Heritage & Carbon: how historic buildings can help tackle the climate crisis

This paper argues that historic buildings can play a leading role in the fight against climate change. To do that, five core issues have to be addressed: policy, guidance, cost, supply chain skills and capacity in local government.

A key starting point is policy because unless that is clear, there is little basis for consistent decision-making by anyone involved. We believe the Government should use the impetus of planning reform and COP26 to act now, changing the NPPF to much better align heritage and sustainability and including policies for carbon reduction in relation to all designated heritage assets, excluding scheduled ancient monuments.

This could cut operational carbon emissions by up to 7.7 $MtC0_2$ per year, equivalent to 5% of the UK's carbon emissions associated with buildings in 2019. It would also act as a powerful stimulus to the green economy and help protect a crucial part of our common heritage which gives so many people a sense of civic pride and identity in this country.

1. The Problem

Proposal 17 of the Government's Planning White Paper (2020) has made recommendations for some limited change to planning policy and the historic built environment. These recommendations are for the planning framework to allow 'where appropriate, sympathetic changes' to historic buildings to better equip them for the challenges of climate change.

The problem is that policy, guidance, knowledge and skills today do not support this ambition – including the current consent regime for designated heritage assets. Why does that matter?

21% of England's domestic building stock pre-dates 1919. Around 500,000 buildings in England are protected by statutory listing and hundreds of thousands more are situated in c.9,900 conservation areas[1]. They cover many different types of buildings including stately homes, terraced houses and blocks of social housing, amongst others.

Fundamentally, this is a position to be proud of. Not only does the UK lead the way in terms of conserving and integrating historic buildings to make beautiful places, we also have the best record in the developed world for keeping and reusing buildings. The heritage sector is worth an estimated £31bn to the English economy and attracted 218.4m visitors in 2018[2].

And yet, the process of adapting these historic buildings so they can thrive in future and be more energy efficient is very challenging.

To a significant degree, this is the result of a lack of certainty and clarity within current planning policy and practice about what can and should be allowed. Furthermore, what is granted consent – for example, double-glazing or internal insulation – varies substantially from region to region, town to town, borough to borough and even amongst decision-makers within the same local planning authority. A broad-brush, one size fits all approach would obviously not work. But what we have is frustrating, costly and prohibitive for many property owners.

The key national regulation for historic buildings is the Planning (Listed Buildings and Conservation Areas) Act 1990 and the National Planning Policy Framework (NPPF, 2019). The Act makes no reference to historic buildings and climate change mitigation - it is purely intended to protect listed buildings and conservation areas. The NPPF explains how change to heritage assets should be assessed. It requires the conservation of heritage assets and allows a balance between 'harm' to heritage significance on one hand and public benefits on the other.

However, the public benefit of climate change mitigation is only briefly mentioned[3] and whilst the NPPF does address climate change, it does so without specific reference to climate change adaptation and energy efficiency measures.

This disconnect is reflected at a local level in regional and local plans. Reductions in carbon emissions are often outlined as benefits for major new developments but these policies rarely apply to historic buildings. Supplementary Planning Documents and Guidance by local authorities are often outdated and fail to address carbon emission reductions in historic buildings. This leaves under-resourced council officers with inadequate guidance and results in variable decision-making.

[1] https://historicengland.org.uk/content/heritage-counts/pub/2020/heritage-indicators-2020/
[2] https://historicengland.org.uk/research/heritage-counts/heritage-and-economy/
[3] Chapter 8, NPPF 2019

The guidance itself provided by Historic England on this subject is well-researched and valuable. However, it is presented across multiple documents and channels, can be difficult to access and is not clearly linked to planning policy, which substantially limits its reach and practical value for local authorities and building owners.

Current Building Regulations, meanwhile, do not allow for or consider the impacts associated with whole life carbon; particularly embodied carbon, which comprises a significant proportion of the carbon emissions associated with the lifecycle of a building.

And to make matters worse, revised Energy Performance Certificate (EPC) mandates then add another layer of complexity for historic buildings which have historically performed poorly within the EPC framework due in part to the inadequacy of the standard assessment protocol when applied to buildings of traditional construction.

Finally, it is important to recognise that the current consent regime does not just affect buildings. It affects people's lives as well. Listed social housing blocks, for example, can be substantially harder to turn into warm and well-insulated homes, in part because of funding problems but also because of the inadequate state of policy, guidance, knowledge and skills required for appropriate adaptations. This exacerbates fuel poverty and has a detrimental impact on people's health.

At the same time, adapting historic buildings badly can create its own health risks. Traditional buildings are generally non-standard. Their materials are usually breathable and even the right energy efficiency measures can still be compromised by defective installation, resulting in poor ventilation and ill health.

To summarise, the ambiguity and inconsistency of planning policy and guidance regarding energy efficiency in historic buildings has left a substantial amount of England's existing building stock vulnerable to the impending climate crisis.

How the Government responds to proposal 17 of the *Planning White Paper* matters to us all.

'All this creates very few incentives and a lot of barriers for owners of historic buildings who want to make energy efficiency improvements.'

2. The Solution

Excellent work to make historic buildings more energy efficient is already being done by some architects, contractors, building owners and research institutions. Four examples are included at the end of this essay to show what can be done. But this work is very often done despite the planning system rather than because of it.

A real step-change requires decisive reformulation of planning policy, more focused guidance from Historic England, reform of the EPC framework, and an increase in supply chain skills and local authority capability and capacity.

Cost is also an important factor and some measures, such as funding for the social housing sector and changes to VAT, are a crucial part of driving energy improvements across the whole built environment. But the trigger for making much of this happen lies in the policy framework.

Revising Policy

Fundamentally, the National Planning Policy Framework must draw out the inherent connection between sustainability and heritage protection. Sustaining heritage assets in the long term, and thus the reuse and consequent retention of their embodied carbon, forms the crux of heritage conservation principles, and the beneficial reuse and retention of buildings embodies the environmental sustainability principles which planning reform itself seeks to espouse. The two things are mutually reinforcing.

Mindful of the fact that the NPPF 'should be read as a whole' (paragraph 3), an important first step is to develop the climate change policy currently set out in Chapter 14 (Meeting the challenge of climate change, flooding and coastal change), so that climate change adaptations and energy efficiency are explicitly addressed:

- Para.148 should add an overarching policy reference to appropriate adaptations and energy efficiency measures, to highlight their importance.
- Para.149 should add a reference to ensure that these issues are addressed in plan preparation.
- Para.154a should add a new development management-related paragraph to address the consideration of proposals for climate change adaptations and energy efficiency measures[4].

These amendments to Chapter 14 would cover all climate change response proposals and where the proposals relate to a heritage asset, reference should also be made to existing heritage policy in Chapter 16, to pick up heritage asset-specific issues. Both policies can then be considered clearly and appropriately alongside each other on a case-by-case basis.

Any such NPPF policy should also be supplemented by clarification in the Planning Practice Guidance and in Historic England's own published advice.

[4] it is suggested that this refers to 'applications', to cover both planning and LBC applications, as per footnote 62 in Chapter 16.

In addition, there should be explicit policy encouragement for carbon reduction measures to all designated heritage assets, where appropriate (excluding Scheduled Monuments). This would be one means of delivering the provision in Section 19 (1A) of the Planning and Compulsory Purchase Act 2004 for development plan documents to include policies designed to ensure that the development and use of land in the local planning authority's area contributes to the mitigation of, and adaptation to, climate change.

Such measures must be informed by up-to-date guidance approved by Historic England to ensure that interventions do not harm historic buildings and other relevant assets and enable them to remain desirable and liveable as well as reducing their operational carbon requirements for the long term.

We suggest that this policy should particularly relate to major refurbishment schemes in historic buildings. It should include appropriate energy efficiency updates, driven by best practice. These upgrades should be proportionate in scale and cost to the overall project and informed by a Whole Building Approach[5] so that they are deliverable.

Revising the NPPF in this way will allow local decision-making to become much more consistent and progressive.

Harnessing the tools we have

As well as these critical changes to policy, there are other levers we can pull. Listed Building Heritage Partnership Agreements (HPAs), introduced in 2013, are a powerful and pragmatic tool that allows change in listed buildings. They are an agreement between building owners and local authorities, conceived to grant blanket consents for routine alterations in large and repetitively designed buildings and groups of buildings, thereby avoiding the cost and delay associated with numerous Listed Building Consent applications for similar works[6].

Such agreements have typically applied to expansive complexes of listed buildings such as the military buildings at the former RAF airbase at Bicester, at the 'ziggurat' post-war housing and education buildings at the University of East Anglia, and at Kings Cross Station in London[7].

HPAs could substantially improve the roll-out of sympathetic and effective energy improvement measures in listed buildings where there are large groups of such buildings in one ownership. This would save cost and time for social landlords who own similarly designed historic blocks of flats and for private landlords who have large groups of comparable listed buildings.

However, despite the potential for simpler collaborative heritage management, HPAs are still vastly under-utilised. We recommend that they are now promoted by central and local government and clearly cited in the NPPF as a valuable tool for the management of historic buildings.

[5] Historic England. June 2018. *Energy efficiency and historic buildings*
[6] IHBC. 2020. Heritage partnership agreements.
[7] Historic England. 2015. Advice Note 5: Setting up a Listed Building Heritage Partnership Agreement.

Improving access to expert advice

Clear guidance on sensitive adaptation of historic buildings will support meaningful policy change. So we recommend that advice and research currently dispersed across the heritage sector, including that from Historic England, amenity groups, government bodies, academic institutions, architectural practices and property developers, be brought together in one place and in a format that is clear, visual, and easy to access and understand.

Guidance spearheaded by Historic England should also inform a framework of professional development to support an effective sustainability and heritage agenda. This can in turn filter down to training programmes at the local level for both colleagues on the regulatory side such as conservation officers and approved building inspectors, and for tradespeople, builders, architects and surveyor who will carry out works.

Celebrating achievements

We also recommend that a central resource should explain and celebrate the best examples of low carbon innovation and adaptation of historic buildings. Right now, these are hard to find at exactly the point when people are crying out for case study examples which are not only intelligent and appropriate but scalable and affordable.

We believe that this will encourage homeowners, community organisations, property developers and institutions with large portfolios of historic buildings to incorporate similar sustainability measures in their own refurbishment and reuse schemes and provide models of best practices across a range of building typologies.

Meeting the costs

Nobody should pretend that tackling the climate emergency or protecting our heritage comes free. At the same time, it is important that changes to the planning system do not create an unmanageable financial burden on private building owners, social landlords and others.

These changes to the NPPF do imply extra cost. But the timing of that cost remains within the control of building owners. It only emerges when they choose to bring forward substantial works of extension or improvement, and their short-term investment in greater energy efficiency will pay back over time in cost-savings achieved in the medium term. Doing things right is actually cheaper in the medium term, both for the owner and for the public purse.

Some resources are also in place or being developed to alleviate this cost. These include grant programmes such as the Home Upgrade Grants (HUGs), and emerging private-sector options, such as green mortgages[8]. Reducing VAT on works to existing buildings would substantially help to offset some of the cost; and more financial help may be necessary from the Government, not least for social housing providers.

[8] House of Commons Environmental Audit Committee. 2021. Energy Efficiency of Existing Homes.

At present, £62m has been allocated for the retrofit of some selected social housing buildings via grants to local authorities[9] and VAT is charged at a reduced rate of 5% for some energy-saving measures for people receiving benefits or over the age of 60[10].

Going forward, this will not be sufficient and the Government should consider whether these measures could be enhanced so that heritage buildings can be maintained in all parts of the country and in all circumstances, particularly where owners, occupants and not-for-profit organisations clearly cannot meet the costs. In this specific context, progressive regulation needs to be applied alongside the funding required to implement it.

For developers and private individuals, there will be some residual cost which is not covered by these measures, and the reality is that planning for and meeting this has to be seen as part of our collective responsibility for protecting our heritage and helping tackle climate change.

‘Doing things right is actually cheaper in the medium term, both for the owner and for the public purse.’

[9] https://www.gov.uk/government/publications/social-housing-decarbonisation-fund-demonstrator-successful-bids
[10] https://www.gov.uk/tax-on-shopping/energy-saving-products

3. The Size of the Prize

In their 2021 Assessment of the energy efficiency potential in heritage buildings in England and Wales commissioned by Grosvenor Britain & Ireland, Verco energy consultants conclude that fabric improvements to listed buildings in England and Wales could generate up to 2 - 3MtCO_2 of carbon savings per annum, equivalent to 12% of the UK's Sixth Carbon Budget. This is an estimated maximum potential figure but gives us a sense of what could be achieved.

Combining listed buildings with unlisted historic dwellings in conservation areas, the operational carbon saving would amount to 4.6 - 7.7 MtCO_2 per year. This broadly equates to 5% of the UK's carbon emissions associated with buildings in 2019 and approximately 30% of the annual reductions in UK carbon emissions required to meet a Sixth Carbon Budget[11] not taking into account deployment rates or grid decarbonisation and using estimates on the relevant number of dwellings.

The study evaluated the pre-retrofit and projected post-retrofit energy performance of a number of typologies of buildings dating before 1919. It was estimated that upgrading the performance of non-domestic historic buildings comprising warehouses, retail buildings, factories and offices could generate roughly 230 ktCO_2 in carbon savings per annum, 39% of which would be saved through the retrofit of factory buildings and 32% by retail buildings.

The study's analysis of domestic buildings covered a range of dates and types, from pre-1850 detached stone houses to Edwardian terraces and semis. Post-renovation figures were based upon the 'low' (or comparatively less intrusive) package of retrofit options as described by Historic England's September 2020 *Carbon reduction scenarios in the built environment: Final Report*[12].

Historic England concurs that substantial impacts can be made through retrofit and state that in domestic buildings these could amount to between 54% and 84% of operational carbon savings[13]. The carbon savings are therefore potentially vast.

This is also reflected in findings by the 2020 Historic England study which concluded that out of three sources of carbon savings evaluated, including substantial building fabric and air tightness improvements, a shift away from fossil fuel-based heating, and the decarbonisation of the national electricity grid, building fabric improvements represented the greatest share of carbon reductions at 40% (weighted average).

Green Economy uplifts

In addition to the direct benefits of carbon savings, increasing the energy efficiency of historic buildings can act as a powerful stimulus to the green economy. The Government's Green Jobs Task Force was established to support the creation of 2 million skilled jobs dedicated to building back greener and reaching net zero emissions by 2050. The UK Green Building Council also cites retrofit as a key factor in the recovery of the post-COVID economy, driving economic growth, job creation and improved living standards[14].

[11] Verco. May 2021.
[12] Historic England. September 2020. Carbon reduction scenarios in the built historic environment: Final Report.
[13] Historic England. March 2021. New Report: "Greening" Historic Homes Could Save up to 84% in Carbon Emissions.
[14] UKGBC. August 2020. Retrofitting our way to Recovery.

Encouraging substantial intelligent upgrading of historic buildings will therefore not just help avert climate change but also benefit the economy. It has the potential to create good skilled jobs, particularly for groups impacted by the pandemic, and help raise income levels in all areas of the country.

If this were paired with a major expansion of historic built fabric training via Historic England and other accredited heritage organisations, it would upskill those new roles and give tradespeople the tools and knowledge to work effectively on historic buildings. Expanding the supply chain in this way would create a growing number of skilled workers able to deliver appropriate and impactful adaptation of historic buildings nationwide.

Combatting fuel poverty and poor health

A disproportionately large number of energy-poor households live in properties in EPC bands E, F and G. In fact, Band G households are three times more likely to be in fuel poverty than the national average. A high proportion of people living in fuel poverty live in older buildings and the average fuel poverty gap is the largest for households in dwellings with uninsulated solid walls[15].

Poor health and emotional wellbeing linked to fuel poverty also has a wider social and economic impact, reducing work productivity and increasing reliance on the NHS[16]. Conversely, it has been estimated that for every £1 spent on retrofitting fuel-poor homes, approximately £0.42 is saved in NHS spending, and that allocating £10bn to improve England's energy-poor housing would save the NHS £1.4bn per annum, paying for itself in just over seven years[17].

Peabody's founding mission 160 years ago was to 'ameliorate the condition of the poor and needy… and promote comfort and happiness'. Today, social landlords like them wanting to upgrade poorly performing historic homes face barriers at every turn.

Changing planning policy is not going to solve all these problems at a stroke. But together with increased skills and funding, it will undoubtedly help combat fuel poverty. In this context, the issue is not just carbon reduction. It is also about cost in use for the people who live there, as well as minimising futile planning applications from hard-pressed organisations trying to upgrade poorly performing historic homes.

"Intelligent upgrading of historic buildings has the potential to create good skilled jobs and help raise income levels in all areas of the country.'

[15] BEIS, 2018. Annual Fuel Poverty Statistics Report
[16] Wade, F. 2020. 'Retrofitting Buildings to Support the Recovery' in Buildings and Cities.
[17] UKGBC. 2017. Regeneration and Retrofit Task Group Report.

4. The Change Agenda

People are drawn to old buildings. They provide meaningful connections to the past, add character to our streets, and make beautiful, atmospheric places in which we want to live and work. The historic built environment plays a central role in defining our communal heritage, with landmark buildings throughout the country serving as emblems of local civic pride.

They also have great potential for adaptation. Many older buildings have been adapted before to meet changing seasonal needs and performance. Occupants installed awnings over sunny windows in summer months to prevent overheating and added hangings and panelling to internal walls for heat retention in the winter.

However, what was once common practice might well now struggle to get consent under today's planning regime. We no longer routinely make best use of the adaptable qualities of historic buildings.

That would be a problem in any context. But climate change changes everything. Continued adaptation, particularly as whole-life carbon values diminish over time, will both sustain heritage assets and mitigate global warming. And allowing historic assets to adapt not only safeguards their relevance and continued life, it also promotes the core idea of building for the long-term, a value which is at last returning to the mainstream of the construction industry and the design of new buildings.

Of course, this needs to be done intelligently. There is always a risk of maladaptation and that is why clear guidance, expert advice and supply chain skills and capacity are so important. Getting the policy framework right is only ever one part of the solution and this needs a joined up, integrated approach across both policy and practice if heritage is to help lead the fight against climate change.

So in summary, we invite the Government to make three core changes to national policy:

- Create a much stronger direct link in the NPPF between heritage protection and environmental sustainability and include policies for carbon reduction in relation to all existing buildings, including designated heritage assets (excluding SAMs).
- Specifically and actively promote climate change adaptations and energy efficiency in the NPPF (this new policy to be read alongside heritage policy where appropriate).
- Promote Listed Building Heritage Partnership Agreements and Local Listed Building Consent Orders within Planning Practice Guidance, allowing large historic buildings or groups of buildings to be changed without the need for Listed Building Consent for pre-agreed works.

In addition, we believe the Government should:

- Support Historic England to accelerate its work to provide much more accessible guidance on how to apply expert-approved energy efficiency measures and build a database of successful case studies.
- Consider additional funding for the retrofit of historic buildings by not-for-profit organisations, similar to the £62m scheme in place for social housing, so that they too can form part of an effective net zero agenda and make a contribution to eliminating fuel poverty and improving public health.

- Consider additional training and resources for local authority conservation teams to help guide best practice adaptation of historic buildings.
- Equalise VAT on renovation and retrofit of existing buildings with that of new build.
- And deliver on the commitment to reform the EPC methodology to better reflect traditional buildings.

Combined, these elements will allow property owners, occupants and developers to proceed with energy efficiency upgrades that are at present often much too difficult to achieve.

Finally, stepping back from the detail of planning reform, we believe there is value in the idea of developing a holistic strategy for decarbonising traditional buildings nationwide, as part of the UK's overarching net zero strategy.

We need to understand the limitations and opportunities surrounding these buildings in an age of climate change, analyse the different policy and funding levers in the round and set a course for implementing them effectively. A pathway to net zero for the whole historic environment would make Britain a world leader in this space.

'Allowing historic assets to adapt not only safeguards their relevance and continued life, it also promotes the core idea of building for the long-term, a value which is at last returning to the mainstream of the construction industry.'

5. Case Studies

There are already some impressive examples of impactful and sensitive projects which improve energy efficiency and preserve heritage significance. They show that heritage protection and climate change mitigation and adaptation can walk hand in hand. While they are not yet the norm, they illustrate that sensitive retrofit of our historic building stock is achievable. These examples and other similar projects can lead the way and become the norm if we change policy, offer better guidance on what good looks like, and build capacity and skills in the supply chain.

Residential Buildings

Residential buildings comprise the majority of England's historic building stock. These range from detached Georgian stone houses, to Georgian and Victorian terraces, to late-Victorian and Edwardian terraces and semi- detached houses. The following case study provides an example of the adaptation of a Grade II-listed, early-Victorian terraced house, typical of very many across the country, which has resulted in substantial carbon savings.

Clapham Terrace House, Clapham, London

Architect: Arboreal Architecture

- Grade II-listed c.1840 terrace house located in a conservation area
- Nine types of internal insulation were introduced to improve thermal performance, each a bespoke solution to localised requirements throughout house, with thicknesses determined by the depth of the original cornices and airtight tapes applied at internal junctions, later plastered over
- Solar panels were installed to an inner pitch of the roof, accessed via a rooflight, which heat half of the building's hot water
- Openable (tilt and turn) double-glazed secondary glazing was installed behind historic timber sash windows
- Weather station installed by Historic England to the roof, which monitors performance
- The space heating demand was cut by more than 75%; air leakage was reduced from 9.6 air changes per hour to 1.8 per hour; and the internal temperature has remained at an average of 20C when occupied
- The house was the first listed building in England to achieve Silver Standard status by the Association for Environment Conscious Building (AECB) and featured in Historic England's Heritage Counts 2019

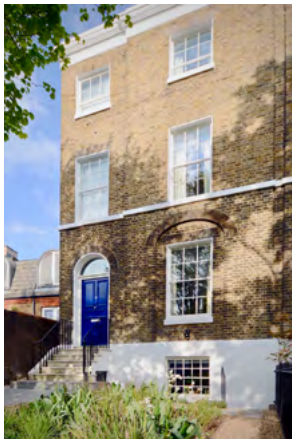
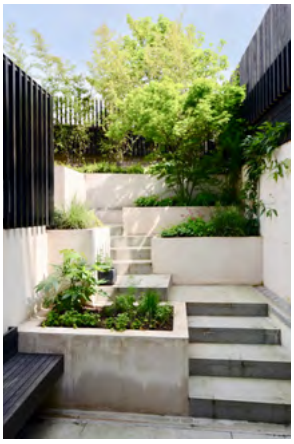
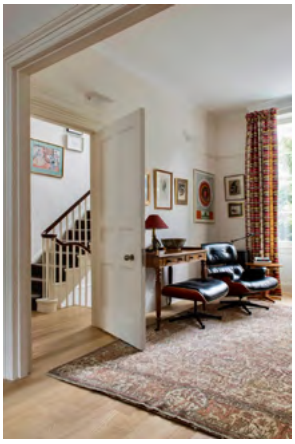




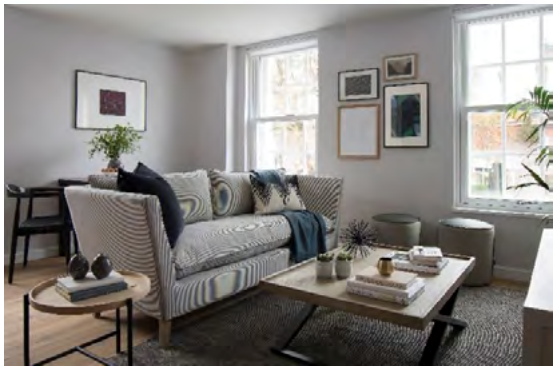
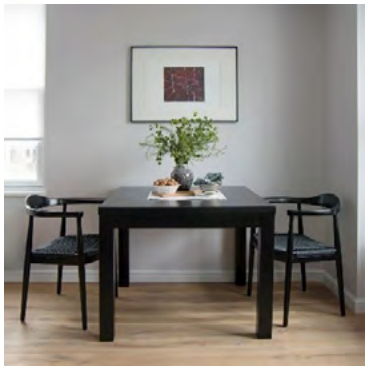

Photo credit: Arboreal Architecture

40-44 Pimlico Road, London

Six Passivhaus apartments and two retail units in the Pimlico Road Design District, London. Unlisted buildings in the Belgravia Conservation Area, constructed in the 1860s.

Architect: March and White




Retail Area **4,870 ft²**
Residential Area **4,618 ft²**

Energy Demand	A large flat at 40-44 Pimlico Road uses c.25% of the overall heating demand and gas consumption of an average UK home.
Air Quality	Due to the high specification of the envelope and low air changes per hour, the air quality inside is significantly better than externally. This has a second added benefit of improving sound-proofing on the busy road, increasing occupier wellbeing.
Window Design	Using a high performing passive house sliding sash window, rather than 'casement' which encroaches on internal space.
Area lost to Insulation	Up to 200 square feet given over to additional insulation and details required to achieve passive house = c.£360k CV
Value Impact	The passive house certificate did not appear to carry any additional market value. Although the building now has a very low energy demand, the high level of air-tightness and testing may not in fact be necessary to drive the bulk of carbon emissions savings. This suggests that Passivhaus may not always be the most appropriate approach to retrofit buildings of traditional construction designed to be vapour permeable and well ventilated.

Industrial Buildings

England's former factories and industrial spaces are also prime candidates for retrofit as part of wider schemes of conversion, often into residential or office use. Their historically substantial interior volumes and floor space, large window openings and 'leaky' envelopes mean that upgrades for energy efficiency can produce sizeable carbon savings.

De Beauvoir Block, 92-100 De Beauvoir Road, Hackney, London

Architect: Henley Halebrown

- Unlisted early-20th century redundant factory complex located in a conservation area
- Refurbished as studios, offices and café, with internal courtyard
- Careful restoration, selective demolition and new construction were combined to reuse and convert a historic building with light-touch intervention, including timber-clad interiors and large interior volumes subdivided to create workspaces
- 92-96 De Beauvoir Road: improved insulation and air tightness standards, when compared against compliance requirements of Part L 2010; extensions, constructed in recyclable steelwork and FSC/PEFC certified timber, provide new roof covering and insulation across the whole of the existing building, where large areas were uninsulated. The proposed measures reduce the annual carbon dioxide emissions of the site by 9,882 kgCO_2, which equates to a reduction of 31.3%
- Thermal upgrades to renovated elements and rooftop studio additions with high levels of thermal insulation and air tightness; air source heat pumps included for the development to provide space heating and cooling; estimated that heat pump systems reduce annual carbon dioxide emissions of the site by 3,621 kgCO_2, a reduction of 16.7%
- Incorporation of energy efficiency measures, such as LED light fittings, low water use fittings, and heat pumps equates to a minimum reduction of 42.8% against the TER 2010 for the scheme, exceeding the 40% improvement requirement under the London Plan 2011
- Civic Trust Awards (Commendation 2019), RIBA Regional Award (London 2018), AJ Retrofit Awards (Office of the Year 2018)

Photo credit: Nick Kane

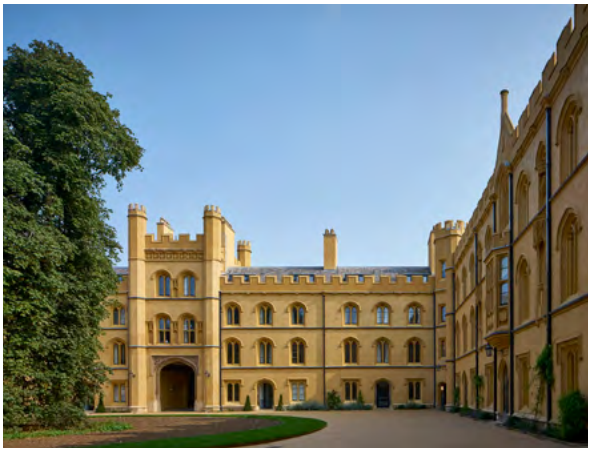
Grade I Listed Buildings

Retrofit schemes which deliver substantial carbon emission and energy consumption reductions are also achievable in highly sensitive Grade I-listed buildings, which are often perceived to be too precious to be altered.

New Court, Trinity College, Cambridge

Architect: 5th Studio

- Grade I-listed building erected in 1825, used as college accommodation, with the original use maintained since construction
- Radical approach taken to substantially cut heating costs, improve the overall amenity and poor quality of the interior environment, and reduce carbon emissions
- Sustainability measures included the addition of 60 mm vapour-permeable insulation to inner face of external walls; reglazing existing windows with 10 mm double-glazed units; decorative joinery shifted to allow for double-glazing and insulation; underfloor heating beneath original floorboards, warmed by ground source heat pumps; replacement of surviving ground floor timber floors with insulated concrete slabs; installation of photovoltaic cells on south-facing roofs; MVHR system using historic chimney flues as vent routes
- Energy consumption and carbon emissions are predicted to reduce by 75% and 88% respectively
- AJ Retrofit Awards (short-list); Regional Finalist in Civic Trust Awards (2017)



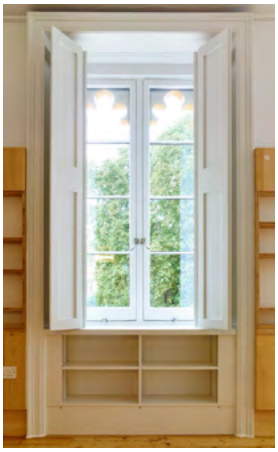


Photo credit: Tim Soar

This paper has been written by Cordula Zeidler and Megan Hari of Donald Insall Associates with Matt Bell of Grosvenor Britain & Ireland. It draws on the advice and experience of a number of consultative partners including The Crown Estate, National Trust, Peabody, Southern Housing and Verco. Historic England was also a consultee and this paper reflects many of its views.

THE CROWN ESTATE

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Southern Housing Group

verco

GROSVENOR