Making Old Buildings Energy Efficient
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Introduction

‘In environmental terms, the continued use of existing building stock, whether or not of particular architectural merit or historic interest, coupled with measures to improve energy efficiency, is a global priority. New build construction, by comparison, is a major user of non-renewable resources and energy.’

It is now generally accepted that we need to live in a way that protects the inheritance of our children and future generations. This applies to all aspects of the environment, natural and built. Effective adaptation of our existing building stock to meet modern requirements for energy efficiency is one important way of creating a more sustainable society.

Around a quarter of our existing buildings are of traditional construction, built before 1918 with methods and materials no longer in common use. Before making changes to the fabric, these aspects of a building need to be understood.

The following information aims to help owners of traditionally constructed buildings make informed decisions on how to create more energy efficient and sustainable homes while protecting their structural integrity and historic character.

Local materials and styles

Part 1: Energy efficiency - a statutory requirement

The buildings that we live and work in consume almost half the energy produced in Britain. Becoming more energy efficient could help slow down climate change, and will also save you money. The government has introduced a number of measures to reduce the amount of energy used in our homes.

Part L of the Building Regulations

Recent changes to the Building Regulations Part L (Conservation of fuel and power) were designed to make both new and existing buildings more energy efficient and therefore reduce CO2 emissions.

The regulations require that whenever significant works are carried out to a building, reasonable provision should be made for the conservation of fuel and power by limiting heat gains and losses; providing energy efficient building serviced with effective controls; providing information on the building and the maintenance and operation of the fixed services to enable the building owner to operate them efficiently.

Go to: [www.planningportal.gov.uk/england/professionals/en/4000000000562.html](http://www.planningportal.gov.uk/england/professionals/en/4000000000562.html) for more information on Part L

Energy Performance Certificates

It will soon be compulsory to produce Energy Performance Certificates (EPCs) each time a building is constructed, rented or sold. These certificates will form part of the Home Information Packs (HIPS) phased in from August 2007 for domestic buildings.

The EPCs will aim to provide a Standard Assessment Procedure (SAP) rating for the building (see Table 1), showing its energy efficiency; and its
Environmental Impact rating (EI) on a scale from A-G (where A is the most efficient and G the least efficient). It will also contain recommended ways to improve the building’s energy performance.

The EPC will give an estimate of the current energy use of a building, and then make recommendations for improvements, along with a predicted potential reduction in energy use. However, these calculations are based on generalised data, with automated recommendations. They do not take into account the individual construction and character of non-standard old buildings. This means that, without further analysis, many EPCs for old buildings will not accurately reflect their energy efficiency.

For more detail on HIPs, their use in relation to traditional buildings, and some of the potential problems, go to:

www.english-heritage.org.uk/server/show/ConWebDoc.11600

Quayside: ‘The embodied energy in the brickwork of a Victorian terrace is equivalent to that needed to drive a car five times round the world.’

Embodied energy is the energy consumed by all of the processes associated with the production of a building: obtaining the natural resources, such as sand or oil, processing and manufacturing, transport of raw materials and finished products, demolition and disposal. Embodied energy is a significant component of the lifecycle impact of a home. It is more sustainable to keep this unit of embodied energy in good repair - with appropriate energy efficient measures installed - than to lose it through demolition and new build.

Historic building legislation

Some alterations to improve energy efficiency require planning permission from the local planning authority. For example, works to alter a roof in order to install solar
panels or photovoltaic cells would require permission, as would external cladding of a building in a conservation area.

In addition, if a building is listed, consent is required for any alterations that affect the character or appearance of the building, such as replacement of original windows. Before making any radical changes to your building it is always a good idea to check whether you need permission by contacting the conservation officer at your local planning authority (contact details at end).

As noted above, Part L of the building regulations requires improved standards of energy efficiency to be adopted into any major alteration to an existing building. For example, if single-glazed windows are to be renewed double-glazed units will usually be required as replacements. **These regulations can be relaxed if the building is listed, in a conservation area, or can be shown to be of local historic interest.** Other means of conserving energy, for example, through the use of secondary glazing, or through increased insulation in other areas of the building, can usually be incorporated into the design to compensate for measures which conserve the character or appearance of an old building. If in doubt, speak to your local conservation officer.

**Historic timber is likely to be of better quality than modern replacements.** Repair and draught-proofing or secondary glazing can be a viable alternative and retains the historic appearance of your house.
Table I: Energy efficiency measurements: A number of systems are used to measure energy efficiency and this can be confusing. This table sets out the main measurements you will come across:

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Background information</th>
<th>Good level indicated by</th>
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<tbody>
<tr>
<td>SAP (Standard Assessment Procedure)</td>
<td>The SAP estimates the space and heating costs of a building and converts them into a rating on a scale from 1 to 100: the higher the number the lower the energy costs. The Energy Saving Trust suggests that a SAP rating of 75 is the minimum target for an existing building. It is important to note that this procedure measures costs rather than emissions - so for example, if fuel costs decrease, householders may turn up their heating and emit more CO2 without paying more and with no knock-on effect on their property’s SAP rating.</td>
<td>High number (75 and above). This is converted into a scale from A-G</td>
</tr>
<tr>
<td>RDSAP (Reduced Data Standard Assessment Procedure)</td>
<td>The RDSAP was introduced to help speed up the EPC process for new buildings, but uses a standardised method not easily assessed in existing buildings. English Heritage recommends that a more detailed SAP process is followed for historic and traditional buildings. See <a href="http://www.english-heritage.org.uk/upload/pdf/Energy-Performance-Certificates.pdf">http://www.english-heritage.org.uk/upload/pdf/Energy-Performance-Certificates.pdf</a></td>
<td></td>
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<tr>
<td>Energy Efficiency rating</td>
<td>Another way of describing the SAP rating.</td>
<td>As above.</td>
</tr>
<tr>
<td>DER (Dwelling Emission Rate)</td>
<td>Part of the SAP rating which estimates the carbon dioxide emissions from heating and lighting each year. Only used in new buildings, buildings which have been extended, or where there has been a change in use (e.g. barn to residential)</td>
<td></td>
</tr>
<tr>
<td>EI rating or EIR (Environmental Impact)</td>
<td>Part of the SAP. This is a measure of the carbon emissions from a property, measured on a scale of 1 - 100. The higher the number, the less CO2 will be emitted.</td>
<td>High number (75 and above). This is converted into a scale from A-G</td>
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### Table I: continued

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<thead>
<tr>
<th>Measurement</th>
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<tr>
<td><strong>U-value</strong></td>
<td>The U-value is used to express the rate of heat loss through an external building element such as a wall or window. A construction with a U-value of 1W/m²K would lose 1 Watt of energy through a 1m² area for every 1ºC difference in temperature between the inside and outside. A low U value means that the construction is well insulated. U values are used to calculate the SAP rating of a building.</td>
<td>Low number (e.g. less than 1.0)</td>
</tr>
<tr>
<td><strong>R-value</strong></td>
<td>The R-value represents the resistance that a series of elements has to the passage of heat energy. It is affected by the thermal conductivity of the element and its thickness. The higher the R-value, the greater the resistance and the better the insulation effect. Because thermal properties of individual products vary, the thermal conductivity value should be checked with the manufacturer.</td>
<td>High number</td>
</tr>
<tr>
<td><strong>BFRC</strong> (British Fenestration Rating Council)**</td>
<td>The BFRC compares the overall energy performance of windows, based on the annual energy flow. Most windows have a negative rating; this indicates a net heat loss over the year. A few very high performance products may be able to achieve a positive figure, indicating a net capture of heat. The ratings are classified A-G. In time, it is expected that the BFRC rating will replace the U-value as the main method for specifying windows. More info at <a href="http://www.bfrc.org">www.bfrc.org</a>.</td>
<td>‘A’ rating</td>
</tr>
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3 **Source:** Energy Saving Trust
Part 2: Energy saving in your house

Insulation

Insulating our houses effectively is a vital step towards saving energy.

Houses built before the First World War usually have solid walls. Water vapour is absorbed by the wall material during wet periods and then evaporates away in drier periods without causing damage. Attempting to seal one or both sides of a solid wall will reduce or prevent existing moisture inside the fabric from escaping, as well as affecting their visual character.

Standard types of insulation applied directly to the internal face of a solid wall will have the effect of reducing its temperature because it no longer receives warmth from the inside. As a result, condensation commonly occurs on the internal wall behind the insulation where its damaging effects can not be seen. In the worst cases these cold, wet walls can cause a rise in U-values, and a reduction in thermal performance.

However, naturally-based products with good ‘breathability’ and hygroscopic qualities (i.e. readily absorb moisture) are now being marketed - see website links at the end for further information. Consent would be required for application of both external and internal insulation applied to the walls of a listed building. Consent would also be required for external insulation applied to a building within a conservation area.

Some buildings of special architectural or historic interest are entered on a national list. Listed building consent is required for proposals which would affect the appearance of such a building. If you are not sure whether your building is listed, or in a conservation area, please contact the conservation officer at your local authority - see contact details at the end.
Case Study 3: Natural insulation and limecrete floors at 31, High Street, Dereham

This brick and partially timber-framed building, listed Grade II, was semi-derelict for a number of years, prior to acquisition by Breckland District Council. Repair works incorporated ‘claytec’ clay plaster; ‘pavatherm’ insulation boards and limecrete floors.

‘Claytec’ is a clay-based plaster which has low embodied energy, being 100% natural, and has good temperature and moisture regulating properties, making it particularly appropriate for solid walls. Its disadvantage is the lengthy drying time - usually a week. The plasterer on site reported that it was pleasant to use, but more time consuming than conventional plasters, requiring careful planning.

To save maximum space ‘pavatherm’ wood fibre insulation board (40mm), usually specified for floors, was fixed over the ‘claytec’, rather than ‘diffutherm’ (60mm), designed for walls. This still achieved a U-value of 0.7. The walls were finished with a lime based plaster coat and two coats of limewash. Wood fibre board is made from a sustainable resource and is vapour permeable, making it particularly suitable for use on solid wall constructions.

Limecrete was used for the ground floor, in preference to a solid concrete floor. Limecrete has lower embodied energy than concrete, is vapour permeable, flexible and light, making it particularly appropriate for older buildings. It also contributes to the insulation value of the floor, reducing the amount of additional insulation required. Slaked lime was mixed with expanded clay beads laid onto a bed of loose-fill insulating aggregate. Locally made clay pammets were bedded onto the limecrete with a lime mortar. The contractor reported that limecrete is sticky to use, and takes a long time to dry out - a week to ten days before it can be walked on, and a further two weeks to completely cure. Again, this requires careful planning of site work.
Insulating under suspended floors and in roof spaces of older buildings is usually more straightforward, and can bring substantial energy savings without adverse effects. However, care should be taken not to damage floorboards when lifting them, particularly in listed buildings. It is also important to ensure that insulation material does not block ventilation under floors and in roof spaces.

An uninsulated loft space would typically have a U-value of around 2.5 W/m²K. With 100mm of insulation this improves to 0.4 W/m²K. With two layers, covering the joists, 0.16 W/m²K can be achieved.\textsuperscript{5}

There are three main types of insulation available:

* Mineral wools
* Oil-based products (e.g. polystyrene)
* Organic: wool, flax, cellulose, wood fibre, hemp

Mineral wools and oil-based products, used by most insulation installers, are non-renewable, have high embodied energy and are difficult to dispose of. They are also unpleasant to use for the installer. Organic insulation does not have these problems but is usually more expensive.

However, organic insulation may last longer than other types because it can absorb and release water without damage. This ‘breathability’ makes organic products particularly appropriate in old buildings.

Grants are available towards the cost of insulation - go to the weblink below for further information:

www.energysavingtrust.org.uk/what_can_i_do_today/energy_saving_grants_and_offers

\textsuperscript{5}Source: Energy Saving Trust
Case Study 4: Insulation at 48-50 Station Road, Foulsham

These 19th century unlisted cottages have been renovated and extended by local builders Hendry & Son. They are built from clay lump, faced with brick.

Mr Hendry wanted to insulate the houses to comply with new-build standards of efficiency while retaining the historic character of the cottages and using appropriate traditional materials such as lime for re-pointing.

Mr Hendry is a local supplier of Thermafleece - insulation made from British sheep’s wool insulation. He favours this insulation over conventional products because it is pleasant to install and does not contain chemicals which might leach out over time. In addition, he feels it is particularly suited to old buildings because of its hygroscopic qualities. Although Thermafleece is more expensive than conventional products he feels these benefits, and lower fuel bills when occupied, will justify the initial outlay. A thickness of 250 mm was used in the lofts of the cottages.

Solid floors in the new rear extension were created using limecrete rather than concrete. Conventional insulation was used under floorboards (75mm) and to line walls (75mm) before plastering. No cement was used in any part of the restoration.

Environmental indicator ratings were calculated for a standard extension, compared to the built extension incorporating the above measures. The results were:

* Carbon dioxide emissions from the existing dwelling plus a standard extension (not built): 3.85 tonnes

* Carbon dioxide emissions from the existing dwelling plus extension as built: 2.73 tonnes
Draught-proofing

Draught-proofing your house is a simple measure to improve energy efficiency - but remember that solid walled buildings need circulation of air to allow evaporation of moisture. Without correct ventilation, an airtight room will often suffer from condensation and mould growth. This can also contribute to health problems. Also, open-flue appliances need a direct fresh air supply to operate safely.

The aim should be to control the number of air changes which occur in the house every hour. Air infiltration tests can be undertaken which assess the existing and predicted performance of your building. The Energy Saving Trust recommends an average natural ventilation rate of between 0.5 and 1.0 air changes per hour.

Often, the main source of draughts in old houses will be from badly fitting windows and doors, which are usually made from timber, and can commonly be over a hundred years old. Householders are often led to believe that such windows are not capable of being energy-efficient and that they should be replaced with modern materials, usually uPVC. But before replacing your existing timber windows and doors there are several environmental issues to think about: see Table 2

Plastic window and timber window

Repairing an existing window is likely to be more sustainable than throwing it away and making a new one - and will preserve the historic character of your property.
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Table 2: Sustainability issues relating to uPVC and timber

* The manufacturing process of uPVC is long and produces toxic by-products
* Other chemicals are added to uPVC to improve stability and other qualities. This makes uPVC very difficult to recycle
* uPVC does not biodegrade when it becomes waste. Additives are susceptible to leaching in landfill sites
* uPVC is also hazardous when it burns because of toxic gases produced
* uPVC window replacements change the character and appearance of an old house, particularly once they begin to discolour
* If one element of a uPVC window fails, the whole unit usually needs replacing
* uPVC windows may need to be replaced every twenty years
* Timber window frames have comparable thermal characteristics to uPVC frames - it is the traditional use of single glazing and lack of draught proofing which can reduce their efficiency
* Timber in old windows is usually of higher quality than modern timber and therefore less likely to need wholesale replacement
* Timber windows can be patch repaired, which requires much less material and is cheaper than wholesale replacement
* Timber needed for repair is a renewable resource with low embodied energy
* Repair of an existing window retains the original character and appearance of an old building
* Properly maintained timber windows can last for hundreds of years

In many cases repairing and upgrading existing windows, through introducing secondary glazing, draught-proofing strips, shutters, or even thick, insulated curtains will be more sustainable - and cheaper - than a replacement. These actions will also help to preserve the character of the building.
Case Study 1: Draught-proofing at 10 Golden Dog Lane, Norwich (Grade II)

This early 19th century house is now used as offices. It has large sash windows which had not been refurbished since their original installation, nearly 200 years ago. They had become ill-fitting and draughty, so the occupants applied to the city council to replace them. Consent was withheld because the windows were not considered to be beyond repair and their replacement would have affected the character of the listed building. Instead the owners were encouraged to upgrade the windows.

Ventrolla were contracted to do the work, which consisted of a complete overhaul of all six rear openings, and the installation of draughtproofing strips. The window frames were taken out and repaired in-situ, over a period of three weeks. The windows now operate as intended and do not admit draughts.
Case Study 2: Secondary glazing at 45 All Saints Green
Norwich (Grade II)

This building is the home of the Norfolk branch of the National Federation of Women’s Institutes. Prior to installation of secondary glazing, the offices were very draughty. Staff had to wear several layers of clothes in winter, and extra electric fires were used to supplement central heating. Apart from the issue of staff comfort, upgrading of the windows was prompted by the WI manifesto on climate change which includes support for increased energy efficiency measures in our buildings.

Three quotes were obtained and Stormwindows won the tender. They were not the cheapest but the Institute felt they offered the best service.

After one day of measuring up, secondary glazing was fixed to 18 windows over two days. Staff noticed an immediate difference - the cold no longer ‘hits them’ as they enter a room - and there has been an additional benefit of increased sound-proofing. In addition, monthly fuel bills have been reduced.

The secondary glazing is virtually invisible from the outside, and unobtrusive on the inside.
Damp-proof courses

If you are carrying out significant repairs to the walls or floors of your building you may be encouraged to install or renew a damp proof course (DPC). The provision of chemical DPCs and associated waterproof renders, plasters, damp proof membranes and concrete floors can all affect the ‘breathability’ of solid walls and can actually make a damp problem worse. Because of the non-standard nature of traditional solid walls, chemical DPCs rarely succeed in forming a coherent barrier against rising damp, and even a physical barrier is liable to local failure. At the same time, the introduction of impermeable barriers can trap moisture and raise the risk of reduced thermal performance.

If the existing walls are damp other measures should be taken to address the problem at source, for example, by removing impermeable renders, adjusting exterior ground levels, or repairing or installing rainwater goods. See [www.handr.co.uk/literature/rising_damp.htm](http://www.handr.co.uk/literature/rising_damp.htm) for further information, or contact your local conservation officer (contact information at end).

Replacing an old suspended floor or traditional brick pamments during renovation with a solid concrete pad can create rising damp problems. Traditional floor treatments allowed moisture from the ground to evaporate over a large surface. A concrete slab prevents evaporation and forces moisture to the sides and up through the walls creating damp, and reducing thermal capacity. If a suspended floor with insulation beneath is not an option, measures should be taken to allow ventilation of the accumulated moisture beneath the new solid floor.

A ‘breathable’ limecrete floor may be more appropriate in an old building, sharing the same vapour permeable characteristics as traditional solid walls, and contributing towards thermal insulation (see case studies 3 and 4 and web links at the end).
Renewable energy sources

Increasingly, house owners are investigating the possibilities of adopting sustainable energy sources in the home, such as solar panels, photo-voltaic cells or wind-powered generators. The government is presently reviewing permitted development in this area in order to facilitate installation of micro-generation equipment by householders\(^6\). However, all types of installation which could affect a listed building or its setting will still require listed building consent. In addition, the government consultation recommends that permission should still be required for installation of such equipment on the front of unlisted buildings in conservation areas or World Heritage sites. Wind turbines attached to any part of such a building will require planning permission.

In addition, Planning Policy Statement 22 on Renewable Energy (2004) states that:

> In sites with nationally recognised designations (Sites of Special Scientific Interest, National Nature Reserves, National Parks, Areas of Outstanding Natural Beauty, Heritage Coasts, Scheduled Monuments, Conservation Areas, Listed Buildings, Registered Historic Battlefields and Registered Parks and Gardens) planning permission for renewable energy projects should only be granted where it can be demonstrated that the objectives of designation of the area will not be compromised by the development, and any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by the environmental, social and economic benefits.

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\(^6\)Changes to Permitted Development, Consultation Paper 1: Permitted Development Rights for Household Microgeneration published by Dept. of Communities and Local Government April 2007
Before taking the step to invest in a micro-generation system it makes sense to ensure that you have

* Carried out works to make your house as energy efficient as possible (for example, with insulation and draught proofing measures, as described above)
* Taken measures to decrease your use of energy (for example, through turning down thermostats, using low energy light bulbs, and turning equipment off rather than leaving on stand-by)

Listed below are brief summaries of the main issues relating to older buildings and microgeneration equipment:

**Solar/ Photovoltaic**

Large solar or photovoltaic units mounted on roof slopes can have a detrimental impact on the character of old buildings. Where possible these types of energy source should be sited away from the main façade of the building, or positioned where they cannot be easily seen. Sometimes, if feasible, it will be better to position the unit away from the main building altogether - for example as a stand alone unit in the garden, or on an outbuilding or garage.

**Wind**

If considering attaching a wind turbine to your building, you should seek the advice of a structural engineer, as wind-loading and vibration may be potentially damaging. See the following link for useful information: http://www.greenspec.co.uk/html/energy/windturbines.html

**Heat pumps**

Installation of ground source heat pump units requires excavation. Before works begin the implications for any archaeology at the site should be assessed. Contact Norfolk Landscape Archaeology on 01362 860528 for further advice.
**Services: all types**

When new services are installed it should always be remembered that technology is continually developing, and that alterations are likely to be necessary in the future. It is therefore a good principle to make all such alteration reversible if necessary. For example, ducting for cable should not be cut into timber frames of through moulded plasterwork.

**Case Study 5: Solar panels on a listed building**

Solar panels have been installed on the roof of this private house which is listed Grade II. Detailed information was required on the proposed location of the panels and their size in the application for listed building consent, but the application went smoothly and was processed within three months.

The position of the panels is the result of a compromise between the owner’s desire to live in a more sustainable way and his and the local authority’s desire to preserve the character of the house. The panels are therefore positioned on the south facing internal slope of the double-pile roof so that they are barely visible. Better performance would have been achieved if the panels had been positioned on the exterior south facing slope.
Part 3: Other sustainability issues

Healthy houses

‘Up to 90% of the internal surface of a building may be sealed with synthetic, petrochemical-based coverings. Indoor environments can be up to 10 times more polluted than the external environment.’

Oil-based paints contain up to 50% solvents. Solvents are persistent, and can build up in the body, causing serious illness. Water-based paints do not contain solvents, but require a large number of other chemicals to make them perform like oil paints. A typical matt emulsion paint will contain, in addition to binder, pigment and extenders, the following additives:

- antifreeze
- dispersing aids
- wetting agents
- thickeners
- biocides
- low temperature drying aids
- antifoam agents
- coalescing solvent
- ammonia

Leftover paint is classed as hazardous waste.

The combination of synthetic paints, chemicals in carpets and furniture, and lack of ventilation is now thought to increase susceptibility to allergies, headaches and other illnesses.

These products can also affect the health of your building. Traditionally constructed walls need to be able to ‘breathe’ (see ‘insulation’ above). Modern impervious surface treatments, particularly when applied to external walls, will trap water within the solid wall, preventing natural evaporation. This can lead to damp problems, condensation and mould growth.

In the past, building surfaces were decorated with lime plasters and washes, and

7 Source: US Environmental Protection Agency
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distemper. These were based on natural products, which allowed vapour in and out of walls. Timber was treated with linseed oil-based paints. Linseed oil soaks in to timber, actively repelling water. Good quality timber windows painted with linseed oil-based paint need only be repainted every ten to fifteen years.

These days there are several natural paint ranges for exterior and internal use which allow your walls to breathe (see suppliers at end).

Case Study 6: Linseed oil paint on Holkham Estate, Norfolk

In 2002 the timber windows of this cottage were in need of re-painting after the typical modern alkyd paint, applied six years before, started flaking off, allowing water ingress. In addition, the putty was no longer protected, allowing it to become hard and cracked. As a result the sills and bottom rail were beginning to show signs of rot.

The windows were stripped down and painted with raw Linseed Oil and three coats of linseed oil paint. With regular cleaning, and a warm coat of raw linseed oil applied when the colour becomes chalky (usually after about seven years,) the windows should not need repainting for a further fifteen years.

The third photograph shows the window in 2007, five years after painting.

Left: before.
Centre: immediately after re-furbishment.
Right: five years on, no further treatment.
Recycling and Reusing

Sustainability requires us to make the best use of what we already have. Reusing old buildings conserves embodied energy and in most cases will be a more sustainable option than demolition and new build.

All the traditional materials used to build old houses are either recyclable or are a renewable resource.

<table>
<thead>
<tr>
<th>Recyclable resources:</th>
<th>Renewable resources:</th>
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<tbody>
<tr>
<td>Flint</td>
<td>Reed</td>
</tr>
<tr>
<td>Brick</td>
<td>Straw</td>
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<tr>
<td>Clay</td>
<td>Timber</td>
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<tr>
<td>Clay tiles</td>
<td></td>
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<tr>
<td>Timber</td>
<td></td>
</tr>
<tr>
<td>Lime mortars</td>
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Case Study 7: Recycled materials at Eastex - Norfolk Materials Exchange

Eastex is a free online information service where organisations and individuals view and place information about redundant stock and surplus raw materials - including building materials. It comprises eleven localised Exchanges, based in Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Norfolk, Suffolk, North Yorkshire, South Yorkshire, West Yorkshire, Humberside and Lincolnshire.

The materials exchange actively exploits the principle that one company’s waste is another’s raw material. By automatically matching these parties via the internet, unwanted materials can be efficiently passed on or sourced - either once or as an ongoing arrangement. It delivers real financial savings for businesses, organisations and individuals and keeps potentially useful materials in circulation.

For more information go to www.eastex.org.uk
Staying local

Pollution caused by the transport of products is recognised as a major contributor to CO2 emissions. Buying products locally is a key element of becoming sustainable.

Traditional buildings were made from whatever materials were at hand. Local clay, flint, carstone, timber, reed and straw were the main materials available in Norfolk. Even bricks were made locally.

These local materials are still available. If materials for repairs are found locally, there is less need to transport them. Some architects and builders are beginning to realise the benefits of using these sustainable local materials and are using them in new buildings as well.

Case Study 8: Straw bales at Quaker Barn, Haveringland

At Haveringland an open-fronted farm building was converted into a holiday house using straw bales to enclose the building.

The main elevation uses green oak and straw bale wall construction with a translucent fibreglass rain screen that allows light to filter into the building while maintaining privacy. Windows on the garden side are of oak or frameless double glazed units that slide in simple steel frames, draught-proofed using car window seals. Internally, the wall is lime plastered.
Case Study 9:  Claylump office, Wymondham

This single-storey building was built in the 1990s using traditional air-dried clay lump blocks. The clay was sourced on site. The building is used as an office.

Conservation and sustainability

The aims of building conservation and sustainability overlap in many ways. The use of natural, renewable, recyclable, and breathable products with low-embodied energy are common to both.

There is some potential for conflict over energy efficiency measures, but if each building is assessed individually, most could be made substantially more sustainable without the loss of their historic character.

For more information, please contact:

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Case Study 10: Energy efficiency measures in the residential conversion of a barn.

These two barns were derelict when the present owners obtained planning permission for residential conversion. A number of energy conservation measures have been incorporated into the conversion, such as sheep wool insulation in roofs and walls, rainwater re-cycling used for flushing and in the washing machine, clay paints, and low energy light bulbs throughout. At the same time the owners have retained the original timber frame and brick envelope of the farm buildings.
Part 4: Sources of information

Further reading

Water conservation: measures to conserve water do not normally affect the character of a building and are therefore not included in this information. However, if you would like to know more about this subject go to: www.environment-agency.gov.uk/subjects/waterres/286587/286911/548861/?version=1&lang=_e

Survey and Repair of Traditional Buildings: A Sustainable Approach Richard Oxley, Donhead Publishing Ltd 2006

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Useful websites

Advice

Norfolk County Council is not responsible for the content of external websites

www.energysavingtrust.org.uk/housingbuildings/publications/: several useful booklets available on-line. See particularly:

* Energy efficient historic homes - case studies (CE138)
* Windows for new and existing housing - a summary of best practice (CE66)
* Practical refurbishment of solid wall houses (CE184)

Also for information on grants towards energy efficiency measures:

http://www.energysavingtrust.org.uk/help_and_support/green_homes_service


www.english-heritage.org.uk/server/show/ConWebDoc.11600 English Heritage advice on Energy Performance Certificates for historic and traditional homes; advice for domestic energy assessors; and SAP ratings for historic and traditional homes.

www.maintainourheritage.co.uk: info on how to maintain your house, and prevent the need for major alterations and repair

www.sustainablehomes.co.uk/pdf/WINDOWS.pdf: information on uPVC and timber windows

www.thecarbontrust.co.uk: for information on the Design Advice Government initiative

www.limecrete.org.uk: information on the lime-based alternative to cement flooring construction
Making Old Buildings Energy Efficient

www.aecb.net/: website of the sustainable building association with information on all aspects of sustainable building techniques, products and practitioners. Particularly relevant fact sheet at www.aecb.net/factsheet.php

www.handr.co.uk/literature/rising_damp.htm information on damp proof courses in old buildings

http://www.greenspec.co.uk/html/energy/energycontent.html information on renewable energy sources

Products

This list is not intended to be comprehensive and inclusion on the list does not guarantee the quality of workmanship or materials.

www.natural-building.co.uk: suppliers of Pavatherm/Diffutherm and other sustainable building products

www.secondnatureuk.com manufacturers of ThermaFleece wool insulation

www.ventrolla.co.uk sash window renovation

www.stormwindows.co.uk secondary glazing suppliers

www.lime.org.uk: information on lime products

www.periodproperty.co.uk/index.shtml: information on products and services for older buildings

www.mikewye.com/: supplier of natural products

www.mylinkspage.com/greenbuilder.html: supplier of natural products

www.skanda-uk.com/heraklith.htm: wood fibre insulation board

www.lime.org.uk/building_materials/Woodfibre_Insulation.asp or www.sustainablebuildingsupplies.co.uk: info on wood fibre insulation board
East Anglian suppliers of products and services

www.norfolksashwindows.co.uk: local window repairs

www.earth-and-reed.co.uk: local supplier of sustainable building products

www.holkhamlinseedpaints.co.uk: supplier of linseed oil paints and other related products

http://www.limecrete.co.uk/index.htm: local company specialising in limecrete floors

* Philip Defoe window restoration: Tel: 01603 460461/ 07774 853595

* Hendry & Sons Ltd, suppliers of conservation materials

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