Tunbridge Wells Borough Council

Energy Efficiency and Historic Buildings

Guidance Note

January 2019

Planning Services

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ENERGY EFFICIENCY AND HISTORIC BUILDINGS

1 INTRODUCTION

This guidance note is intended for use by homeowners but provides helpful information for any type of historic building, in any use.

Because we now use energy much more intensively than in the past, there is a need to ensure that as little energy as possible is used in our homes (the behaviour of the resident) and that our homes are able to resist the escaping of the energy that is being consumed to avoid wastage (the behaviour of the fabric of the house).

Ongoing research is proving that historic buildings – generally those built before 1919 – are very adaptable to measures to improve thermal efficiency, and can perform very well, despite bad press generally as being 'drafty and cold'. In fact, research carried out by Historic England in response to the standard assessment of homes for Energy Performance Certificates has shown that older buildings use far less fuel than predicted at the beginning of the study.

Windows are often the focus of efforts to improve the energy efficiency of older buildings, even though they typically account for only 10% of the heat loss of a building. There are, however, several other improvement measures that can be taken that are likely to be more effective, and less harmful to the building.

This guidance note shows how improvements can be achieved that work with the fabric of the building without harming its special character. Traditional buildings can't be retro-fitted for better energy efficiency performance in a manner that would be suitable for a building of modern construction, as that could harm its fabric. Traditional buildings still need to breathe, but there are a number of measures that can be explored to improve their energy efficiency without trapping moisture.

Additional guidance is listed in the appendices, and in boxes within each section.

Some work to historic buildings, and especially listed buildings, may require consent. Please contact Planning Services at planning@tunbridgewells.gov.uk for advice.

2 UNDERSTANDING

Standard retrofitting measures cause damage to old buildings, causing more problems with trapped moisture in particular. An understanding of how your home is built and how it has been adapted over the years can help. This is called the 'whole house' approach.

> The Historic England website gives practical tips on understanding how your old building has changed:
>
> https://www.historicengland.org.uk/advice/your-home/your-homes-history/

UNDERSTANDING THE BUILDING'S HISTORY

- How was it intended to perform when it was built and how has this changed?
- Every time you change the building, understand the consequences of the change.

UNDERSTANDING THE CURRENT PERFORMANCE

- You can start by logging information on how it is currently performing, for instance by getting a Smart Meter to analyse electricity usage.
- Analyse your fuel bills for trends.
- It is important to understand energy use before and after efficiency measures have been taken/installed to support the design and sizing of renewables.
- Look for cobwebs indicating where there are drafts, and fill these gaps (this can be more effective than you think).
- Get someone in to carry out a fan pressurisation test, which sucks air out of the home and the resultant change in pressure between inside and out will indicate where air is escaping unnecessarily (such as door and window frames, floors and skirting boards).
- Look for signs of damp and take advice from the Local Authority Conservation Officer or a suitably qualified specialist (beware of standard solutions from damp proofing services that have little experience with how historic buildings perform).
- Treat the cause, not the symptom (this can often result in work that damages the building).

QUESTION ASSUMPTIONS

- Initial comparisons made against SAP/EPC ratings and fuel bills show that old buildings are more efficient than predicted.
- Beware of trying to achieve the unachievable
- Base targets on an understanding of the building
- Bespoke solutions are often required
- Chase what is best for the building, not what the standard target is (see Part L flexibility)

3 MAKING IMPROVEMENTS - Step 1: start small

Decide what you want to do based on your understanding of how the building works and how you behave, and don't start with the windows! A number of small, inexpensive solutions or changes to behaviour can be applied which can greatly improve the performance of an older home. This table from the Centre for Sustainable Energy and the Bath Preservation Trust's publication *Warmer Bath: A guide to improving the energy efficiency of traditional homes in the city of Bath (2011)* is a useful 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

Review usage patterns

Apart from the standard advice to:

- Wear a jumper
- Have quick showers instead of long baths
- Only boil enough water in a kettle for what you need

You may also wish to review the following:

- Place lids on saucepans to reduce condensation and energy usage
- Switch your oven off 10-15 minutes before cooking time finishes (residual heat will continue the cooking)
- Turn appliances off at the wall socket when you don't need them, including phone and camera chargers

- Use a clothes airer or washing line instead of a tumble dryer. Even better, install a roof-pulley airer to make use of rising convection heat.
- Turn off lights
- Reduce lighting levels
- Close doors (in old buildings this can make a bigger difference than you think)
- Close curtains, blinds and shutters
- Turn off appliances at night
- Lower thermostats
- Use natural light and ventilation
- Turn down radiators to a low consistent heat in rooms that are rarely or never used, and shut the door

Smarter and more efficient equipment

- Install a smart meter to better monitor electricity usage – most electricity suppliers will provide a meter to customers free of charge
- Consider upgrading your boiler
- Put an insulating jacket on the hot water cylinder
- Line curtains with thermal interlining
- Install thermal blinds
- Use radiator controls
- Install an intelligent digital thermostat or boiler controls (compensator, optimal starts)
- Change to energy efficient lightbulbs
- Install light sensors
- Zone heating, lighting and cooling
- Upgrade to energy efficient appliances when the current ones need replacing
- Use tablet or mobile phone apps to turn on heating/appliances remotely only when needed

The Energy Savings Trust has a section on 'quick wins':

https://www.energysavingtrust.org.uk/domestic/energy-saving-quick-wins

Make minor repairs

- Service equipment
- Clean windows and light fittings
- Repair windows and doors
- Fill cracks in fabric where air infiltration is noticed
- Fix insulation defects (cement render is never compatible with older buildings)

MAKING IMPROVEMENTS - Step 2: review

- Review the performance of the building and energy usage after making minor changes and improvements

MAKING IMPROVEMENTS - Step 3: low cost improvements

The next step is to consider the lower cost, lower intervention improvements to various parts of the home.

Further guidance on insulating roofs and floors in older buildings, and upgrading windows and doors can be found on Historic England's web pages for property owners:

https://www.historicengland.org.uk/advice/your-home/saving-energy/making-changes-to-save-energy/

Roofs

- Insulate loft space at joist level (cold roof insulation).
- Cap disused chimneys (ensuring there is ventilation) or install a chimney balloon.

Floors

- Fill in gaps between floorboards with timber slips for larger gaps or sawdust mixed with glue for smaller gaps.
- Where floors are suspended timber floors, install insulation between joists. If the floorboards are historic, extreme care must be taken as they can be easily damaged.

Windows

- Overhaul windows and install draft proofing
- Install secondary glazing
- Reinstate shutters

See Historic England guidance on the thermal efficiency of sash windows, at:

https://www.historicengland.org.uk/advice/your-home/saving-energy/making-changes-to-save-energy/sash-windows/

MAKING IMPROVEMENTS - Step 4: insulate where appropriate

There are additional insulation measures that can be considered, but they need to be approached with caution as the result could cause damage to the fabric, as well as the special character, of the building. Where alterations are required in order to install insulation, it is best to wait until work is required to that particular area, such as re-tiling a roof. This will make the work more cost effective as well. There are several alternatives for types, and combinations, of insulation, some of which are more natural and/or breathable than others. See Historic England guidance in Appendix 2.

Roofs

- If the loft is heated, insulate above, between, or beneath rafter level, but take care to ensure there is ventilation and no thermal bridging. Insulating above or below will alter the character of the roof and may cause unacceptable harm to the building's appearance and historic fabric.

Floors

- Insulate solid floors. The energy savings from this type of work will more often than not be minimal in comparison to the costs from potential damage to historic fabric and amount of work involved in taking up the floor for the installation. If a solid floor has to be replaced or repaired this may present an opportunity for insulation.

Walls

All of the measures below are likely to raise several issues regarding resultant appearance, but more importantly technical performance of a building that is meant to breathe. The best opportunity for this is usually where inappropriate materials have been used previously (for instance, cement infill panels between parts of a timber framed building) and breathable insulating materials can be used as a replacement.

- Install internal solid wall insulation (this will alter the proportions of a room and potentially interfere with details such as window reveals, skirting boards, architraves, etc., and may trap damp behind).
- Install internal insulation to timber framed walls (the technical details of this depend on the infill material).
- Install external solid wall insulation (in most cases this is likely to have a harmful impact on the character of a historic building and more often than not will not be acceptable).
- Install external timber framed wall insulation (depending on the materials used, this will alter the appearance of the external walls).

Windows

- Install sealed double glazed units to windows (this may not be acceptable if the existing window is historic or made to match existing historic joinery).

MAKING IMPROVEMENTS - Step 5: renewable energy

Switch to low carbon or renewable energy. These options may be limited, depending on location and type of property, but should be explored as a possibility if no harm would be caused. We suggest that professional advice be sought to ensure the renewable chosen is the most appropriate technology, and that you contact the Council regarding any need for formal permission (see Appendix 2 for contact details).

- Solar water heating
- Solar photovoltaics
- Wood chip boilers (not recommended if in an air quality management area/built up urban area, but ideal if not on mains gas and in a rural setting)
- Combined heat and power boilers
- Ground source heat pumps
- Air source heat pumps (can be noisy and can underperform due to poor sizing and installation errors)
- Micro wind generation

Choose any new system with care, review the information available and see expert advice as necessary. Appendix 2 lists various websites to obtain further information.

See Historic England guidance on low carbon technologies and microgeneration:

https://www.historicengland.org.uk/advice/your-home/saving-energy/generating-energy/

APPENDIX 1

FURTHER INFORMATION

TUNBRIDGE WELLS BOROUGH COUNCIL

1	*General Planning Queries*
	planningsupport@midkent.gov.uk
2	*Pre-application Advice Forms*
	www.tunbridgewells.gov.uk/residents/planning/make-a-planning-application/pre-application-advice

HISTORIC BUILDINGS

3	*Historic England Advice*
	www.historicengland.org.uk/advice/your-home/saving-energy/energy-efficiency *'Older houses are often thought to be cold and draughty, but they can vary greatly in their energy efficiency depending on how they are constructed and maintained. There is growing evidence that many perform better than assumed, and some outperform modern houses in terms of energy demand and comfort.'*

4	*Energy efficiency and Historic Buildings - Application of Part L of the Building Regulations to historic and traditionally constructed buildings*. English Heritage, 8 December 2017
	Historic buildings, whether listed or not, are usually exempt from the application of Part L, where compliance with the energy efficiency requirements of the Regulations would unacceptably alter their character and appearance. https://historicengland.org.uk/images-books/publications/energy-efficiency-historic-buildings-ptl/

5	*Energy Efficiency in Historic Buildings.* Historic England, various dates www.historicengland.org.uk/advice/your-home/saving-energy/guidance/
	Range of Historic England guidance on different measures to improve the energy performance of historic buildings: • Insulating pitched roofs/warm roofs • Insulating at ceiling level/cold roofs • Insulating dormer windows • Insulating flat roofs • Insulating thatched roofs • Insulation of suspended timber floors • Open fires, chimneys and flues • Draft-proofing windows and doors • Early cavity walls • Insulating solid ground floors • Insulating solid walls • Insulating timber framed walls • Secondary glazing

6	*Traditional Windows: Their Care, Repair and Upgrading.* Historic England, David Pickles, Iain McCaig, Chris Wood. February 2017
	https://historicengland.org.uk/images-books/publications/traditional-windows-care-repair-upgrading/ Page 1: *'The [replacement window] industry has invested heavily in marketing over a long period and as a result has persuaded many home owners that their old timber windows are rotten, draughty, and beyond economic repair, whereas in most cases minor repairs and some upgrading would have allowed them to remain fit for purpose and serviceable for years to come.'* Page 2: *'Windows are the eyes of a building – they let in light and give views out – and profoundly affect their appearance. In addition, traditional windows bear witness to the artistic, social, economic and technological developments of past ages.'*

7	*Energy Heritage: A guide to improving energy efficiency in traditional and historic homes - a Changeworks initiative.* Changeworks Resources for Life, 2008. http://www.changeworks.org.uk/resources/energy-heritage-a-guide-to-improving-energy-efficiency-in-traditional-and-historic-homes

8	*Renewable Heritage: A guide to microgeneration in traditional and historic homes.* Changeworks Resources for Life, 2009. http://www.changeworks.org.uk/resources/renewable-heritage-a-guide-to-

	microgeneration-in-traditional-and-historic-homes

9	*The Green Guide for Historic Buildings* *How to Improve the Environmental Sustainability of Listed and Historic Buildings* Author: **The Prince's Regeneration Trust** Publisher: **TSO (The Stationery Office)**

10	*Warmer Bath: A guide to improving the energy efficiency of traditional homes in the city of Bath,* June 2011 Will Anderson, Centre for Sustainable Energy Joanna Robinson, Bath Preservation Trust www.cse.org.uk

11	*Old House Eco Handbook: A Practical Guide to Retrofitting for Energy-Efficiency & Sustainability, Roger Hunt and Marianne Suhr in association with the Society for the Protection of Ancient Buildings (SPAB), 28 March 2013* SPAB also offers courses to home owners run by the authors of the book, details of which are on their website: www.spab.org.uk

12	*SPAB Energy Efficiency Research* Following on from work carried out by English Heritage and Historic Scotland, SPAB is undertaking a series of research reports into the thermal performance of older buildings. The aim is to dispel the myths associated with this topic and to "reveal some fascinating and useful information to help people make beneficial, effective and appropriate decisions about their old buildings without the need to destroy historical fabric or harm the indoor environment in the process. (Jeremy Garlick, SPAB Technical Officer)" www.spab.org.uk/advice/spab-briefings/

13	*Planning Responsible Retrofit of Historic Buildings: The Sustainable Traditional Buildings Alliance, 2015* The Sustainable Traditional Buildings Alliance (STBA) is a collaboration of not for profit organisations that acts as a forum for sustaining and improving traditional buildings in the UK. The forum has published the above research report (available through the Historic England website as a free download) and

	produced an interactive guidance wheel for retrofitting. http://www.historicengland.org.uk/images-books/publications/planning-responsible-retrofit-of-traditional-buildings/ http://responsible-retrofit.org/wheel

14	*Historic Scotland Technical Papers* The Conservation Group within Scotland's historic environment statutory advisory body, Historic Scotland, has produced a number of technical papers on energy efficiency and historic buildings. https://www.historicenvironment.scot/advice-and-support/

15	*Greening your Victorian house: The Victorian Society* http://www.victoriansociety.org.uk/advice/greening-your-victorian-house

16	Three websites that contain examples of what other house owners have done to make their homes more energy efficient Ecovation http://ecovation.org.uk Sustainable Energy Academy www.superhomes.org.uk Retrofit for the Future www.lowenergybuildings.org.uk

17	Westminster City Council has produced two practical guidance notes for their area that are very useful as general guides as well. www.westminster.gov.uk/retrofitting-historic-buildings

GENERAL

18	The Energy Saving Trust is the best place to start for general energy efficiency advice. Their website includes an online energy check on your home. www.energysavingtrust.org.uk

19	Advice on the Tunbridge Wells Borough Council web pages: www.tunbridgewells.gov.uk/residents/housing/housing-standards-and-pest-control/energy-advice

20	The Building Research Establishment (BRE) provides updates on Government policy and research on new technology: https://bregroup.com/

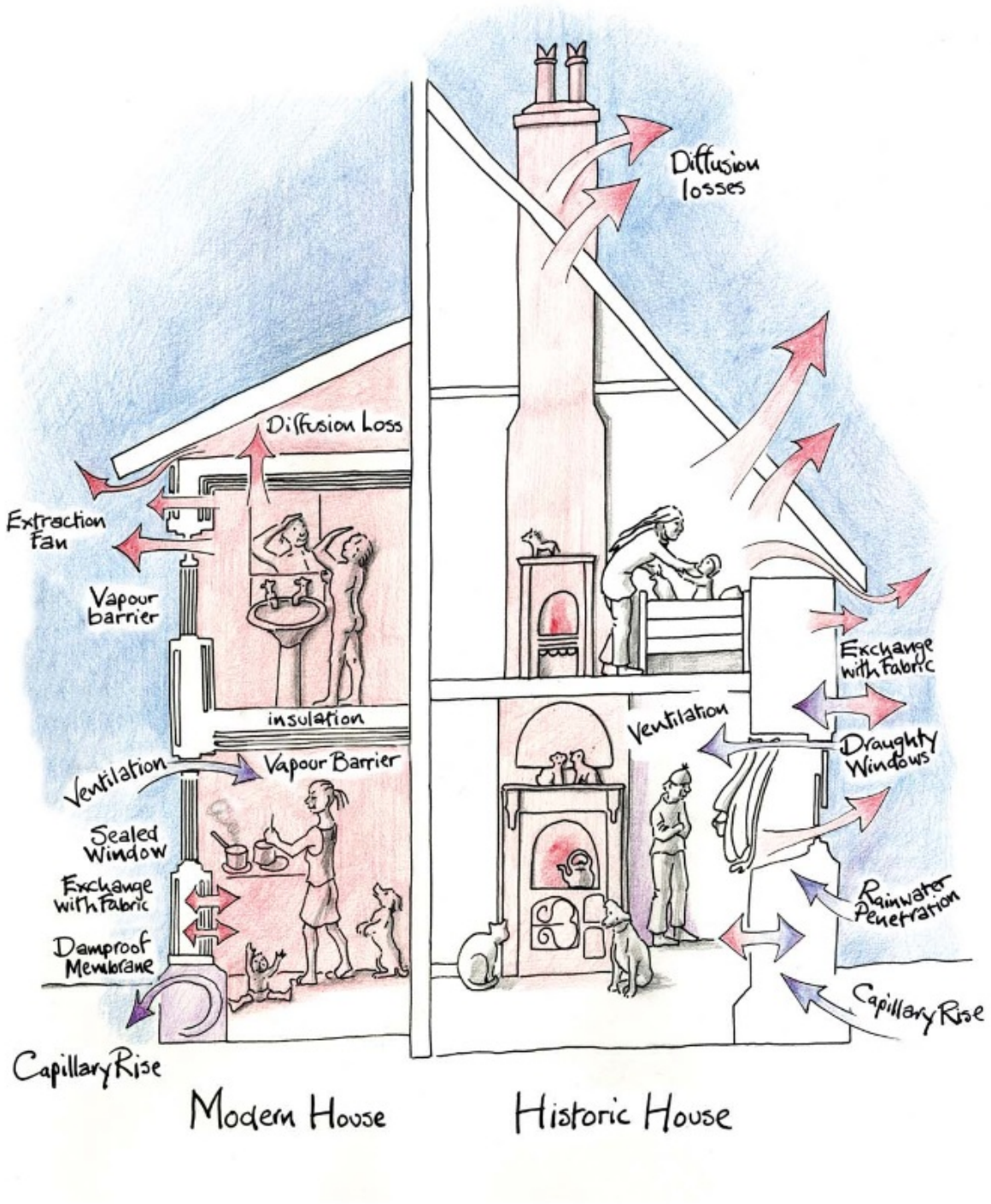
SMALL BUSINESSES AND COMMUNITY GROUPS

21	The Carbon Trust for businesses or public bodies: https://www.carbontrust.com/home/

22	The Centre for Sustainable Energy provides fact sheets on energy improvement measures and community projects: https://www.cse.org.uk/resources

APPENDIX 2

COMPARISON OF HOW NEW AND OLD BUILDINGS PERFORM



Energy Conservation in Traditional Buildings: London: English Heritage