housing stock. Such opportunities might include collaboration on the following:

- Bulk buying of measures and technologies to make them, particularly the less common ones, more affordable;
- Standardisation of leasing agreements for 'removable' measures such as boilers;
- Disseminating experience of pilot projects such as those funded by EU programmes (Thermie, SAVE, etc);
- Training of staff in awareness of new technologies;
- Energy advice provision for tenants; and

⁵ Relevant guidance on HECA and fuel poverty, e.g for England
www.defra.gov.uk/environment/energy/heca95/ainfo.htm

- ❑ Sharing experience and technical expertise of new and emerging technologies.

3 Private housing considerations

Local authorities are ideally positioned to facilitate investment in energy efficiency by private landlords and owner-occupiers. Numerous examples of such facilitation have been demonstrated through HECA projects over the last few years. Powers to act in these sectors have been substantially reinforced through the introduction of well-being powers⁶ and the new Regulatory Reform Order⁷.

Initiatives for owner-occupiers

Partial grant and loan schemes developed by local authorities have worked well in many areas for staple energy efficiency measures, through supplier incentives or as pioneered through HECAAction programmes. There is increasing evidence of local authorities developing initiatives which offer other measures such as solar water heating and external wall insulation. However as uptake has been limited, it is important to consider the following parameters in developing and marketing similar schemes:

- ❑ Level of funding required from the landlord/resident;
- ❑ Disruption to the premises;
- ❑ Partnerships with credit unions, housing associations or home improvement agencies for administering loan and grant schemes; and
- ❑ Promotion of the benefits of, and experience with, the measure.

There is opportunity also for leasing or rental schemes for higher cost measures, but legal implications and financial liability need to be carefully considered.

Guildford BC – Private sector renovation grants

Guildford Borough Council offers private sector renovation grants of up to £3,000 for measures such as external wall insulation, heat recovery ventilation units and renewable energy technology, if effective in delivering affordable warmth. These are targeting households living in HTHs. The Council is planning a collaboration with energy suppliers to access their Energy Efficiency Commitment funding and is also looking to negotiate bulk discounts for external wall insulation.

Signposting to national grants, such as Solar Grants and Clear Skies, in collaboration with Energy Efficiency Advice Centres is an obvious opportunity to engage local householders. This can also apply to energy supplier schemes where they are offering incentives for the less common measures.

Solar water heating schemes

Various local authorities are implementing schemes to promote solar water heating systems. These include Lewes, Leicester and Kirklees. All make use of bulk discounting and are often accompanied by a small grant to further reduce the price, typically by a few hundred pounds. Leicester's Solar Rental scheme provides flexible financing, whereby the rent charges are designed to match savings in hot water heating costs and householders can buy the system at any time. Applicants to Kirklees and Calderdale's Simply Solar scheme need to have loft and cavity wall insulation installed before accessing these benefits.

⁶ Local Government Act 2000 (England and Wales)

⁷ Regulatory Reform (Housing Assistance) (England and Wales) Order 2002

Birmingham CC – Package of Measures

Birmingham City Council is planning a pilot project aiming to deliver affordable warmth to 2000 hard to heat properties (private and public) in a deprived area by providing a complete package of energy efficiency measures. These include central heating, loft insulation, draught proofing, lagging pipes/tanks and Sempatap (internal wall insulation).

The Council aims to work with the health and education sectors in targeting households and raising awareness. The project will be funded from Home Repair Assistance, renovation and Single Regeneration Budget allocations and from Energy Efficiency Commitment funding. It is also undertaking a feasibility study into the use of community heating in the medium to long term to deliver affordable warmth.

Initiatives for private landlords

Whilst there have been some successes in targeting private landlords with central heating and insulation schemes, there is little evidence of investment in less traditional measures. Successful schemes have involved a mixture of loans and partial grants for central heating systems, which make the property more desirable. There may be opportunities therefore to promote A-rated boilers over the minimum D-rated models.

When developing a scheme aimed at private landlords, there are additional considerations to those mentioned above:

- ❑ As private landlords are a non-homogenous group and their priorities vary considerably, it is important to work closely with a landlords' forum (or even to develop one); and
- ❑ Central heating is perceived to increase the asset value of any property, unlike most insulation. It is conceivable that external cladding could also add value to the property, because of its weather protection and aesthetic benefits. Loft or cavity wall insulation (if appropriate) because of its cost-effectiveness should be an integral part of any proposition that includes a heating system.

Chester City Council

Chester's energy efficiency scheme offers 50% grants to private landlords towards the cost of installing cavity wall insulation, draught proofing, gas condensing boilers and heating controls and ventilation. The scheme depends upon:

- ❑ *A partnership with the local landlords forum, providing a means of accessing landlords and for promotion of the scheme; and*
- ❑ *An existing accreditation scheme which includes energy efficiency.*

4 Selection of measures and technologies**Systems approach**

For refurbishment, it is important to take an overall systems perspective and to make use of the improvement and upgrading opportunities presented. Consideration should be given, wherever possible, to:

1. Reducing heat load;
2. Employing an efficient (and, for fuel poor households particularly, cheap) form of heating;
3. Considering efficient lights and appliances; and
4. Using renewable forms of energy including electricity supply.

For individual retro-fit measures, it would be prudent for each local authority to have a hierarchy of measures in order of priority. This could be drawn from the list of measures, shown in cost-effectiveness order in the table, but based upon local priorities, housing stock, funding sources available and/or likely interest from householders and landlords.

Investment in very efficient gas (or oil) boilers alongside appropriate cost-effective insulation measures should achieve affordable warmth for many households. This means that for instance considering a top A-rated boiler rather than a D-rated model for many solid walled properties would be a cost-effective upgrade.

Issues

The extra cost of a condensing boiler represents a cost-effective investment. As some plumbers are still reticent to install condensing boilers, it is important to look for an experienced installer.

Further information

From the Energy Efficiency Best Practice programme:

- ❑ GPG 284 - Domestic central heating and hot water: Systems with gas and oil-fired boilers – guidance for installers and specifiers
- ❑ GIL 074 – Domestic Condensing Boilers: The Benefits and the Myths

Oil-fired condensing boilers

Description

Oil-fired condensing boilers are high-efficiency oil-fired boilers which, when operating at optimum conditions will cause the exhaust steam to condense. A separate drain for the mildly acidic condensate is therefore required, which can be plumbed into existing sink wastes or connected to a new soakaway. Their increased efficiency is largely down to the effectiveness of the heat exchange process, which for many units requires two heat exchangers, which being non-moving parts do not affect reliability. Minimum operating efficiency as required by Building Regulations in Scotland, England and Wales, is 85%, whilst the best available oil-fired condensing boiler is 95% efficient, representing an improvement of one-eighth over the minimum.

Issues

The extra costs of an oil-fired condensing boiler over a conventional one is greater than that for a gas condensing boiler but this can still be more cost-effective than other measures (see table).

Further information

From the Energy Efficiency Best Practice programme:

- ❑ GPG 284 - Domestic central heating and hot water: Systems with gas and oil-fired boilers – guidance for installers and specifiers
- ❑ GIL 074 – Domestic Condensing Boilers: The Benefits and the Myths

Internal wall insulation (of exterior walls)

Description

Internal wall insulation can be carried out with internal drylining, most commonly with composite plasterboard-insulation boards, or by installation of an internal wall with a ventilated cavity. It is often considered too disruptive and expensive unless major refurbishment or repairs, such as replastering, are being planned. It is commonly used by the Northern Ireland Housing Executive (NIHE).

Issues

Detailing is an important consideration, particularly the sealing of openings in the new board and ventilation of new cavities to eliminate the risk of condensation within the wall construction (warm air must not be allowed to condense on cold surfaces).

One disadvantage of dry lining is the durability of the plasterboard. This can be overcome by alternative building boards (NIHE is piloting one product).

Some innovative proprietary products such as mould-control plastic foam or multi-layered foil offer alternative dry-lining solutions but may not deliver the same insulation properties, or as cost-effectively, as more conventional materials. The former is usually used to reduce levels of condensation on kitchen and bathroom walls, and should not cause the same levels of disruption as conventional dry-lining.

Further information

From the Energy Efficiency Best Practice programme:

GPG 138 – Internal wall insulation in existing housing – A guide for specifiers and contractors

External wall insulation

Description

There are many proprietary systems available for the external insulation of walls, which have been used extensively on social housing. These may comprise cladding panels, fixing systems and insulation, sometimes with a ventilated cavity, or an insulated render.

Issues

This measure is perceived as expensive for insulation purposes alone but it can offer cost-effective energy efficient benefits if rainscreen protection is required for the building. The costs of scaffolding for medium and high-rise blocks can be significant, and the structural integrity needs to be reviewed before taking additional loading of external panels. There are additional aesthetic benefits although there may also be planning issues to consider (see planning section). There is minimal disruption to tenants.

Further information

From the Energy Efficiency Best Practice programme:

- ❑ GPG 293 – External insulation systems for walls and dwellings
- ❑ GPG 155 – Energy-efficient refurbishment of existing housing

Heat pumps

Description

Ground source heat pumps (GSHPs) are an alternative means of space and hot water heating which extract heat from the ground. Effectively they are a refrigerator operating in reverse, whereby the energy required to power the refrigerant pump is used to transfer a lot more energy, typically more than 3 times. The heat collector is located below ground either in a shallow trench or a deep borehole.

Air-source heat pumps do not demonstrate the same levels of efficiency.

Issues

A GSHP requires a large area of ground in which to lay the pipe or sufficient access for a drilling rig for a borehole. Careful consideration should be given to the location of the collector. Additionally GSHPs are not suited to uninsulated and large dwellings because the heat load demands a 3-phase electricity supply.

Further information

From the Energy Efficiency Best Practice programme:

- ❑ GPG 339 – Domestic Ground Source Heat Pumps: Design and installation of closed-loop systems
- ❑ GIR 072 – Heat pumps in the UK – a monitoring report

Heat pump Centre www.heatpumpcentre.org/org/home.htm

Solid fuel cassettes

Description

Solid fuel cassettes or open fire converters are used to enclose an otherwise open fire, to ensure that more of the combustion energy is used to heat a room. They can be as efficient as 65%, compared to an open fire of 10% to 45%.

Issues

As many people are used to 'open' fires, they may be reluctant to enclose them. If solid fuel cassettes are seen as one of the main ways of reducing the incidence of fuel poverty in a given area, a substantial marketing campaign is likely to be required.

Further information

Solid Fuel Association – www.solidfuel.co.uk

Wood-fired boilers

Description

Wood-fired pellet boilers use wood pellets as the fuel source, which are denser and more easily handled than solid wood. The use of pellets alongside a hopper system and an automatic feed system ensure that these boilers can be easily controlled. (Most wood fires are not very controllable.) The hoppers need to be filled manually, as often as twice per week in winter months and twice a month in the summer⁹. Depending upon the source of this wood, its use could be considered as carbon-neutral.

⁹ Alternative Measures for HEES, NES report for National Assembly of Wales, April 2002

Issues

Regular filling of hoppers may render these wood-fired boilers unsuitable for some households. They will not be suitable for use within Smoke Control Areas (but are no less suitable than open wood fires)

Further information

Introducing wood pellet fuel to the UK - www.dti.gov.uk/renewable/pdf/BU100623.pdf

Measures table

Measure	References	Potential Funding Sources	Typical cost [£/house] ⁹	
			Min	Max
Loft insulation (200mm) ^{e,k}	2,5,11,12	EEC, FP	200	250
Cavity wall insulation (50mm) ^e	2,5,11,12	EEC, FP	200	400
Gas condensing boiler	12,17	Transco, EEC	100 ^a	300 ^a
Solid fuel cassettes ^b	7,12	Warmfront, HEES	500	800
Oil condensing boilers	5,12,17,18	Local authority money	400 ^a	600 ^a
Internal wall insulation (50mm) ^e	2,5,6,11	EEC, FP	650	1650
Ground Source Heat Pumps ⁱ	3,15,16	Clear Skies/SCRI	3900	7000
External wall insulation (50-70mm) ^e	2,5,6,11	EEC, FP	2500	4000
Solar water heating ^c	4,6,9	Clear Skies/SCRI	2500	4000
Advanced glazing ^m	19	EEC	500	1500
Photovoltaic panels ^j	6,8	Solar grants/Clear skies/SCRI	6000	8000
Heat recovery ventilation units - room sized ^d	10,14	EEC	150 ^a	300 ^a
Wood-fired boiler	7,9	Clear Skies/SCRI	4500 ⁿ	5000 ⁿ

Key

- a Marginal cost of purchasing more energy efficient option. Gas boiler use 78% and 90% efficiencies, oil 78% and 95% efficiencies.
- b Assumes 3100 kWh room with a conversion from an open fire to a closed room heater with efficiencies of 28% and 60% respectively.
- c Calculations based on heating water only for 2.8m² of panel, providing 40-50% of the hot water for a family of four.
- d Calculations based on air change of 27m³/hr with a 13°C temperature difference at 85% heat recovery efficiency.
- e Assumes a floor area of 80m², roof area of 40m² and wall area of 90m².
- f Based on 4 tonnes of loose wood pellets providing heat and water for a year at £350/tonne.
- g Based on a 2-3 bed semi-detached house requiring 13500kWh space heating and 2500kWh water heating, with all costs quoted as installed costs.
- h Savings made will depend on the type of fuel/heating system currently being used. Where this is not obvious assume gas heating as a reference.
- i Based on a coefficient of performance of 3 with 13500kWh required to heat the house annually.
- j Based on a 1kWp system of 10m² multicrystalline modules.
- k 200mm based on data from reference 6 when used as a top-up measure.
- m Assumes an improvement in U-value from 2.0 to 1.5 W/m²K.
- n Based on 15KWth system burning wood pellets. This figure could double if burning wood chips.

References

- 1 EEBPp Good Practice Guide 155 - Energy-efficient refurbishment of dwellings
- 2 EEBPp Good Practice Guide 171 - Energy efficiency primer
- 3 EEBPp Good Practice Guide 339 - Domestic ground source heat pumps: Design and installation of closed loop systems
- 4 Solar Trade Association website - www.greenenergy.org.uk/sta/
- 5 Transco Hard to Heat Homes report
- 6 Welsh Assembly Government Report - Alternative measures for HEES (written by NES)
- 7 Solid Fuel Association website - www.solidfuel.co.uk
- 8 PV UK website - www.pv-uk.org.uk
- 9 Clear Skies website - www.clear-skies.org
- 10 Vent-axia technical helpline - 01293 526 062
- 11 NHER - Good Practice Guide HECA Monitoring strategies
- 12 Sutherland tables - Central Midlands Autumn 2001
- 13 Lior International NV
- 14 Baxi technical website - www.baxicleanairsystems.co.uk
- 15 Heat Pump Centre website - www.heatpumpcentre.org
- 16 EEBPp General Information Report 072 - Heat pumps in the UK
- 17 National Energy Foundation website - www.natenergy.org.uk
- 18 Plumbcentre UK website - www.plumbcentre.co.uk
- 19 ACEEE website - <http://aceee.org/press/op-eds/op-ed2.htm>

Typical energy saving [kWh/yr]	Typical cost saving ^h [£/yr]		Typical cost benefit [p/kWh]	Energy costs [p/kWh] Reference	Energy type
	Min	Max			
4,800	35	45	0.16		
3700	75	150	0.27		
2735	90	110	0.49		
5904	90	110	0.73		
3400	90	110	0.98	1.4	Mains gas
3700	75	100	1.04	1.8	Solid fuel house coal
9000	120	600	2.42	2.2	Oil
3700	85	120	2.93	2.4 ^f	Wood pellets ¹³
1750	25	120	9.29	2.6	Off-peak electricity
500	17	60	13.33	3.5	LPG
750	50	60	18.67	6.9	On-peak electricity
36	1	3	23.15		
No data on comparison before/after					

Funding Abbreviations

SCRI	Scottish Community Renewables Initiative
EEC	Energy Efficiency Commitment
FP	Fuel poverty programmes: Warm Front, Warm Deal, HEES in Wales, Warm Homes
Transco	Transco Affordable Warmth programme

Solar water heating

Description

Solar water heating systems tend to use one of two main products types, either flat panels or evacuated glass tubes. Installed on roughly south-facing roofs (+/- 30 degrees), they can save around half the annual hot water costs of a domestic property.

Issues

There are a limited number of installers in the UK but training is available for heating engineers and plumbers through the Shine 21 programme. There is often a wide range of prices, some of the higher prices being associated with direct selling companies. The Solar Trade Association has a code of conduct for its installers. There is little experience of compatibility with combination gas boilers although some manufacturers of combination boilers do specify compatibility.

Further information

Solar Trade Association – www.greenenergy.org.uk/sta

Photovoltaic panels

Description

Photovoltaic (PV) panels generate electricity from the light falling upon them. Building-related PV cells tend to be based upon one of a number of silicon technologies with different efficiencies (mono-crystalline silicon, poly-crystalline silicon, thick and thin film amorphous silicon). Generating DC voltage, they require invertors to be able to connect to mains voltage. PV modules come in a variety of shapes and sizes including roof tiles, glass laminates, standing seams and shingles.

Issues

High capital cost remain an issue for many landlords and householders, but the Solar Grants programme now offers grants towards the cost of this measure. As with other small-scale renewable electricity generation, exporting electricity is not usually a good economic proposition. Metering and connection to the electricity distribution network need to be considered alongside the export tariff.

Further Information

British Photovoltaic Association – www.pv-uk.org.uk

Heat recovery ventilation units

Description

These room ventilation units recover heat from the extract air in order to heat incoming air. More expensive than normal extractor fans, they can recover 60% to 85% of heat that would otherwise be wasted. Humidistat-controlled versions are available, making it suitable for social housing by eliminating the need for tenants to switch them on or off.

Issues

Ventilation is an important energy consideration and yet is not always considered to be an energy efficiency problem. Heat recovery ventilation units are not cost-effective from purely an energy saving perspective, as can be seen from the table, but their other benefits are significant; improved comfort is one. Also for social housing providers, maintaining reasonable internal humidity levels will minimise maintenance and management costs¹⁰. For occupants, fresh warm air will have health benefits, particularly where mould spores are not allowed to develop.

Further information

From the Energy Efficiency Best Practice programme:

- ❑ GPG 268 – Energy-efficient ventilation in housing – A guide for specifiers on the requirements and options for ventilation

For a list of manufacturers, contact the Residential Ventilation Association www.feta.co.uk/rva/rva01.htm

¹⁰ Benefits to the landlord of energy efficient housing, HEEBPP GPG 21 and related case studies

Combined heat and power (CHP)

Description

Combined Heat and Power (CHP) involves the simultaneous generation of heat and electricity (co-generation). Technologies to power the generators can vary from gas-powered internal combustion engines to large combined cycle gas turbines. CHP should be considered for all high-rise blocks, high-density newbuild housing schemes and existing community or district heating networks. As it is more cost-effective for continuous high heat demand, it suits applications such as leisure centres, hotels and civic centre for instance and therefore should be considered for mixed-use applications, and not just domestic heat loads.

Issues

CHP represents a considerable capital and long-term investment, as well as requiring substantial planning time. It is economically preferable for the landlord to make use of the electricity generated e.g. for communal lighting, lifts etc, rather than exporting it through the distribution and transmission network with their associated costs. There are a variety of financing packages available to obviate capital investment by the landlord but the economics of investment in CHP are highly dependent upon the cost of the primary fuel (gas, biomass, etc) and the value of the electricity and heat generated.

Further information

From the Energy Efficiency Best Practice programme:

- GPG 234 – Guide to community heating and CHP

Combined Heat and Power Association – www.chpa.co.uk

Advanced glazing

Description

Building Regulations in England and Wales set thermal standards of glazing of 2.0 and 2.2 W/m²K overall U-value), for windows with wood or PVC and metal frames respectively. These are weighted average figures, taking account of the thermal conductivity of frames. Scottish Regulations are more complicated and take account of heating systems and therefore U-values can be as low as 1.8 W/m²K.

It is possible to get advanced glazing systems with even better thermal performance, perhaps with a U-value as low as 1.0 W/m²K. Windows with U-values nearer 1.5 would be easier to obtain.

There is anecdotal evidence that these products need not incur an unnecessarily high cost premium for the improved thermal performance.

Issues

As this is still a niche market, products are typically produced outside of the UK, in areas such as Scandinavia or the USA. There may be a range of price premiums and so it is important to shop around to get the best prices and specifications.

5 Planning and building control issues

Planning

Where any measures are perceived as having a material alteration to the dwelling, then planning consent will be required. However, as there are likely to be differences in the interpretation of the Planning Policy Guides, it is important to be clear with the relevant Local Planning Authority (LPA). Some LPAs may have issued their own Supplementary Planning Guides, which would clarify their interpretation. Measures likely to need checking include external wall insulation, solar thermal units, photovoltaic panels and glazing. Dwellings in conservation areas, Areas of Outstanding Natural Beauty or listed buildings have greater constraints, the latter requiring a specific listed building consent.

The following table summarises the likely impacts on planning and building control.

PLANNING CONSIDERATIONS - RETROFIT

Measure	Building control approval or use of approved scheme	Planning consent in: most areas	conservation areas	AONB	listed buildings	Further support
Solar thermal	No	Possibly	Yes	Yes	Yes	www.practicalhelp.org.uk/ PPG 22, England and Wales
Photovoltaic External Wall insulation	No	Possibly	Yes	Yes	Yes	
Glazing	Yes	Yes	Possibly	Yes	Yes	www.inca-ltd.org.uk/ http://fensa.ggf.co.uk/

Building control

Certain retrofit measures will need to conform with the Building Regulations in Scotland, England and Wales. These are glazing, boilers and hot water tanks, the latter two requiring upgrading of controls as well. These standards for existing dwellings are relatively new, and replacement will always result in an energy efficiency improvement. However, given the difficulties in achieving affordable warmth in HTHH, it makes sense to consider the highest possible energy efficiency at the time of replacement, particularly with respect to boilers. Careful selection of specifications can make a considerable difference for little or no additional cost. Building Control approval or conformance with an approved accreditation scheme should be sought.

Building Regulations do not impose standards for retrofit internal or external wall insulation, unless a wall is being rebuilt. However the Regulations remain a good benchmark for the specification of wall insulation, whether internally or externally applied to existing dwellings.

6 Funding

Sources of funding and means of financing should be reviewed once the measures required have been selected.

Potential sources of funding include:

- Energy suppliers under the Energy Efficiency Commitment: local authorities and housing associations should make a case for the energy savings that can be made through investment in certain measures within their stock. Suppliers will be generally looking for the most cost-effective ways to meet their targets (resulting in limited opportunities therefore for HTHH in the short-term), unless there are any benefits relating to marketing and publicity from investment in less standard measures. There may be an opportunity for suppliers to fund the cost of the insulation within a cladding programme required for rainscreen protection;
- The Community Energy Programme, for community heating and combined heat and power or biomass heating;
- The Clear Skies and Scottish Community Renewables Initiative for small-scale renewable energy projects such as solar water heating, solar water heating, hydro, ground source heat pumps, automated wood pellet stoves and wood fuel boilers; and
- The Solar Grants programme for photovoltaic systems;
- The New Opportunities Fund: Renewable Energy Fund for small-scale biomass heating systems.

Financing mechanisms can include offering to lease of removable appliances and preferential loans as well as grants.

- Transco Affordable Warmth programme can underwrite leases for gas central heating systems
- The European Investment Bank has an agreement with the Co-operative bank for low interest loans aimed at the fuel poor in regional development areas.
- A number of financing mechanisms exist for the installation, commissioning and running of CHP plants, from manufacturers and energy service companies.

7 Further help

Practical help – T: 0870 241 2089, F: 0870 130 8831, E: info@practicalhelp.org.uk, W: www.practicalhelp.org.uk, A: Practical help, 120b Dalberg Road, London, SW2 1AP

Action Energy – T: 0800 58 57 94, E: help@actionenergy.org.uk W: www.actionenergy.org.uk/ActionEnergy/default.htm

Energy Efficiency Best Practice in Housing Programme – T: 0870 120 7799, F: 0845 1207789
E: bestpractice@est.co.uk, W: <http://www.est.org.uk/bestpractice>

The Glass and Glazing Federation - T: 020 7403 7177, F: 020 7357 7458,
E: info@ggf.org.uk, A: 44 - 48 Borough High Street, London SE1 1XB

INCA- Insulated Render and Cladding Association - T: 01428 654 011, F: 01428 651 401, E: incaassociation@aol.com, W: www.inca-ltd.org.uk, A: INCA, PO Box 12, Haslemere, Surrey, GU27 3AH

New and Renewable Energy Enquiries Bureau – T: 01235 432 450, F: 01235 433066, E: NRE-Enquiry@aeat.co.uk, W: www.dti.gov.uk/renewable/index.html, A: New & Renewable Energy Enquiries Bureau, ETSU, Harwell, Didcot, Oxfordshire, OX11 0RA

OFTEC – Oil Firing Technical Association – T: 0845 65 85 080, F: 0845 65 85 181, E: enquiries@oftec.org, W: www.oftec.org.uk, A: Foxwood House, Dobbs Lane, Kesgrave, Ipswich, IP5 2QQ

OFGEM – Office of Gas and Electricity Markets, for information on the Energy Efficiency Commitment -
T: 020 7901 7119/ 7332/ 7003, F: 020 7901 7378, E: library@ofgem.gov.uk, W: www.ofgem.gov.uk, A: OFGEM, 9 Millbank, London, SW1P 3GE

Solid Fuel Association – T: 0845 601 4406, E: sfa@solidfuel.co.uk,
W: www.solidfuel.co.uk/frame/800index.html, A: 7 Swanick Court, Alfreton, Derbyshire, DE55 7AS

Combined Heat and Power Association – T: 020 7828 4077, F: 020 7828 0310, E: info@chpa.co.uk, W: www.chpa.co.uk, A: Combined Heat and Power Association, Grosvenor Gardens, London, SW1W 0BS

British Photovoltaic Association – T: 01908 442291, F: 0870 0529 193, E: enquiries@pv-uk.org.uk, W: www.pv-uk.co.uk, A: The British Photovoltaic Association, National Energy Centre, Davy Avenue, Knowlhill, Milton Keynes, MK5 8NG

8 Updating of this guide

This guide attempts to bring together an overview of different sustainable energy technologies in one accessible guide, within the constraints of making assumptions for an average house. As both costs and efficiencies or effectiveness of these technologies are expected to change over time, it is the intention of the Energy Saving Trust to update this guide on a regular basis. EST would therefore like to hear from manufacturers, installers or specifiers as to how this guide may be improved, particularly on progress of the technologies. Please send any suggestions for improvement to:

Practical help
120b Dalberg Road
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E: info@practicalhelp.org.uk