

Sustainable construction policies

Retrofit topic paper

December 2023 | Rev C

Sustainable construction local plan policies | Supporting documents

Operational energy and carbon

Technical evidence base / New buildings only

Recommends specific policies to reduce new buildings' operational energy use, require low carbon heating systems, increase renewable energy generation and ensure that targeted performance is delivered. Demonstrates that they are technically feasible and comments on their cost.

Embodied carbon

Topic paper / New buildings and retrofit

Explains the concepts of upfront embodied carbon and life cycle carbon. Recommends and assesses specific policies.

District heating

Information paper for officers / New buildings and retrofit

Explains the different types of district heating systems, how they compare with an individual heating system and which systems would help to deliver Net Zero.

Retrofit

Topic paper / Retrofit

Articulates the crucial role of retrofit to achieve Cotswold's carbon targets and how the Local Plan (and wider planning system) can better support and incentivise decarbonisation.

This work was led by



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The consultant team includes two organisations who have previously collaborated on a range of new construction and retrofit projects, net zero guidance and policy work. It includes architects, engineers, conservation and energy specialists. It brings together a diverse set of skills with a shared ethos of collaboration, practicality, and commitment to accelerate the reduction of carbon emissions from buildings.



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Purpose of this paper

The purpose of this document

Cotswold District Council has the ambition of delivering a Local Plan that is “Green to the core”. The purpose of this document is to explore what impacts can be made through the Local Plan on **existing buildings**, specifically with regards to the transition to a net zero carbon district.

It is formed of three main sections which are illustrated on the right. The document will also help to inform the forthcoming update to the Design Code and could be used to inform future Supplementary Planning Documents.

In our separate reports on operational energy and carbon and embodied carbon, we look at how the Local Plan can assist with the delivery of net zero carbon new buildings within the district.

Who is this document for?

This document is intended for planning officers to help inform and guide the development of the Local Plan, the Design Code and any potential new SPD.

Links to other documents

The council’s Net Zero Carbon Toolkit is a good source of practical and specific guidance on what retrofit is, measures that can be taken and standards that should be targeted.

Section 1

In section 1 we summarise why retrofit is so important, and we look at the Context for existing buildings in Cotswold District, the makeup of its built environment and landscape, the character and importance of its buildings.

Section 2

In section 2 we consider the barriers and opportunities to low carbon retrofit.

Section 3

Section 3 explores potential policies that would support the transition to net zero in the Cotswold District. We also recommend other areas in which the Council can facilitate the transition to net zero through the planning process – for example through additional guidance for applicants and householders.

“The planning system could be utilised more effectively to facilitate the significant challenge of retrofitting existing buildings and infrastructure both for adaptation to more extreme climate events and to enable de-carbonisation”

Climate Change Committee, Spatial Planning for Climate Resilience and Net Zero, 2023

1.0

Retrofit and the role of planning in the transition to net zero



Why is retrofit important?

Decarbonisation of existing buildings is critical for the UK to meet its Net Zero obligation

The majority of the buildings that will exist in 2050, when the UK has legally committed to having net zero carbon emissions, have already been built. It is therefore critical to decarbonise the existing building stock.

The electrification of existing buildings will play a pivotal role

The decarbonisation of the electricity grid has, so far, provided a major component of the UK carbon emissions reductions that have been delivered. Moving existing buildings away from fossil fuel heating towards electricity can put them on track to Net Zero.

The decarbonisation of the gas grid through hydrogen is very unlikely. The recently published National Infrastructure Assessment actually states *"The Commission's analysis demonstrates that there is no public policy case for hydrogen to be used to heat individual buildings. It should be ruled out as an option to enable an exclusive focus on switching to electrified heat."*

Reducing energy use will help with electrification

The capacity of the UK to generate electricity renewably is not infinite. The total demand on the network needs to be limited to the amount of energy that we can produce primarily from wind and solar energy with nuclear by 2050. This requires us to reduce energy use from existing building through retrofit, which will also save money on energy bills and make the transition affordable for people and businesses and manageable for the country.

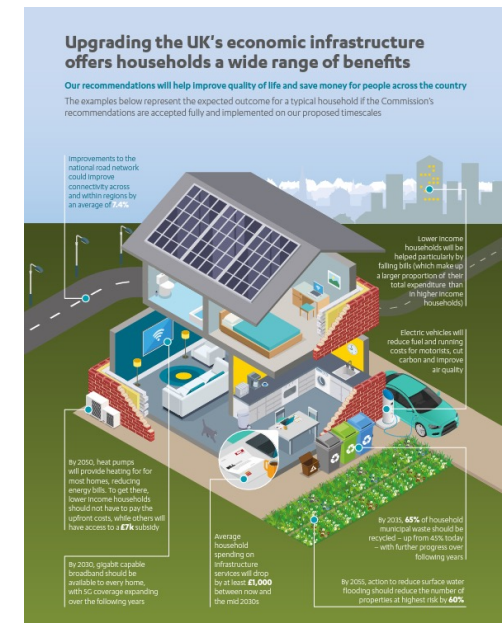
The journey matters as much as the destination

The amount of carbon dioxide emitted globally between now and 2050 determines the temperature rise that will be experienced. To meet our international obligations under the Paris Agreement, we need to be reducing emissions rapidly and immediately.



The Paris Agreement is a **legally binding international treaty on climate change**. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015. It entered into force on 4 November 2016.

Its overarching goal is to hold "the increase in the global average temperature to well below 2° C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5° C above pre-industrial levels."



The second National Infrastructure Assessment issued in October 2023 identified many benefits from acting urgently on measures to support UK Net Zero, including transitioning buildings to electric heating, such as heat pumps.

What are we trying to achieve with building retrofit?

Carbon emission reductions

The objective of retrofit should be to put existing building on track towards Net Zero Carbon by 2050 (or earlier). In simple terms, the ultimate net zero carbon buildings ambition is to generate all of buildings' energy needs from zero carbon energy sources. This will require a reduction in energy use coupled with an increase in renewable energy generation, as well as the phase out of fossil fuels. Although getting existing buildings on track towards Net Zero is a challenge, it can be done.

Housing quality & health outcomes

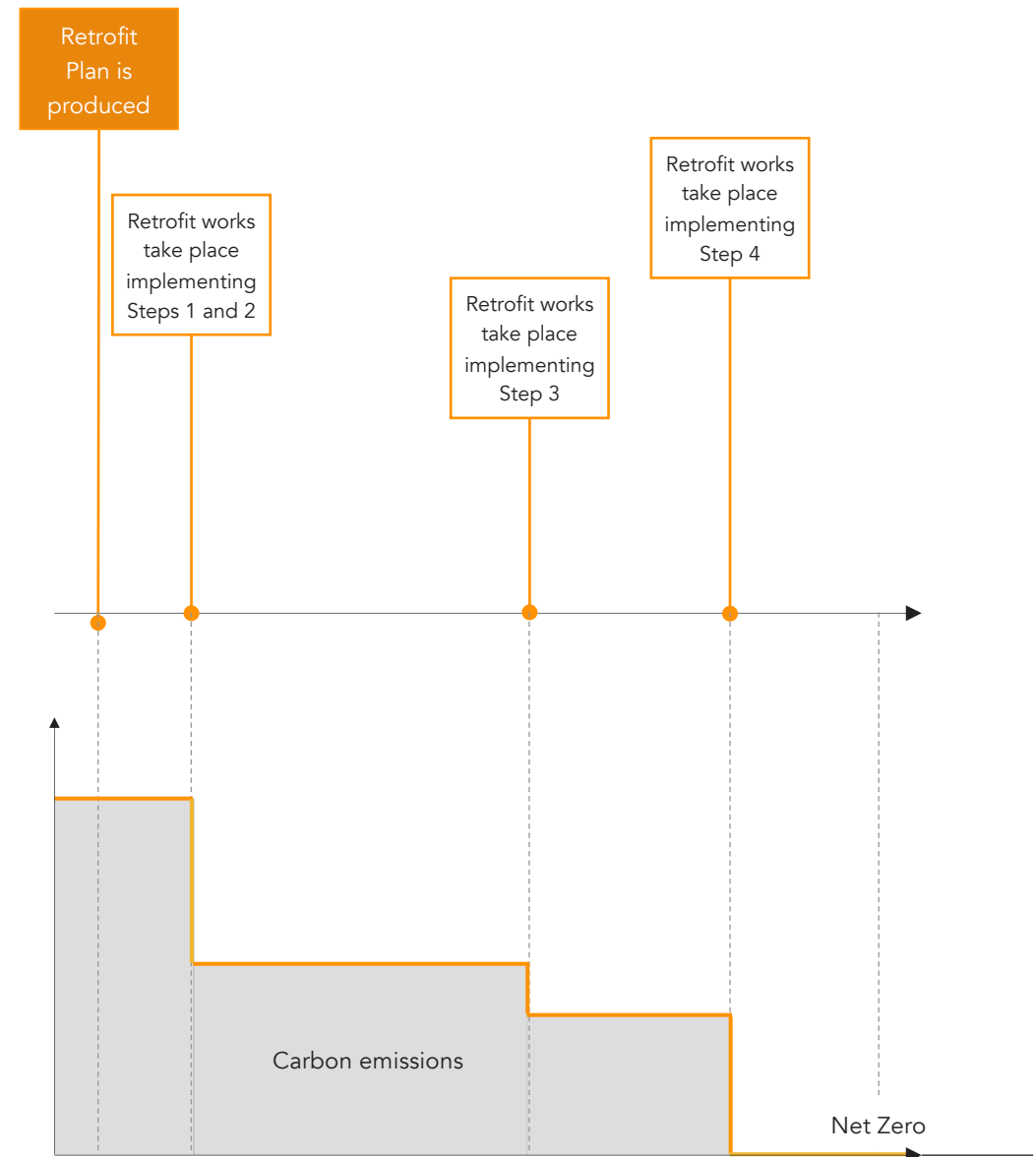
This topic paper is focused on facilitating energy savings and carbon reductions in existing buildings through the Local Plan, but there are other valuable co-benefits which are also a key outcome from retrofitting building. Improving airtightness and insulation and addressing defects and damp are all components of good retrofit and all will make homes more robust, more comfortable and healthier.

An ambitious objective, delivered in steps

Practically, it means that:

1. The building's energy efficiency is improved.
2. A low carbon heating system is installed.
3. Renewable energy is installed on-site.
4. The building is made smart ready.

This is unlikely to be delivered in a single stage though, particularly for homes, and several steps are likely (see adjacent illustration).



Note: the expected decarbonisation of the grid is not represented for simplicity but will also contribute to the reduction of carbon emissions over time.

What are the key retrofit measures?

Retrofit for net zero carbon is the process of upgrading different elements of a building to make it more energy efficient, to move to low carbon heating systems and to enable it to generate renewable energy. These are discussed below.

Energy efficiency improvements

Energy efficiency improvements save energy, reduce running costs and improve comfort. Upgrading windows, insulating walls, roofs and floors, and retrofitting Mechanical Ventilation with Heat Recovery (MVHR) (which reduces unwanted heat loss through air leakage) all improve energy efficiency.

Which combination of measures are appropriate for a particular building will depend on a variety of factors, including its age, construction, current level of energy efficiency and any technical or conservation constraints.

Low carbon heat and no more fossil fuels

The main objective of retrofit should be to accelerate the move away from gas/oil boilers towards heating systems using electricity (e.g. heat pumps or direct electric heating and hot water may be acceptable in a very efficient home). Households not served by mains gas should remain off-gas.

Solar PVs

We need to increase solar energy generated in the Cotswold district to reduce carbon emissions and balance energy use. Many homes and commercial buildings have a significant roof space and can directly benefit from this electricity.

Demand flexibility for a smarter electrical system

Energy storage (e.g. hot water tanks) and smart controls will play an important role in integrating buildings into the wider energy system.

Category	Measure
 Energy efficiency	Double or triple-glazed windows Insulation (wall, roof, floor) Airtightness Ventilation (e.g. MVHR)
 Low carbon heat and no more fossil fuels	Individual heat pumps Communal heat pumps Low carbon heat networks Direct electric
 Demand flexibility	Energy storage Smart energy controls
 Renewable energy generation	Solar PVs

Summary of key retrofitting measures

Planning can be a hurdle – it should be an opportunity

Retrofit is a multi-faceted challenge and there are many reasons why retrofit is not currently happening at the pace or level of ambition required. The planning framework is currently a hurdle, but it can play a very positive role for low carbon high quality retrofit.

Technical

- Retrofit often appears to be an excessively complex set of measures.
- Tenure adds another element of complexity.
- Retrofit can be over-simplified, leading to inappropriate measures and potential issues (e.g. moisture in walls).
- The risks involved in retrofit are not clearly identified and catalogued per measure.

Delivery and supply

- The customer/client journey is challenging.
- The choice often appears to be between (expensive) professionals or contractors lacking an overview or understanding of the end goal.
- Every new retrofit needs to manage risks on its own (e.g. procurement, heat pump installation and commissioning) instead of mutualising them.
- Planning is a very clear hurdle.

Costs/funding

- The costs of retrofit are high and the financial benefits can be unclear and uncertain.
- Energy cost savings are generally not a sufficient motivation.
- Running costs of heat pumps (including maintenance) are perceived as a concern.
- Application for grant funding is complex and uncertain.
- Procuring the services of an architect or a Retrofit Coordinator can be seen as expensive.

Demand and take-up

- Does my building use too much energy? Can I significantly improve its energy efficiency and put it on the right track towards Net Zero? It is difficult for the public to access responses to these basic questions.
- Finding reliable advice on what to do is also not straightforward.
- It is very difficult to determine the relevance of generic information and there is a clear need for more specific advice.

Planning

- Can be obstructive or enabling
- Can influence costs and funding and demand and take up

Retrofit and Permitted Development rights

Permitted Development rights and planning permission

Some key retrofit works fall under Permitted Development (PD) rights.

For domestic buildings, these include window replacement, heat pumps and solar PV installation. In each case, there are limits applied and relevant guidance (see adjacent text box), but the presumption is that they are, or should be, permitted.

For **flats**, Permitted Development (PD) rights do not apply (except, in some cases, for solar PV installations).

Any measures which do not fall within the PD limits (e.g. external insulation, triple-glazed casement windows at the back, listed buildings alterations) will require planning permission.

*Some permitted development rights are removed in the case of listed buildings, or buildings in a conservation area or Area of Outstanding Natural Beauty (AONB).

Permitted development (from the Planning Portal) *

Windows replacement: *"You do not usually need to apply for planning permission for [inter alia] insertion of new windows and doors that are of a similar appearance to those used in the construction of the house or installation of internal secondary glazing."*

Heat pumps: *"The installation of air or ground source heat pumps or a water source heat pump on domestic premises is usually considered to be permitted development, not needing an application for planning permission."* Please note that the installation has to comply with specific requirements though, e.g. location.

Solar panels: *"The installation of solar panels and equipment on residential buildings and land may be 'permitted development' with no need to apply to the Local Planning Authority for planning permission [subject to limits and conditions]."*

Guidance for historic and listed buildings

Successful heritage management is achieved by respecting and understanding historic significance whilst accepting the need for change and improvement.

Historic England's introduction to its **Climate Change Strategy** acknowledges that 'We need to prepare to experience some loss of heritage' but there is a gap between the recognition that something needs to be done and the identification of what is acceptable and where the sacrifices should be made.

The National Planning Policy Framework [NPPF] introduced a presumption in favour of sustainable development whereby proposed developments which correctly balance the requirements of economic, social and environmental issues should be granted planning permission unless there are strong reasons why permission should not be granted. This balancing is tilted more in favour of sustainability in the December 2022 NPPF consultation where greater weight is given to the need to adapt existing buildings. The checks and balances of chapter 16 'Conserving and enhancing the historic environment' still apply where it sets out the criteria for making decisions around adapting heritage assets although, it doesn't address how much weight sustainability criteria carry as a material consideration.

This is addressed in the November 2023 consultation **Historic England's Climate Change and Historic Building Adaptation advice note** which sets out to support consistent decision making on energy efficiency interventions. It states that conservation of the heritage asset should always be given great weight, but it also provides guidance suggesting what might be an acceptable loss.

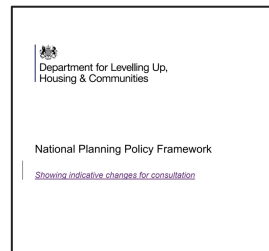
Whilst domestic retrofit can benefit private owners, councils need to recognise the public benefit of improved energy efficiency reducing carbon emissions, potentially balancing or outweighing harm. Changes that cause harm to listed buildings should be avoided or any impact minimised, although consent should be granted for the works if the public benefit outweighs that harm.



Heritage and Climate Change – Historic England

Heritage and Climate Change – A strategy for Historic England's response to the climate, energy and biodiversity crisis

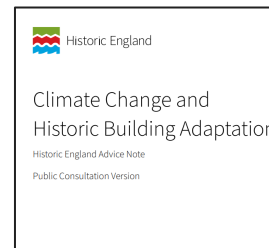
"Our climate is already changing. Projections can be used to estimate where and when hazards driven by climate change will threaten vulnerable heritage. We need to prepare to experience some loss of heritage. Our work in this area is complex, multi-faceted and evolving; it will continue to adapt and respond as we learn more rights"



National Planning Policy Framework - Department for Levelling Up, Housing & Communities

NPPF consultation – Supplementary paragraph 161

"To support energy efficiency improvements, significant weight should be given to the need to support energy efficiency improvements through the adaptation of existing buildings, particularly large non-domestic buildings, to improve their energy performance (including through installation of heat pumps and solar panels where these do not already benefit from permitted development rights"



Climate Change and Historic Building Adaptation- Historic England

Climate Change and Historic Building Adaptation - Advice note

"When applications for changes to a building in response to climate change are assessed, a balance will have to be made between the significance of the heritage asset and the public benefits (that is positive climate action) provided by the proposal."

Local plan update, design codes and supplementary planning documents

Addressing retrofit in the Local Plan

The Local Plan update offers the opportunity to create a shift in emphasis. 'Green to the Core' principles to encourage and support good retrofit may be difficult to encode as policy, but energy efficiency improvements, alternatives to fossil fuel free heating and renewable energy generation can be shown to be possible and appropriate to encourage as many people as possible to look at these solutions more closely.

Guidance: Design Code and a dedicated SPD?

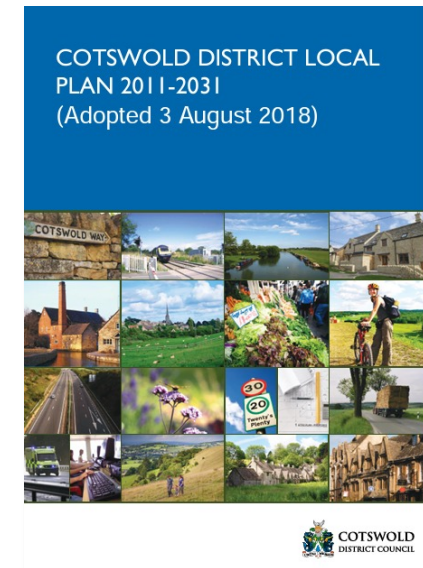
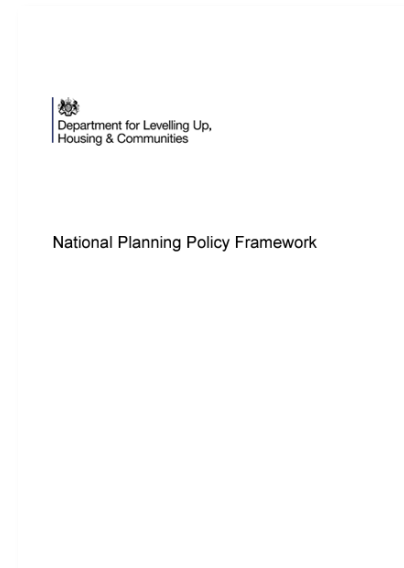
The ongoing work to create a revised Design Code can bring a clearer focus on embodied carbon (retrofit vs rebuild) and design issues such as PV which are not currently covered in a positive way.

The main barriers to retrofit are funding and complexity, both actual and perceived.

Providing clear guidance, perhaps in the form of an SPD, on the retrofit work that is permitted, or that is likely to be considered favourably, would help to reduce the complexities that do exist:

- Legislation – national and local policies and statutory requirements overlap, and it can be difficult for a layperson to understand which takes precedence.
- The guidance on permitted development, AONB, Conservation areas and Article 4 directions can be circular with each referring or linking to the others in a way that is hard to navigate with confidence.

Perceived barriers such as the expectation that obtaining planning permission is always a slow, expensive and administrative process can be more directly addressed with guidance on the website on what is required, how long it takes, who can best help and what it costs.



The different and overlapping policies and rules are difficult for a layperson to navigate, but seeking professional advice is often seen as expensive and time consuming.

Some councils and other organisations have published their own guides such as the Community First Oxfordshire charity's guidance on permitted development rights.

Existing retrofit policies and approaches adopted by other Local Authorities

Bath and North East Somerset Council

This policy encourages retrofitting measures to existing buildings to improve their energy efficiency and adaptability to climate change, as well as the incorporation of micro renewables, where appropriate. Master planning or 'major developments' should demonstrate the opportunity of retention and retrofitting of existing buildings within the site. For listed buildings retrofit, listed building consent is needed and should provide evidence on how energy measures are impacting the heritage importance of the building. This policy is also supported by a retrofit guidance and includes a basic requirement to meet building regulations for extensions or change of use.

Bristol City Council

This policy sets criteria that extensions or alterations to existing buildings must follow, including respect of the site context and the overall design and character of the building and retain traditional and or/and distinctive architectural features. No mention is made of energy efficiency, low carbon heat or renewable energy.

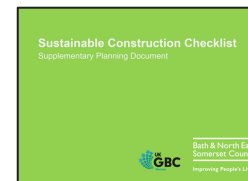
South Oxfordshire Council

Developments including retrofit of existing buildings should aim to minimise the carbon and energy impacts and a sensitive approach should be taken towards special character of heritage assets.

Cambridge Council

Retrofit strategies should not impact the character and appearance of listed buildings/ buildings in conservation areas/ local heritage assets and should improve its the energy efficiency through various retrofit measures, such us the addition of loft and cavity wall insulation, the replacement of F & G rated boilers to A-rated condensing one, heating controls update and draught improvements.

Unfortunately, **none seek to move away from fossil fuels.**

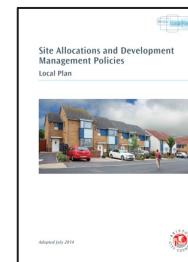


Sustainable Construction checklist SPD – B&NES

B&NES – Policy CP1: Retrofitting existing buildings

"Existing buildings may have fewer options for improving energy performance and measures should be sensitive to the existing building. Appropriate incorporation of micro renewables will be encouraged.

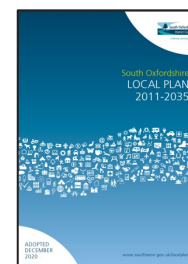
Proposals for works to historic buildings will be judged on their own merits, taking into account the significance and character of the building and its setting. All Listed Building Consent applications must provide full details of energy measures including their impact on fabric, appearance or building function."



Bristol 2014 local plan

Bristol – Policy DM30: Alterations to existing buildings

"Extensions and alterations to existing buildings will be expected to respect the siting, scale, form, proportions, materials, details and the overall design and character of the host building, its curtilage and the broader street scene, retain and/or reinstate traditional or distinctive architectural features and fabric, safeguard the amenity of the host premises and neighbouring occupiers and leave sufficient usable external private space for the occupiers of the building. Proposals that would sensitively adapt existing buildings to alternative uses as an alternative to demolition will be supported."



South Oxfordshire 2020 local plan

South Oxfordshire – Policy DES8: Promoting sustainable design

All new development, including building conversions, refurbishments and extensions, should seek to minimise the carbon and energy impacts of their design and construction.

A sensitive approach will need to be taken to conserve the special character of designated and non designated heritage assets in a manner appropriate to their significance.

2.0

Retrofit and the Cotswold context:
Opportunities and barriers

The current housing stock in the district

The Cotswold District is predominantly rural in character, with many small villages and towns. The overall population of the district is approximately 91,000. It is one of the largest districts in the country but has one of the smallest populations – it is therefore very low density. The largest town in the district is Cirencester with a population of 20,229 (2021). The economy is mainly based around tourism and agriculture.

Age of the domestic building stock

According to council tax stock properties as of March 2022, There are approximately 45,000 domestic buildings in the district, built across four main periods:

- Pre-1900s: solid wall construction, traditional building materials and vernacular architecture
- 1900-1950s: solid wall construction, early cavity wall
- 1950-2000s: uninsulated cavity wall construction
- Post-2000s: insulated cavity wall construction

Building typologies

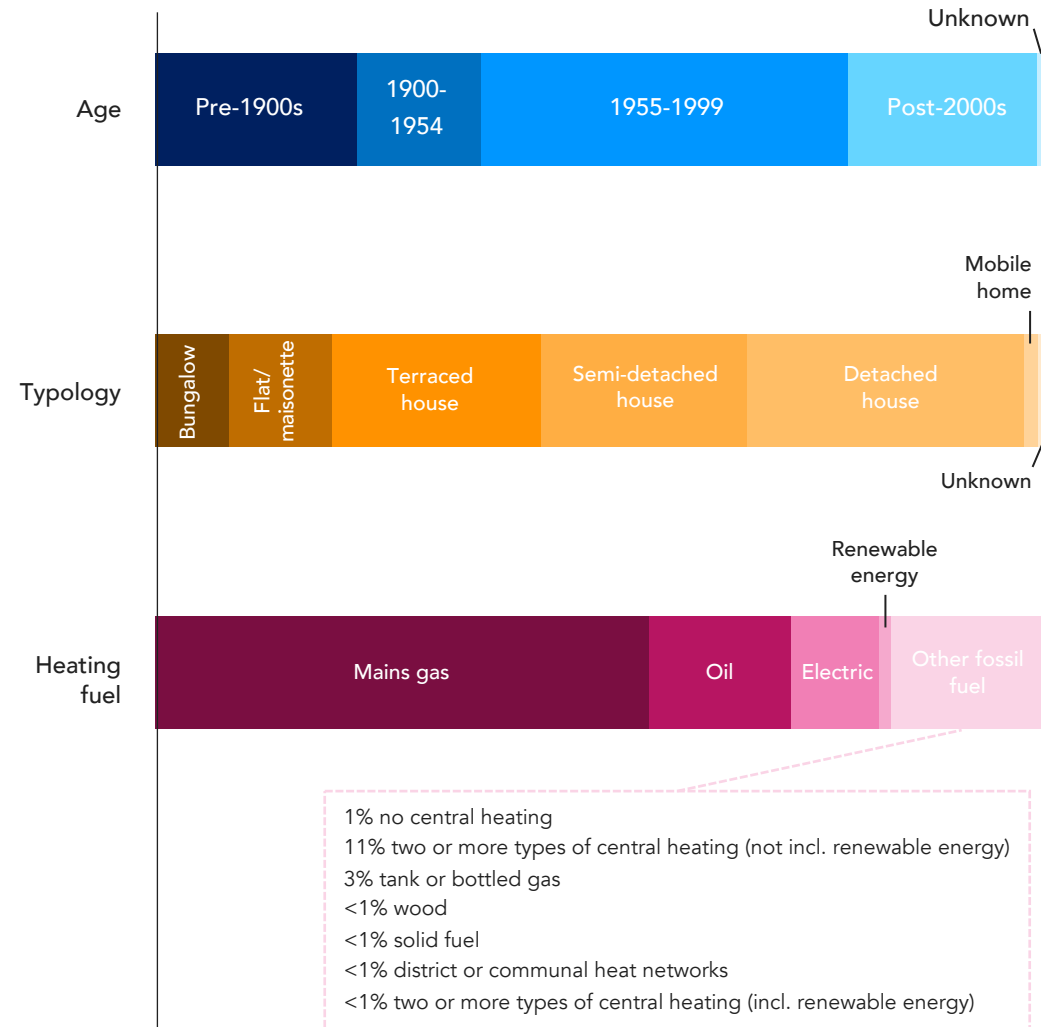
As of March 2022, Cotswold's largest domestic building typologies are detached houses, semi-detached houses and terraced houses. The district also has a small proportion of flats/maisonettes (11%) and bungalows (8%).

Listed buildings

According to the National Heritage List for England (NHLE) 2015 survey, **11-24%** (5,000-11,000) of the domestic buildings in Cotswold are listed.

Heating

According to Nomis data, most homes in the district are heated by gas but there is also a large proportion of off-gas oil-heated homes.



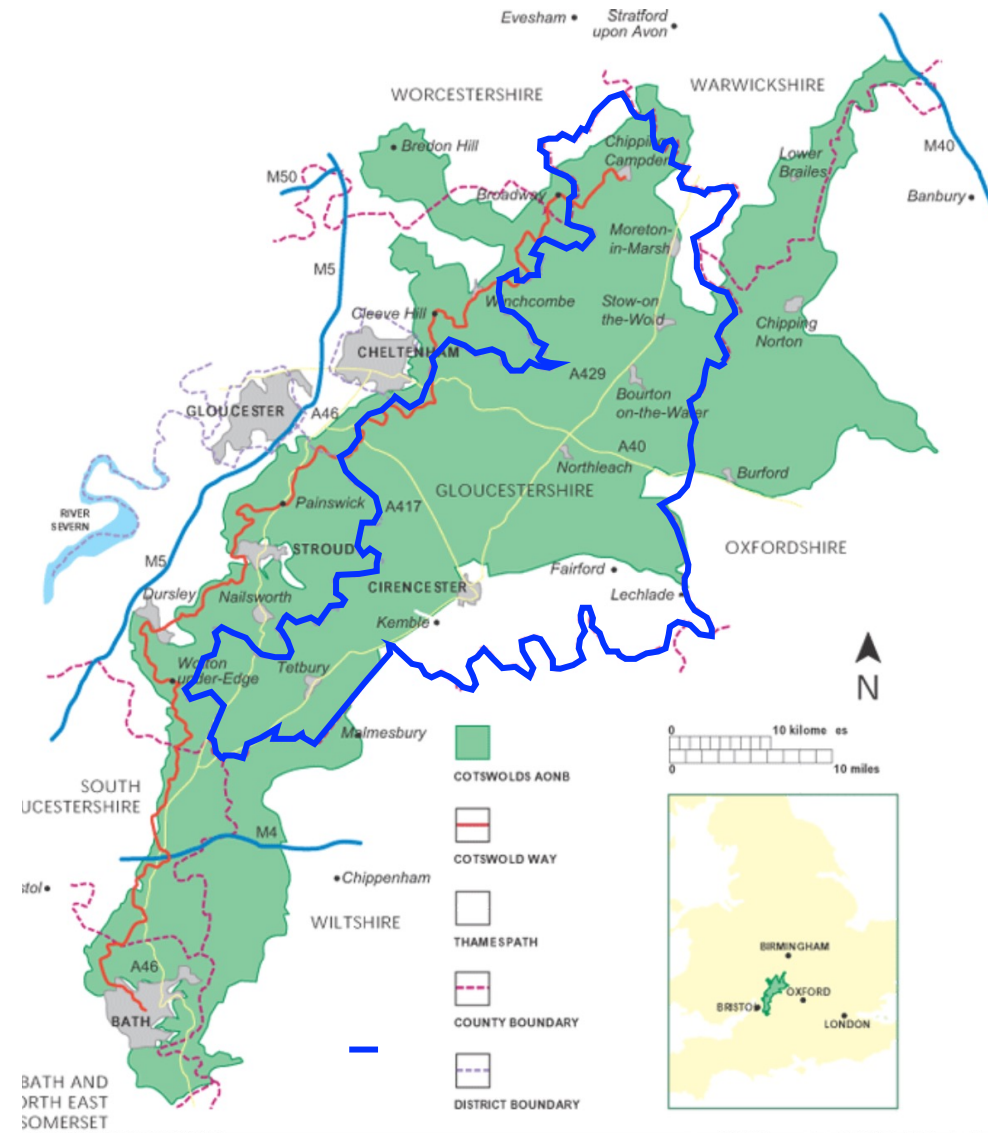
Key statistics about the housing stock in the Cotswold district.

The Cotswold AONB

The Cotswold Area of Outstanding Natural Beauty (AONB)

An area of outstanding natural beauty (AONB) is land protected by the Countryside and Rights of Way Act 2000 (CROW Act) to conserve and enhance its natural beauty. Development proposals affecting AONBs must consider and factor the areas conservation objectives, mitigating any negative effects if unavoidable.

Some 80% of the district by area is covered by the Cotswold AONB. Properties within the AONB may have some Permitted Development Rights removed – it is not clear if this is the case or which ones.



Cotswold Area of Outstanding Beauty (AONB) is highlighted in green. The Cotswold District boundary is in blue. Approximately 80% of the district is covered by the AONB.

Conservation areas and listed buildings (1/2)

There are more conservation areas in the Cotswold district than any other local authority

There are 144+ Conservation Areas within the Cotswold District. This is more than any other council in the UK. They are mostly situated within the villages and towns of the district, and therefore a large proportion of the district's building stock is situated within a Conservation Area.

Buildings located in a Conservation Area will have some Permitted Development (PD) rights removed.

Potential for change within the Conservation Areas

The historic environment is an irreplaceable shared asset, and we have a duty to preserve this heritage. The level of listing, its significance and potential impact of change on the character of a place or building are determinants of what type of consent is required. By understanding what is important about a place and the degrees of significance, rational decisions can be made about how to conserve it.

The key challenge of implementing domestic retrofit at scale within conservation areas is balancing and reconciling conservation objectives with management of sustainability-led change.

Listed buildings

It is estimated that there are 5,000-11,000 listed properties within the Cotswold District. Buildings are listed for a variety of different reasons related to their **significance** and **heritage value**. The significance of buildings, spaces, places or elements is an amalgam of different heritage values.

Listed buildings may have some or all Permitted Development Rights removed. Most changes to listed buildings will require planning permission. This provides an opportunity to create policies that encourage appropriate and sensitive retrofit measures.

Significance in the context of the Cotswold District

Evidential value: *what evidence does it reveal about the past and what potential for new knowledge is there in the fabric of the asset?*

The area is rich in evidence of prehistoric, roman, medieval and later settlement occupation providing evidence of social change alongside human impact on the landscape reflected in changing agricultural practice.

Historical value: *how does the asset or its features support a narrative of the past and what are its associations?*

Numerous archaeological sites, historic buildings and landscapes chart the influence of the wool trade on the settlement patterns. The emergence of industrialised textile production and arrival of the canal and railway networks brought wealth and interconnectivity facilitating export of textiles and its characteristic stone to national markets.

Aesthetic value: *how do people engage with the asset emotionally both in respect of the original design and the way that the place has evolved?*

Mediaeval timber buildings were replaced by stone in the seventeenth century which gave rise to a new vernacular of visually cohesive harmonious settlements. Changes in architectural tastes reflecting increased sophistication and affluence expanded the range of its fine architecture of soft stone.

Communal Value: *how does the asset bring people together as a community and how is it valued for its social role?*

The area is prized for its distinctive sense of place unified by its harmonious yellow and light brown limestone buildings, structures and drystone walls

Conservation areas and listed buildings (2/2)

The Cotswold District has a number of particular characteristics that affect the approaches to retrofit that may be most suitable or effective.

Aesthetic sensitivities

The visitor economy is hugely important to the district and measures that could affect the visual appeal of communities could detrimentally affect the area's economy.

Particular issues to local vernacular construction (e.g. stone roofs).

Cotswold limestone is relatively porous, so damp issues are a risk if not very carefully controlled – even for relatively new properties. Older stone roofs may be fragile compared to modern clay tiles or slate roofs, so access for the installation of PV may not be possible.

Small communities with densely built town centres

Characteristically small towns and larger villages have very densely built centres with small properties built very close together, with very restricted private outside space, making the siting of heat pumps a particular challenge.

One size doesn't fit all

The Cotswolds have been centres of habitation for centuries and the buildings reflect the progressive, successive development. Towns and even individual buildings have gone through many phases of construction. Simple, generic rules are unlikely to be useful so a suite of solutions that can be turned into bespoke plans is needed.

Rural and agricultural buildings

Rural buildings can be large and with multiple extensions and alterations that make a single retrofit approach difficult to identify, introducing a degree of complexity that can be challenging to understand for many owners.



Town centres with densely built buildings of different ages and construction



Rural properties with multiple phases of construction

Key barriers and opportunities for retrofit

While there are many and Areas of Outstanding Beauty (AONBs) and Conservation Areas (CAs) in the district, the majority of housing is concentrated in the main towns outside of AONBs and CAs.

Owners of these homes will therefore have more freedom over what they can do to their homes – they will have more scope for the addition of photovoltaic panels, external wall insulation and high-performance replacement windows for example.

Conversely, the Local Plan will have less influence in these areas as there will be fewer instances when planning applications need to be made.

Barriers

- Historic significance of traditional Cotswold stone buildings and sensitive nature mean some modern retrofit solutions may not be suitable (e.g. external wall insulation).

Opportunities

- Actual energy performance of buildings of traditional construction is often better than theoretical energy performance.
- Traditionally built homes perform best when in good state of repair and maintenance.
- Many homes in the district will not be required to seek planning permission in order to make changes.



There is a wide range of buildings in the District.

3.0

Recommendations and potential retrofit policies for the Cotswold District Council's new Local Plan

What can the Local Plan do to facilitate retrofit?

Outlining the direction of travel

Strategic policies have the virtue of communicating the Council's direction of travel and long-term ambition. Introducing a strategic policy on retrofit and Net Zero Carbon would be very useful.

Setting requirements for when planning consent is required

There are various instances in which the owner of an existing building will need to apply for planning permission to make changes to their building. These include:

- Changes falling outside of permitted development rights (particularly in Conservation Areas and Area of Outstanding Natural Beauty where permitted development rights are restricted).
- Major refurbishment which alters a building's appearance or massing.
- Change of use, where planning applications are required to change the building's use class.
- Changes to Listed Buildings, where listed building applications are required.

For the above cases, policies can be introduced to require particular retrofit measures to be considered and/or implemented.

There is also the opportunity to use a planning application as a trigger for a particular retrofit measure (e.g. change the gas boiler for a heat pump when an extension is proposed).

Explaining Permitted Development rights

Permitted Development rights remove the need to make a planning application. While this reduces the impact the Local Plan can have through policy, it is nonetheless a potential enabler for certain measures. It is important that homeowners understand what they can do through Permitted Development rights for this advantage to be fully realised.

Mechanism	Description
Strategic objectives	High level wording in the Local Plan can be used to set out the broader strategic aims of the Local Plan and lend some weight in how decisions are made.
Policy	Can be used to mandate compliance with particular requirements.
Material considerations	A matter that should be considered in deciding a planning application
Permitted Development Rights	Permitted Development Rights are set at the National Level and allow certain changes to be made without seeking planning permission.
Local Development Orders	LDOs provide permitted development rights for specified types of development in defined locations. They are flexible and locally determined tools that LPAs can use to help accelerate the delivery of appropriate development in the right places.
Neighbourhood Development Orders	Can grant planning permission for specific types of development in a specific neighbourhood area
Listed Building Consent Order	Can grant planning permission for certain types of works for the alteration or extension (but not demolition) of listed buildings in England.
Listed Building Heritage Partnership Agreement	Allow the owner of a listed building or buildings and their local planning authority (LPA) to agree which necessary works to the building are routine and regular and, if done correctly, will not harm its special interest. The agreement grants listed building consent (LBC) for these works, for an extended period of time, and they can go ahead whenever convenient.
Supplementary planning documents	Documents which add further detail to the policies in the local plan.
Design codes	A set of illustrated design requirements that provide specific, detailed parameters.

Where are the greatest opportunities?

Mid-century and post war buildings

Most mid-century and post war buildings in the district are not located in Conservation Areas and are not listed. Owners of this type of housing have the most freedom of choice over implementation of retrofit measures. These buildings, therefore, will not require planning permission for any alterations.

The historic nature and heritage value of the district presents opportunity

Opportunities for the Local Plan include:

- The high number of buildings located in Conservation Areas or the AONB. This increases the number of applicants who will need to make a planning application to make changes and will increase the number of people looking at the council's website for guidance on what they can and can't do.
- The high number of listed buildings presents an opportunity for providing clear guidance on the measures that will and will not be acceptable for different building types and construction.

The Local Plan can have the greatest impact through agreeing a policy stance on low carbon heat and windows

Technically, the greatest opportunities for energy and carbon savings lie in:

- 1) Replacing gas and oil boilers for low carbon heating systems such as Air Source Heat Pumps or other low carbon heat.
- 2) Replacement windows – leaky, single glazed windows lose a large proportion of heat.
- 3) Ventilation – when windows are replaced it is important to consider energy efficient ventilation to ensure humidity is controlled and air quality is maintained.

For buildings in Conservation Areas and Listed Buildings a planning application may be required to make changes. The council should work on agreeing their position to what replacement windows would be suitable in what circumstances.



Mid-century buildings offer the greatest potential for energy efficiency improvement.



Large extensions that require planning permission could be asked to meet the same performance as new buildings, particularly where the extension forms a self-contained annex to the original house.

Strategic objective | Supporting text for policies

The adjacent table lists some supporting text that could be used alongside the policies suggested later in this section.

Ref	Proposed supporting text
RF.00	Retrofit and net zero The Council acknowledges that the current Cotswold building stock needs to decarbonise in order for the District to comply with its carbon budget and achieve Net Zero. The amount of carbon dioxide (CO₂) we have left to emit globally for a 50% chance of limiting global temperature rises to below 1.5C above pre-industrial levels is limited (this is known as a global carbon budget). At 2022 CO₂ emissions rates this global carbon budget will be used up by 2029. As a developed nation, the UK, and the Cotswold district, has a relatively smaller portion of the global carbon budget. At current emissions rates, the Cotswold district is on track to consume its carbon budget well before 2027 (Tyndall Centre for Climate Change Research). CO₂ emissions from homes in the Cotswold district accounted for 26% of the district's CO₂ emissions in 2022. It is therefore essential to take positive and rapid action to reduce CO₂ emissions from homes. Existing buildings need to become more energy efficient, switch their fossil fuel heating system for a low carbon heating system and contribute to the generation of renewable energy.
RF.00	Exceeding national building regulations standards National building regulations set minimum thermal insulation (u-values) standards for alterations and extensions to dwellings. These minimum standards fall short of the insulation standards that would better support the transition to net zero. We believe that in the context of the climate crisis we should be striving for better standards. Through specifying insulation standards that go beyond the minimum, CO₂ emissions are decreased, occupants' energy bills are reduced, and internal comfort levels for occupants improve. In parallel, the more energy efficient the home the more occupants can take advantage of smart energy tariffs and reduce their energy bills even further. Energy efficiency also plays an important role in supporting our national electricity grid to decarbonise by reducing peak loads and enabling a greater proportion of our electricity to be generated with renewable energy technologies.

Encouraging low(er) carbon retrofit

Require a change to low carbon heat

Where planning permission is required for retrofit work, including extensions, it could be possible to require the removal of fossil fuel-based systems to be replaced with low carbon heating systems.

Set superior performance targets

The LETI Climate Emergency Retrofit Guide constituent element method targets are shown in the table to the right. This gives limiting values for U-values, airtightness, systems, hot water and renewables. For some developments, it may be appropriate to go even further and and require *EnerPHit* or *Energiesprong* as a standard or quality assurance processes. This could be required in situations where a development would normally be less likely to be approved.

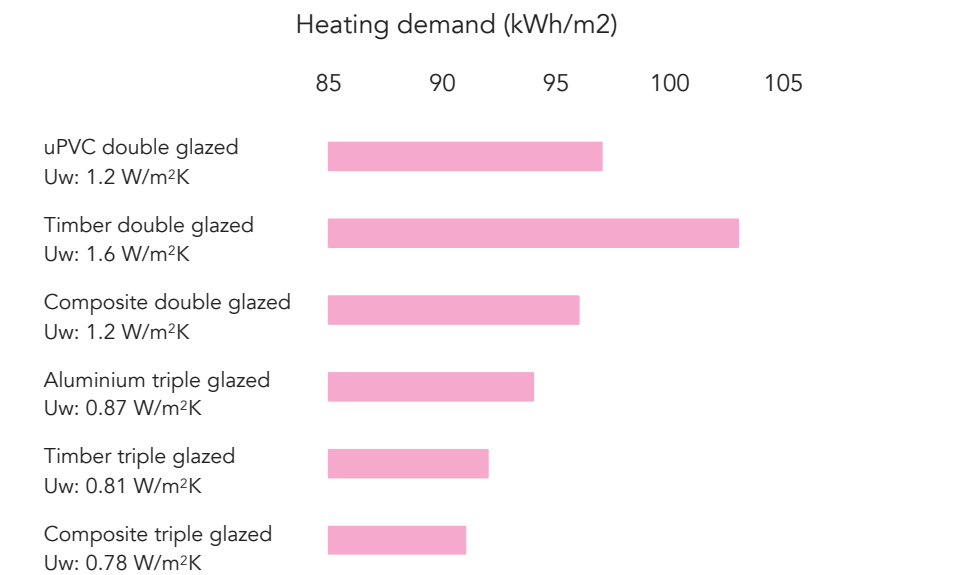
Require a whole house retrofit plan

For some larger applications it may be appropriate to require a that a whole house retrofit plan is developed to PAS 2035 with a retrofit co-ordinator, to ensure that the property is on an effective and safe trajectory towards net zero carbon.

Windows

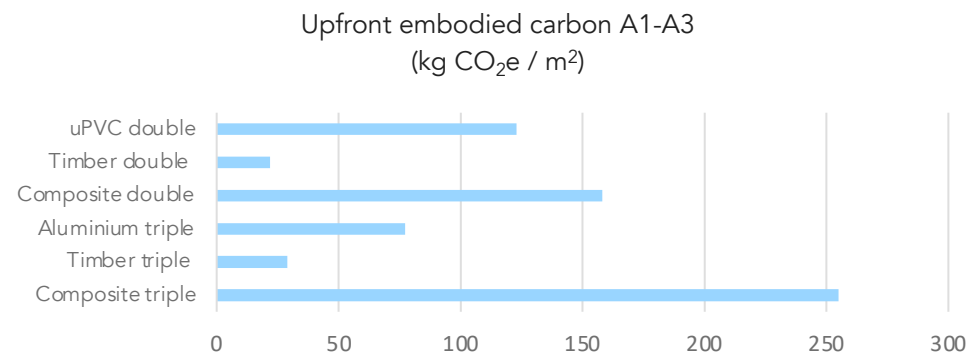
Replacement of windows is very often a key step in improving the energy efficiency of homes. Providing some simple guidance on the pros and cons of different approaches and the relative performance of different window types would be helpful.

The graphs to the right show the results of a recent study comparing 6 specific windows from different manufacturers, comparing both the operational energy differences and the embodied carbon. For embodied carbon in particular, the differences between different window frame types can be smaller than the differences between different manufacturers of the same window type. Supplier selection is therefore an important decision. It is generally the case that uPVC windows with the same specification will have a worse performance and higher embodied carbon than a timber framed window.



Results of a comparison of 6 specific windows, energy modelling of a single dwelling by Etude.

Lower heat demand (shorter bar) means the window is providing better insulation and therefore better energy performance.



Comparison of 6 specific windows by Etude, data from published EPDs.

The results are given as kg of CO₂ per m² of window. Where other greenhouse gases (such as methane or refrigerants) are also emitted in the process, these are converted to the equivalent kg of CO₂ that would have the same global warming potential

Encouraging low(er) carbon retrofit | Summary of potential policies

Initial recommendations

The adjacent table forms part of a 'long list' of potential policy recommendations.

Ref	Proposed supporting text	
	The transition to low carbon heat away from gas is a critical step for all buildings and generating renewable energy with roof-mounted PVs represent a significant opportunity. Whole house retrofit plans are advisable for every home, in order to avoid the risk of either abortive costs or unintended consequences and to avoid installing incompatible improvements. This is a principle in the British Standards for home retrofit (PAS 2035).	
Ref	Type	Proposed policy wording
RF.01	Fossil fuel heating	Any planning application involving the replacement of a fossil fuel heating system by another fossil fuel heating system will not be accepted. A new low carbon heating system is required.

Extensions and alterations | How to encourage energy efficiency and low carbon heat upgrades?

Permitted development

Most extensions to homes are carried out under Permitted Development (PD) rights. However, there are cases where a proposed extension will fall outside of PD rights – for example, extensions above a certain size. In these cases planning permission will need to be sought and the LA will be able to apply policy and certain requirements.

An opportunity to intervene in the rest of the building

Where an extension requires planning permission, there is an opportunity to ask for or to demand improvements to the energy performance of the main building. The Net Zero Toolkit provides guidance on approaches to encourage such improvements.

It may be possible to write a policy which, for example, requires that the house with the extension should switch from fossil fuel heating to low carbon heat at the same time as the extension.

There is also the opportunity to request that consideration is given to future improvements (e.g. future solar photovoltaic provision).

Self-contained annex

There is a grey area where an extension provides self-contained accommodation. Building Regulations requires that any self-contained unit requires a SAP calculation to be carried out. In these cases, if planning permission is required because the extension is large or if there are limited PD rights, it would be reasonable to require the same performance for the annex as for a new build home, where new build policy goes beyond minimum compliance.

An extension should trigger the improvement of the home (especially low carbon heat)

Grasping the opportunity
When considering the lifetime of a house, there are not many times when major improvements can be made. An extension is a fantastic opportunity to make a significant step towards Net Zero carbon and not locking in poor/high carbon decisions.

What to consider
When considering the scope and costs of extending a home, the following opportunities should be considered:

1. Upgrading the heating system, and replacing the gas boiler with a heat pump.
2. Replacing existing windows with double or triple glazed windows
3. Upgrading the existing external fabric of the existing building (including both insulation and airtightness).
4. Installing Mechanical Ventilation with Heat Recovery (MVHR)
5. Installing solar PV panels to generate electricity

Staged retrofit – piece by piece
It is possible to undertake a staged retrofit when extending a home. A very useful resource and robust methodology is the EnerPHit Retrofit Plan. This scheme helps create a plan for taking a staged retrofit process, where the measures to improve the building fabric are put to a timeline. This allows the extension to be built and improvements to be made over time, and not just in a single phase. This can be an attractive and practical approach as often the capital costs of undertaking an extension and undertaking a major refurbishment all at once may not be affordable.

EnerPHit retrofit project with extension (Source: Passivhaus Plus)

EnerPHit staged retrofit improvement plan process (Source: PHi)

Go to section... 46

The Net Zero Toolkit provides some advice on using extensions as a catalyst to improve homes' energy performance.

Extensions and alterations to dwellings | Summary of potential policies

Initial recommendations

The adjacent table forms part of a 'long list' of potential policy recommendations.

Ref	Proposed supporting text	
	The opportunities of extensions and alterations to existing dwellings Extensions and alterations to existing dwellings provide great opportunity to improve the energy efficiency, carbon emissions and comfort of a home or building. Often extensions will replace a significant part of the existing building envelope, enabling a leaky, uninsulated façade to be replaced by a high performance, comfortable energy efficient façade. An extension may also involve the replacement of heating systems and windows or doors in other areas of the property. It also provides the opportunity to plan for and create space for future technologies – new, low carbon heating systems, energy storage systems or energy efficient ventilation systems. Similarly loft extensions and other work to the roof may provide an opportunity to add solar photovoltaic panels to generate renewable energy – reducing the time and cost of an installation by installing it at a time when roof access is already in place.	
Ref	Type	Proposed policy wording
RF.02	Extensions and alterations to dwellings	Extensions to existing residential dwellings: new elements (e.g. walls, windows), should exceed minimum building regulations requirements and meet the minimum elemental standards set out in the table below: [reproduce LETI Home Retrofit Targets table, Appendix 1] Listed buildings are exempt from complying with this policy.
RF.03	Extensions and alterations to dwellings	Loft conversions with dormer windows: upgrades to roof coverings and insulation should exceed minimum building regulations standards and meet the minimum elemental standards set out in the table below: [reproduce LETI Home Retrofit Targets table, Appendix 1] Listed buildings are exempt from complying with this policy.
RF.04	Extensions and alterations to dwellings	Extensions to existing residential dwellings: where gas or oil boiler systems are replaced no new gas or oil boilers will be permitted. Instead, low carbon heating technology should be provided. Acceptable low carbon heating options include: Air Source Heat Pumps Ground Source Heat Pumps Listed buildings are exempt from complying with this policy.
RF.05	Extensions and alterations to dwellings	Extensions to existing residential dwellings: where gas or oil boiler systems are used, the fossil fuel heating system should be replaced with a low carbon heating system. such as Air Source Heat Pump. Listed buildings are exempt from complying with this policy.

Listed buildings | Summary of potential policies

Initial recommendations

The adjacent table is a 'long list' of initial policy recommendations aimed at reinforcing Permitted Development Rights through the Local Plan document.

Ref	Proposed supporting text	
	Listed Buildings Climate change mitigation and adaptation is imperative if we are to conserve our environment: natural, urban and historic. Our historic buildings, which contribute so much to the Cotswold district, play an important role in our response to climate change. Mitigating climate change and conserving historic buildings are compatible goals. Achieving both these aims requires thoughtful, sensitive and appropriate interventions. Taking the right action now will help us create an historic environment that is fit for purpose into the future. The amount of carbon that goes into constructing a building (its embodied carbon) is significant). Maintaining, repairing, reusing, and adapting existing buildings to enable their continued use is one of the most effective ways to reduce carbon emissions and unnecessary waste.	
Ref	Type	Proposed policy wording
RF.06	Listed Buildings	Applications for energy saving, low carbon heating systems or energy generating proposals to listed buildings (or within their settings) will be considered in accordance with national policy and legislation. When considering the impact of such proposals on the significance of a designated heritage asset, great weight will be given to the asset's conservation (and the more important the asset, the greater the weight will be). Where harm to the significance of a designated heritage asset is identified, this harm will need to be weighed against the public benefits of the energy saving or generating proposals, and assessed in the context of... • The quantifiable energy saving, low carbon heat or energy generating public benefits of the proposals • The quantifiable CO₂ savings public benefits of the proposals • The embodied energy/carbon costs and public benefits of the proposals • Evidence that all other alternative means of saving and/or generating energy that would cause less harm to the LB have been fully considered and where appropriate implemented or included within the proposals. • Ensuring that any secondary impacts on the heritage asset have been fully considered • Fully exploring, and including where reasonable, all options for minimising harm • The potential ease of reversibility of any proposals.

Community scale solutions

Renewable energy schemes

In many of the historic towns and villages, there will be a number of properties where it will not be possible to install solar PV on roofs, either because the roofs are too fragile or because the visual impact would be unacceptable.

In these communities, it may be appropriate to consider community renewable schemes instead, with a large array located in or near the settlement.

Solar arrays can be ground mounted and there may be some areas where this can be considered. However, these are often controversial because they may displace food production on agricultural land. The security fences required to prevent theft can be visually intrusive.

Another option may be to utilise the roofs of non-residential buildings in the community, such as modern school buildings, light industrial units, agricultural sheds or even churches. Using these roofs to accommodate the arrays avoids the need for security fences and substantially reduces the visual impact. Community energy schemes have been set up all over the country and there are a number of organisations now providing advice and support.

District heating

The possibility of using heat networks to provide decarbonised heat to homes where an air source heat pump may be difficult to accommodate is considered in a separate topic paper.



Ground mounted solar arrays can provide good renewable generation and some habitat for wildlife. They are often controversial with residents, particularly if they are located on agricultural land or in an AONB.



A community renewable energy scheme has installed PV on the cloister roof of Salisbury cathedral

Providing guidance for greater clarity on retrofit (1/2)

Providing clarity is a key enabler

A relatively high percentage of homes in the Cotswold District are listed or in a conservation area. Almost all of them are in the Cotswold AONB.

These well deserved special designations can serve as a barrier to home and building owners undertaking retrofit works due to the lack of clarity around what they can and can't do.

It is not easy to find this information online. Sometimes advice may seem contradictory or circular, never leading to a definitive answer. Proactive and motivated building owners will find the information they need through following the pre-application process (for which the council charges a fee). For those less so, or less confident, improvements will simply not be made. Or, worse, the wrong improvements will be made without the necessary permission.

Explain permitted development rights

The Local Plan and/or associated guidance could clarify Permitted Development Rights, where they enable zero carbon retrofit measures (e.g. Air Source Heat Pumps, and Solar Photovoltaic panels on roofs).

Further recommendations

- The council should undergo an exercise to identify improvements that can be made without building owners needing to seek permission. Ideally this should include all buildings types – including those in conservation areas and listed buildings.
- For allowable improvements included above, the Council could produce and publish clear guidance that positively confirms what improvements are acceptable in what circumstances. Guidance could take the form of: an FAQs page; illustrated diagrams or to specific guidance pages (e.g. Planning Portal).

I want to insulate my roof and put a dormer in at the same time – what would be acceptable?

Do you need planning permission for solar panels in the AONB?

What is considered permitted development in a Conservation Area?

Are you allowed to use a heat pump in a listed building?

Can I put double glazed windows at the back of my listed building?

Example Frequently Answered Questions (FAQs) home and building owners may have regarding retrofit

Providing guidance for greater clarity on retrofit (2/2)

Encouraging good practice

Cotswold District has a very varied stock of ages and types of buildings. The overall effect of the piecemeal construction using the same materials is what creates the unique character of the local towns and villages, but it also can make it hard for the public to find reliable advice on how to retrofit these complex buildings. Encouraging and helping the largely private owners of these homes and buildings to pursue effective retrofits should be a priority and a key part of that will be to provide sources of information on how to do it.

There are many buildings that are not historically significant, and which could support a wider strategy for retrofit. For example, the low density light industrial buildings and some agricultural buildings could accommodate additional PV that the fragile stone roofs in the historic village centres can't support.

Suggestions for encouraging good practice (general)

Holistic thinking

Produce guidance aimed at householders on suitable measures and targets, and encourage whole house retrofit plans and long-term strategies.

Supporting retrofit rather than rebuild

Consider mechanisms to make retrofit economically more viable. For example, by keeping fabric and energy targets but waiving S106 offset payments if those are levied.

Whole house approach

Encourage submitting a whole house retrofit plan prior to commencement of works on site. Benefits can be maximised, and risks minimised with a thorough understanding of the asset.

Suggestions for encouraging good practice (measures)

Building fabric

Make allowances for changes to geometry due to increased insulation on the cold side of structures (e.g. raised ridge heights).

Windows

In conservation areas (not for listed buildings), offer some leeway on change of appearance for glazing provided a superior performance standard is met. E.g., permit triple glazed mock sash windows.

Air Source Heat Pumps (ASHP) & Mechanical ventilation with heat recovery (MVHR)

Provide specific guidance on how to install key technologies, including acceptable types and locations for equipment and grilles for the key typologies in the Borough, and/or provide a pro forma Planning Application for this specific issue that could help individuals who do not have the necessary Permitted Development rights.

Locating MVHR grilles on rear elevations, and ASHP either in back gardens or on rear facing roofs, (where it is structurally safe to do so) could be accepted for all except Listed Buildings.

PV

Encourage owners of Industrial and agricultural buildings to install PV arrays whenever other works, such as roof replacement or refit works, are undertaken under permitted development rights.

Consider whether matching or other funding. e.g. grants from a carbon offset fund can be provided. It would be necessary to set a minimum fabric and/or energy performance, for example matching the new build standard insulation or predicted energy use, to ensure the funds were not used to support inefficient buildings. The roof space that could be used for PV which may otherwise be wasted is a substantial opportunity to address the energy balance of the District overall.

Potential next steps for Cotswold District Council

This document has given an overview of the retrofit policy landscape in the context of Cotswold District Council, and potential areas for policy intervention and guidance.

The policies proposed in this topic paper respond to the ambition of delivering a Local Plan that is “Green to the core” and are leading edge in comparison with other Local Authorities. The need of moving away from fossil fuels is highlighted, making this policies unique and highly aligned with the Climate Change context.

Policies regarding implementation of retrofitting measures that improve energy efficiency and adaptability are explored and enhanced from those found in B&NES, Bristol City Council and Couth Oxfordshire Council, which might seem a bit overly concerned with conservation.

Some suggestions are given below on how to take this further.

Evidence base for retrofit

Similarly to the operational energy study evidence base, a retrofit evidence base could be developed to identify specific retrofit policies applicable to Newham’s buildings.

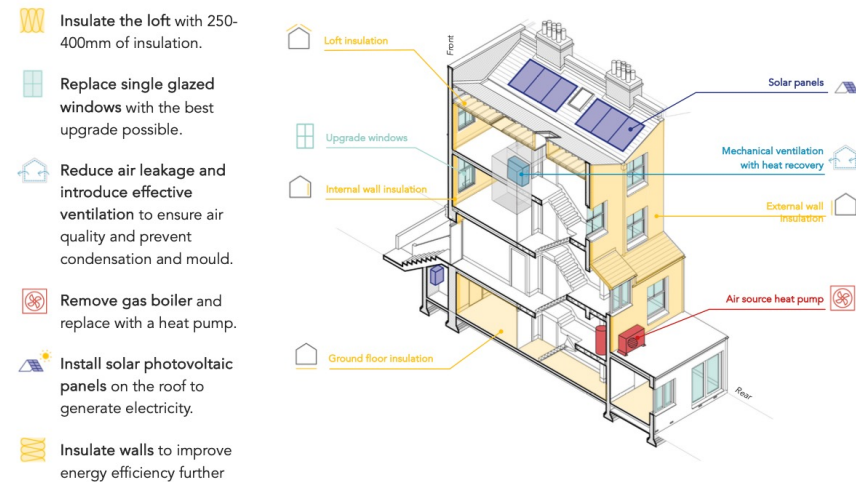
Retrofit Action Plan for Cotswold District

This would involve assessing the condition and energy use of the existing building stock and developing a retrofit strategy to move towards net zero carbon.

Guidance for householders

Develop extensive, specific and accessible guidance for householders, covering development of whole house strategies and technical advice. Include recommended allowable solutions for retrofit applications sometimes perceived as contentious, e.g., window details and positions of key technologies such as MVHR, ASHP and PV.

The ‘end point’: A better, healthier and more comfortable house on track to Net Zero



Example of retrofit measures included in guidance for householders developed for Levitt Bernstein and Etude.

4.0

Appendices



Appendix 1: LETI home retrofit targets, elemental targets

The Table on the right is taken from the LETI Climate Emergency Retrofit Guide. It lists target u-values and other specification values for constrained retrofit (in the case of listed buildings for example) and unconstrained retrofit (where there are few technical or heritage limitations). Exemplar values are also suggested.

<https://www.leti.uk/retrofit>

SIGNPOST Chapter 4 - LETI home retrofit targets
- 4.3 Constituent element method

			LETI best practice		LETI exemplar
Building element		Retrofit actions	Constrained retrofit	Unconstrained retrofit (cool temperate climate)	All retrofit types
 Walls	Cavity	External, cavity or Internal insulation	0.24 W/m².K	0.18 W/m².K	0.15 W/m².K
	Solid uninsulated	External or Internal insulation	0.32 W/m².K	0.18 W/m².K	0.15 W/m².K
	Timber frame	External or Internal insulation	0.21 W/m².K	0.18 W/m².K	0.15 W/m².K
 Roofs	Cold	Insulate	0.12 W/m².K	0.12 W/m².K	0.12 W/m².K
	Warm/flat	Insulate	0.22 W/m².K	0.12 W/m².K	0.12 W/m².K
 Floors	Suspended timber	Insulate between joists	0.20 W/m².K	0.18 W/m².K	0.15 W/m².K
	Solid uninsulated	Excavate and insulate below	0.80 W/m².K	0.15 W/m².K	0.15 W/m².K
 Windows and doors	Windows	Replace	1.30 W/m².K	1.00 W/m².K	0.80 W/m².K
	Doors	Replace	1.00 W/m².K	0.80 W/m².K	0.80 W/m².K
 General envelope	Thermal bridging	Mitigate where possible	0.10 W/m.K	0.10 W/m.K	0.08 W/m.K
	Airtightness	Draught proofing, sealing of chimneys and vents	3.0 ach@50Pa	2.0 ach@50Pa	1.0 ach@50Pa
 Systems	Systems and appliances	Fossil fuel free home	Fossil fuel free	Fossil fuel free	Fossil fuel free
	Ventilation type	Install and remove extract fans	MVHR*	MVHR	MVHR
	Lighting power	Replace lamps and fittings	50 lm/W	100 lm/W	100 lm/W
 Hot water	Hot water tank	Increase insulation or replace	1.5 W/K	1.5 W/K	1.5 W/K
	Primary pipework	Insulate all pipework	90% of pipework insulated	90% of pipework insulated	90% of pipework insulated
	Shower demands	Low flow fittings	16 litres/pers.day	16 litres/pers.day	16 litres/pers.day
	Other demands	Low flow fittings	9 litres/pers.day	9 litres/pers.day	9 litres/pers.day
 Renewables	Photovoltaic generation	Rooftop installation	0 % of roof area covered in PV panels	40 % of roof area covered in PV panels	40 % of roof area covered in PV panels

* If not possible use demand control dMEV or demand control cMEV