

What is whole house retrofit ?

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1 The issue at stake

There is an emerging discussion in policy documents and public guidance about the idea of a “whole house” (or sometimes “whole building”) approach to retrofit as a way forward for the sustainability of the built environment in the UK. This interest has arisen in response to the many unintended consequences of existing retrofit programmes and projects including unhealthy indoor environments, fabric decay, moulds and condensation, building services problems, remedial costs and liabilities, failure to meet reduction targets and even increased carbon emissions and energy use in some cases.

It is generally accepted that, to a large extent, these problems have occurred, directly or indirectly, as a result of single focus, single measure or un-integrated approaches to work on existing buildings.

Indeed, the concept of retrofit itself could be said to be single focus, often being primarily about energy/carbon in use, rather than a holistic approach with equal concern for issues such as health, comfort, long term durability of buildings, embodied impact, the wider environment, heritage and community.

The need for a whole house/building approach has been championed by several organisations including the AECB, the NEF, the Passivhaus Trust, the Retrofit Academy and the STBA. The concept has been taken up by government more recently in the Hansford Review of Solid Wall Insulation and now the Bonfield Review. However, there is some confusion about what is meant by a “whole house approach” and nearly all current information defines it simply in terms of improving energy efficiency in use (and sometimes renewable energy generation) through technical measures.

2 Development of the approach

The work of the STBA has to some extent changed the discourse around this topic. The STBA’s 2012 report *Responsible Retrofit of Traditional Buildings*, commissioned by DECC, highlighted the possible impacts of single focus energy retrofit measures and policies on health and heritage as well as the environment and energy use. The report concluded that health (of people and buildings) and heritage (which means connection with the past, community and beauty) are not just nice add-ons. They are as essential for sustainability as carbon emissions reduction.

The report also noted that most problems in retrofit occurred not in single building elements but either at interfaces between elements, technologies or building processes, or through interactions between measures, people and buildings. Many of these effects are not fully understood and much of the information upon which we base our design, construction and use is uncertain or lacking. Some of this uncertainty is due to the fact that buildings and people behave differently in different environmental, social and economic contexts. Any new approach must therefore recognise systemic effects in buildings, take account of context and actively address uncertainty.

The STBA developed the concept of *Responsible Retrofit*, which has holistic aims (health of the occupants and building, energy and environment, and heritage and community), is based on the context of the building and takes into account uncertainty, the complexity of interactions and embraces conflicting values. It is necessarily a learning-based, joined-up approach in which all parts of the process of retrofit (including procurement, assessment, design, installation, use and maintenance) are engaged – in other words it is a genuine whole house approach. The STBA also emphasises the need to integrate retrofit (i.e. change) with memory and maintenance (continuity of understanding and practice).

3 Levels of whole house approach

The widespread and unspecific use of the term “whole house” means that it is interpreted in many ways, resulting in confusion. It is therefore necessary to distinguish between different levels of whole house/building retrofit.

The table below sets out commonly used approaches along with the concerns, risks and scope for use of each. The STBA does not consider the first two listed to be whole house approaches at all, but in practice they are sometimes described in this way.

These different levels of approach are related to the extent to which connection and context are considered. At one extreme, in the “every part of the house” approach (which is often called a whole house approach in marketing literature), there is no consideration of conflicts or interactions between measures, no engagement with occupants and no assessment of significance, community or heritage context. This is a reductionist approach in which health, heritage and even energy use are very likely to suffer negative outcomes. It is only appropriate, therefore, for very limited applications.

At the other end of the scale, a genuine whole house approach (Responsible Retrofit) begins with the significance and context of the house, considers the relationships between building fabric, services and occupants, and then involves everyone in the process of design, installation and use. This will minimise negative unintended consequences, can be used in all building types, but also brings other challenges.

Level	Description	Concerns / Risks	Scope for use
Every part of the house	Multiple technical measures in a “pick & mix” approach (eg the Green Deal.)	No understanding of connective effects, ignores occupant engagement, monitoring and feedback, heritage and health. Multiple unintended effects.	Should not be carried out, except where technologies are entirely independent of each other.
Insulation of all walls	Improved thermal coherence and air tightness on external walls. This approach is promoted by many in EWI industries.	Impossible on complex buildings. Only partial integration of connective effects, ignores systemic effects and occupant engagement. Risks to Indoor Air Quality and Heritage.	Only if ventilation, windows, floors and lofts are also included (as in WHM). Not appropriate for traditional or complex buildings.
Whole House Minimum (WHM)	Insulation and airtightness/ thermal coherence of whole building shell (ie walls roofs floors and windows/doors) plus effective ventilation.	Assumes that technical solutions are available. Does not deal with uncertainties, behaviour, heritage, renewables etc. Technical failures may occur in complex buildings with heritage risks to streetscapes.	Can be applied at scale on low risk (non-complex, good condition, not exposed to driving rain etc) and non-traditional buildings.
Whole House Plus (WHP)	Integration of all services and occupant behaviour, plus maintenance and feedback in a broader programme.	Requires additional education training, skills, different funding, changes to standards and a knowledge feedback mechanism. No community context, so heritage risks and lost opportunities.	Can be applied at scale on low/ mid risk properties. Avoid heritage buildings and conservation areas.
Whole House Advanced (WHA or Responsible Retrofit)	As WHP plus integration of heritage and community context, including district schemes for renewable energy, local employment.	Needs a completely new approach from government. Challenge of different values and a framework for resolving value conflicts and priorities will be needed.	Can be applied widely to all building types.

4 The challenge

The big question is: how do we move from a reductionist approach (where measures are unconnected to each other or to context, and where only materially quantifiable elements such as energy and carbon are considered valuable) to a whole house/ building approach that values qualities such as health and aesthetics and takes into account connections and context? There may be intermediary stages between the reductionist and the holistic, which allow government and business to continue their activity, but with a new direction and hopefully better outcomes?

The proposed approach raises challenges in a number of key areas:

- Industry: need for mainstreamed understanding of traditional buildings, improved skills and practice, and a learning-based, joined up approach
- Building Owners and Occupiers: increased disruption, upfront cost and occupant involvement
- Communities: increased emphasis on community schemes, heritage and local engagement
- Government: new policy framework, with different funding and assessment mechanisms
- Standards, certifications and insurance: a complete change in approach is required

All this is very challenging but business as usual is not acceptable. Unless we start with the Whole House Advanced/ Responsible Retrofit position and see everything we do in this context, our efforts will lead to unintended consequences and may be counter-productive even in the most narrowly measured terms. Even if we cannot achieve the Whole House Advanced approach for many years, it needs to be the framework within which partial measures and processes are undertaken, so that learning can be increased and long term risks reduced.

5 Vision, values and transformation

The aim of the STBA is to help develop a sustainable traditional built environment. However, both theoretically and practically, this cannot exist outside of a sustainable society, economy and culture. Sustainability policies based upon the Whole House Advanced/ Responsible Retrofit approach can only thrive within economies that share the same values and are ethically based.

The failure of current retrofit measures is not just because we do not sufficiently understand traditional buildings, or have the wrong approach or the wrong standards or skills. It is because we have an economic and political system which is driving misallocation of finance, land and housing, depletion of natural resources and pollution. This in turn fails to incorporate the qualitative values of heritage, wellbeing, community and biodiversity; values which, for most people, give meaning to their world.

In this context, we need to rethink our whole approach to buildings. The process of retrofit, if carried out right, has great potential not only to repair the environment but also to improve peoples lives. It can also contribute to the societal transformation which will be needed to achieve genuine long term sustainability.

The STBA is an alliance of not-for-profit organisations representing the sustainability, heritage and professional sectors in the UK. The STBA aims to promote and deliver a more sustainable traditional built environment through high quality research, education, training and policy.

There is unavoidable complexity and uncertainty in the way that old buildings, new technologies, nature and people perform and interact. Furthermore, retrofit often involves conflicting values and aims. There is no one-size-fits-all 'solution'. Responsible Retrofit means taking an informed, integrated and ethical attitude to these challenges.

The Responsible Retrofit Series of booklets aim to help people do this, by providing short and usable guidance about traditional building retrofit, based upon best current research and practice. These booklets will help to reduce risk and liability, while also improving outcomes in reality, not only in terms of energy, but also health and heritage.

This briefing paper is abridged from a longer article which will be published online:

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Responsible Retrofit Series

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