Sustainable Building and Construction Guidance

South Worcestershire Development Plan Review 2021–2041

Adopted June 2026

Contents

1. Introduction

Context

A commitment to mitigating and adapting to climate change

The South Worcestershire Development Plan Review 2021-2041 (SWDPR) was adopted on 26 March 2026, and the Local Plan covers the Local Planning Authorities of Malvern Hills District Council, Worcester City Council and Wychavon District Council. The Local Plan includes policies intended to help development adapt to and mitigate the effects of clime change on people and the natural environment.

Both Malvern Hills District and Wychavon District are committed to a course of action to adapt to the impacts of climate change and building resilience to its impacts across the districts. The policies in the SWDPR and this guidance are supportive of this process.

A further overarching national priority is to encourage low carbon development and design measures to improve resilience and adaptation to climate change, which is essential, so all new buildings are fit for the future. This means that new development should avoid adding excessive amounts of carbon emissions to the atmosphere during construction, but they should be designed in ways that can protect communities from the adverse effects of climate change, e.g. excessive heat, flooding etc.

Purpose of the Sustainable Building and Construction Guidance

The Sustainable Building and Construction Guidance is to provide further information relating to the implementation of planning policies in the 2026 South Worcestershire Development Plan Review (SWDPR). What it does not do is add additional policies or requirements over and above the Local Plan policies or Building Regulations. Specifically, the guidance applies to SWDPR 01 Climate Change Mitigation and Adaptation; SWDPR 05 Design and Sustainable Construction and SWDPR 28 Design.

Other relevant Local Plan policies are SWDPR 17 Housing Mix and Standards; SWDPR 37 Renewable and Low Carbon Energy; SWDPR 39 Sustainable Drainage Systems.

This guide includes information about sustainable construction methods and materials used in new development applicable to any type of development proposals coming forward across Malvern Hills District and Wychavon District. The application of these approaches can reduce the construction and operational impact on our environment, wildlife, climate change, health and wellbeing. It also provides guidance on how the operating efficiency of existing buildings can be improved through retrofitting, particularly in respect to historic buildings.

The document also complements the following Supplementary Planning Documents (SPD) adopted by the district councils:

- South Worcestershire Air Quality SPD
- Wychavon Design Code SPD (2026)
- Wychavon Town SPD (2026)

Who is the document for?

It is for those considering undertaking any type of development proposal and applicable at the pre-design stage, working up a detailed scheme, and when submitting a planning application. It should be referred to be homeowners, developers, architects and designers and those making decisions on planning applications.

2. Legislative and policy context

National Climate Change Strategy and National Planning Context

Future Homes Standard 2026

Published on 24 March 2026 the Future Homes and Building Standards is part of the UK government's broader strategy to reduce carbon emissions from new buildings. The standard mandates that all new homes in England be net zero and carbon ready from 24 March 2027. The standard aims to dramatically improve the energy efficiency of new homes and reduce their carbon impact. The standard mandates that all new homes must be built with low-carbon technologies and be more energy-efficient than ever before.

Consequently, the Future Homes Standard (FHS) focuses on several key aspects that will directly impact architectural design:

- **Energy efficiency and heat loss**: Homes built after March 2027 must meet rigorous new requirements around energy efficiency. The regulations will set strict limits on heat loss, pushing architects to focus on airtightness and high-performance insulation.
- **Low-carbon heating systems**: The traditional gas boiler will be phased out, and homes will need to adopt alternative low-carbon heating solutions. The emphasis will be on air-source heat pumps, ground-source heat pumps, and solar thermal systems. Architects will need to consider these systems during the design process, ensuring their integration is both efficient and aesthetically pleasing.
- **Carbon-efficient materials**: The materials used in construction will need to align with sustainability goals. This means architects will have to increasingly consider the embodied carbon of materials, with a push toward products made from sustainable sources.
- **Smart technologies**: The Future Homes Standard also encourages the integration of smart home technologies that help homeowners manage their energy use more efficiently. This could mean the integration of smart thermostats, energy-efficient lighting systems, and solar panels that can be monitored and controlled for maximum efficiency.

The FHS requires that new homes must produce 75–80% fewer carbon emissions compared with homes built to the 2013 Building Regulations. The continued approach via building regulations is to use a target emissions rate (TER) setting a minimum allowable standard for the energy performance of a building. It is defined by the annual CO2 emissions of a notional building of same type, size and shape to the proposed building and expressed in annual kg of CO2 per sq. m.

The help achieve this, standards are included for the building fabric; e.g. the performance of insulation and heat loss, improved airtightness and reducing thermal bridging. In addition, FHS now mean that fossil fuel heating systems will no longer be permitted in new homes and instead low-carbon technologies, such as heat pumps, must be used instead. Solar PV is now also mandated on new homes and have become a functional requirement under Building Regulations.

Further information on the New Homes and Building Standards can be found via this link: Future Homes Standard 2026: Full Guide | HEM Guide

National Planning Policy Framework (NPPF)

The Government policy, in the land use planning context, relating to sustainable buildings and places is currently set out in the latest NPPF form December 2024. The relevant sections of the NPPF include chapter 5 'Meeting the challenge of climate change', chapter 14 'Achieving well-designed places'; chapter 18 'Meeting flood risk and costal change', and chapter 20 'Conserving and enhancing the historic environment'.

The Government has consulted on an update to the NPPF published in December 2025. The new version of the NPPF is expected to be published later in 2026.

The Government has also published Planning practice guidance which includes several sections relevant to sustainable building and construction Planning practice guidance - GOV.UK

The guidance is complementary to the NPPF and Planning practice guidance to which the district council must have regard, as a material consideration, in reaching decisions on planning applications.

SWDPR Sustainable Building and Construction requirements

The SWDPR contains several requisite planning policies to deliver sustainably constructed and well-designed buildings that minimise their impact on the environment. Neighbourhood plans may also contain policies relating to sustainable construction and mitigating climate change.

The policies in the SWDPR should be read as a whole when preparing and making decisions on planning applications and the following section expands on the principal policies that support approaches to sustainable build and construction.

Alongside SWDPR 01: Climate Change Mitigation and Adaptation describe the relevant policies throughout the SWDPR to ensure that all new development minimises its environmental impact and is resilient to the consequences of climate change. Generally, the aim is to reduce the energy demand from new development, through both design and a fabric first approach. In addition, a priority is the use of sustainable construction techniques and materials, incorporating water use management and conservation features, renewable and low carbon energy generation to minimise the ecological and carbon footprint of new buildings.

Building Industry assessment and standards

In SWDPR 05: Design and Sustainable Construction and SWDPR 28: Design planning applications are expected to demonstrate how all types of development will achieve the above requirements through the Design and Access Statements, as well as the application of several recognised industry standard assessments approaches e.g. BREEAM or equivalent, energy statements etc.

BREEAM Building standards

SWDPR policies refer to the use of BREEAM building standards. SWDPR 05 B and SWDPR 28 B sets out an expectation that new development, whether residential or commercial, should meet the standards, or equivalent assessment, where feasible and viable. BREEAM can be used to develop a more holistic approach to both the design, construction and use of buildings that results in sustainable buildings.

Developers can appoint an independent licensed BREEAM Assessor to help decide which BREEAM standard best applies to the development. A pre-assessment can be carried out prior to work starting on site and details can be submitted as part of a full planning application, an outline planning application or reserved matters application. This can save time and money ensuring a building is designed and constructed meets the requirements of the particular rating.

As a development progresses, information should be passed to the BREEAM Assessor to review, monitor and determine compliance with the standard. The Assessor’s assessment is submitted to BRE for a certification decision. The developer should receive a certificate showing the rating received and a BREEAM plaque for the building. The BREEAM certificate showing the final decision and rating can be submitted to satisfy Planning Conditions requiring a building achieve a specific BREEAM rating.

Homes Quality Mark

Policy SWDPR 05: Design and Sustainable Construction and SWDPR 28: Design expect all new major residential development to achieve a Home Quality Mark assessment (or an equivalent assessment) where feasible and viable. The Homes Quality Mark has been incorporated into the BREEAM UK New Construction: Residential (BREEAM UK NCR). The updated standard takes a whole-life performance approach to home sustainability, supporting better outcomes from design through to construction and long-term operation. The scheme assesses homes against three key sustainability indicators, covering environmental, social, and economic performance.

- Environmental: Reduces carbon emissions, enhances resource efficiency, protects biodiversity, and promotes circular design principles.
- Social: Supports occupant health, wellbeing, and quality of life. Focusing on indoor air quality, daylight, thermal comfort, noise, and access to green spaces.
- Economic: Encourages efficient use of materials, future-ready infrastructure, and homes that are resilient, cost-effective to run, and adaptable over time.

Therefore, where reference to the Homes Quality Mark appears in the SWDPR 05 and SWDPR 28 this now should be read as the BREEAM UK NCR standard. Further information can be found on the BREEAM website BREEAM UK New Construction Residential | BREEAM.

Heritage Assets

In terms of the historic environment SWDPR 09: Historic Environment and SWDPR 33: Management of the Historic Environment support the sustainable and viable reuse of historic buildings and the incorporation of approaches to climate change and adaptation measures where appropriate and that do not cause harm to the significance of the heritage asset in line with the NPPF.

Therefore, although the SWDPR must be read as a whole, the following policies are considered to directly support the delivery of sustainable construction and climate change mitigation [South Worcestershire Development Plan Review 2021 – 2041 - South Worcestershire Development Plan.

SWDPR 01: Climate Change Mitigation and Adaption

SWDPR 05: Design and Sustainable Construction

SWDPR 09: Historic Environment

SWDPR 28: Design

SWDPR 33: Management of the Historic Environment

SWDPR 37: Renewable and Low Carbon Energy

SWDPR 39: Sustainable Drainage Systems

SWDPR 40: Water Resources, Efficiency and Wastewater Treatment

The SWDPR includes several strategic housing allocations which have their own site-specific policies (and in respect to SWDPR 55: Worcestershire Parkway and accompanying Wychavon Town SPD) which include requirements for the delivery of sustainable design, building and construction. In respect to any planning applications for these sites these requirements should be considered alongside the wider policies referred to above.

Supporting a Framework for Sustainable Building and Construction

The term 'sustainable building' focuses the utilisation of construction methods, materials and technologies that provide developments which:

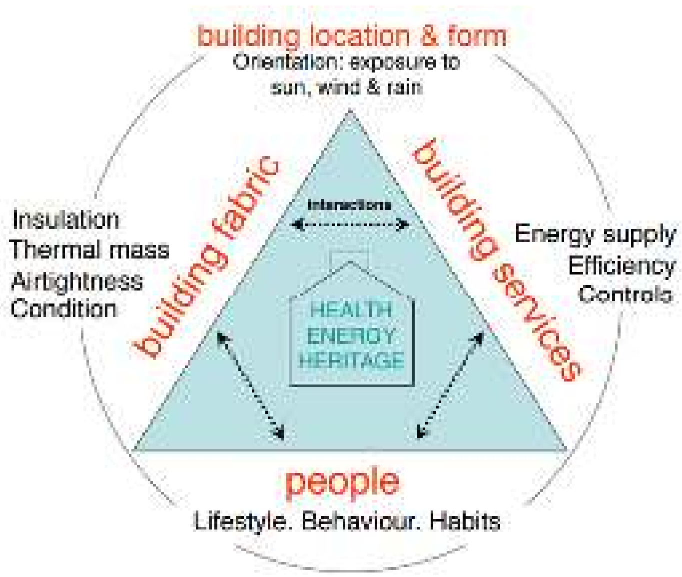
- Reduce demand and use of finite resources and which result in lower carbon emissions or are 'zero carbon'.
- Support comfortable and safe environments that promote human health and wellbeing.
- Protect and enhance the natural environment and its habitats and species.
- Adapt the built environment to the impact of climate change through design.
- Are cheaper to heat and cool and less vulnerable to volatile energy prices.

It also applies to buildings that, through the quality of their design, are built to last including buildings that are flexible and adaptable. Likewise historic buildings due to their longevity are not only considered to be sustainable but can be adapted to ensure their continued future use.

The four most important factors affecting a building's energy use in operation are:

- *Building location and orientation* - The performance of a building envelope will be affected by regional variations in climate and its exposure to wind, rain and sun.
- *Building fabric* - The form and design of the building envelope and the physical properties (and condition) of the construction materials and components also affect performance.
- *Building services and equipment* - Heating, cooling, lighting and ventilating a building all use energy. Energy is also consumed by equipment and appliances employed for business, cooking and entertainment.
- *People* - Occupants use their buildings in different ways. The amount of energy they use varies too. The number of people in a building, the levels of comfort they expect, and the technical services and equipment they require all have a significant effect on how much energy is consumed.

Fig. 1: Building performance triangle



How to Improve Energy Efficiency in Historic Buildings (Source: Cadw, 2022)

3. Low carbon, low energy buildings

Introduction

The built environment is one of the largest contributors to greenhouse gas emissions, with significant impacts arising not only from how buildings are operated, but also from the materials, construction processes and waste generated across their entire lifespan. Therefore, the aim is to reduce carbon at every stage from design and construction through to occupation and end of a building's life.

Developments can minimise both embodied and operational emissions through recognised whole life carbon methodologies, best practice design principles, and the application of the energy hierarchy. It provides practical guidance for applying Policy SWDPR 05 and related standards, ensuring that all new buildings contribute meaningfully to climate resilience, resource efficiency, and long-term environmental sustainability.

A Sustainable Design and Construction Checklist is set out at Appendix 1. This has been provided to assist proposals in demonstrating how the requirements of Policy SWDPR 05 have been met. This checklist, which seeks a summary of sustainable measures incorporated into proposals, should be submitted with planning applications and could be included within the Design and Access Statement, as part of a wider climate change/environment statement or as a standalone document.

Best Practice Guidance

There are several key best practice documents that are referred to throughout this document. While there is no mandatory policy requirement to comply precisely with the standards and approaches, they are useful in providing guidance around the policy requirements of Policy SWDPR 05 can be met as well as providing stretching targets to create truly low and zero carbon buildings.

- The UK Net Zero Carbon Buildings Standard (UKNZCBS) - provides a unified, science-based method for determining whether buildings are genuinely aligned with the UK's net-zero targets. It has been developed collaboratively by major industry bodies including the UK Green Building Council, London Energy Transformation Initiative (LETI), Royal Institute of British Architects (RIBA) and Royal Institution of Chartered Surveyors (RICS). It intends to provide industry standard targets on energy to ensure buildings comply with the UK's carbon and energy budgets. It sets mandatory limits on operational energy use and upfront embodied carbon, alongside requirements for fossil-fuel-free heating and minimum on-site renewable generation.

- RIBA 2030 Challenge - a voluntary framework to help architects align building design with a netzero carbon trajectory by 2030. It sets performance-based targets for reducing operational energy, embodied carbon, potable water use, and improving health and wellbeing outcomes across new builds and major refurbishments.

- LETI Climate Emergency Design Guide - provides a clear pathway for designing new UK buildings to meet whole-life net-zero carbon, setting out practical and measurable requirements across operational energy, embodied carbon, heating systems, demand response, and data disclosure, with detailed KPIs for key building types and a call for these standards to become mainstream by 2025 to keep pace with climate targets.

- The UKGBC Net Zero Carbon Buildings: A Framework Definition - provides a clear, industry-aligned methodology for achieving net zero carbon in both construction and operation, defining high-level principles focused on reducing emissions first, addressing both embodied and operational carbon, and offering guidance for developers, designers, owners and policymakers on how to measure, verify and evidence net zero performance across a building's lifecycle.

- Passivhaus - a rigorous, performance-based, international energy standard that reduces space heating and cooling demand by up to 90% compared to traditional building stock, often eliminating the need for conventional heating systems entirely. It focuses on a "fabric-first" approach, utilizing five core principles: high-level insulation, thermal bridge-free design, superior airtightness, high-performance triple-glazed windows, and mechanical ventilation with heat recovery.

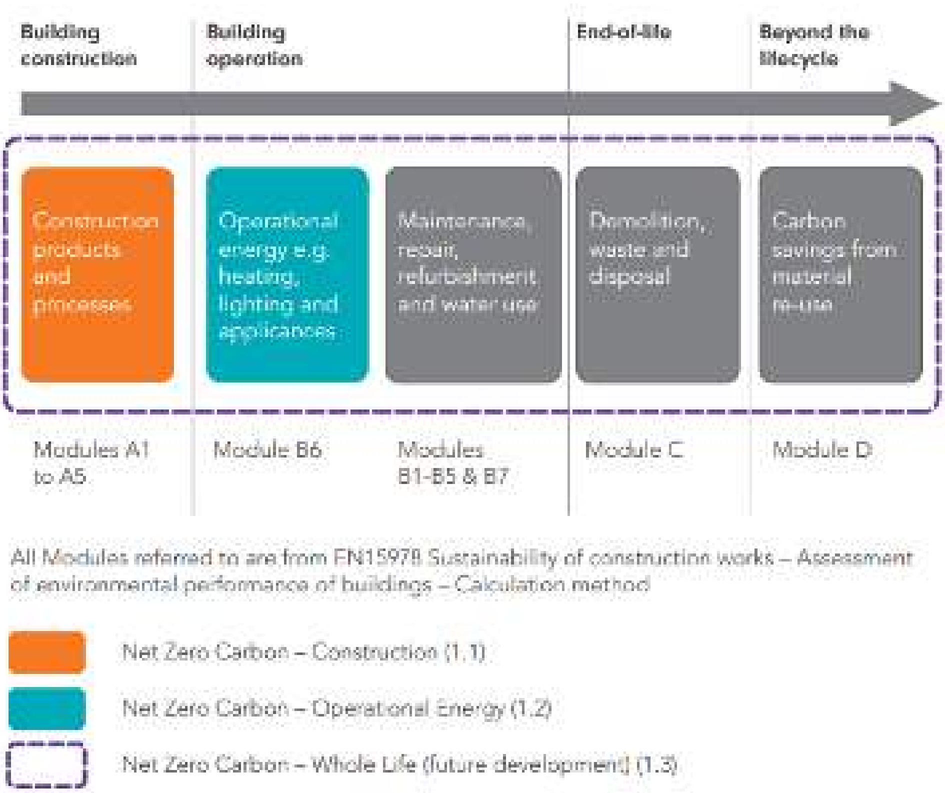
- RICS Whole Life Carbon Assessment for the Built Environment - sets out a consistent method for measuring carbon emissions across a building's entire life cycle, covering embodied impacts from materials and construction, operational energy use, maintenance, and end-of-life stages. It helps project teams identify major carbon sources, compare design options, and make informed choices to reduce both embodied and operational carbon, supporting progress toward net-zero development.

Whole Lifecycle Approach

Policy SWDPR 05: Design and Sustainable Construction requires that development proposals consider the whole lifecycle carbon emissions of the development and demonstrate actions taken to reduce them.

The UK Green Building Council[1] define whole lifecycle carbon as "the combined total of embodied and operational emissions over the whole life cycle of a building". The whole life cycle of a building is "the entire life of a building from material sourcing, manufacture, construction, use over given period, demolition and disposal, including transport emissions and waste disposal".

Fig. 2: Whole Lifecycle Approach



Source: UKGBC Net Zero Carbon Buildings: A Framework Definition, 2019

[1] Net Zero Whole Life Carbon Roadmap | UKGBC

To ensure that all elements of carbon emissions sources through a building's life are considered, a whole lifecycle carbon calculation, using a nationally recognised methodology, can be undertaken.

A detailed whole life study can be caried out at RIBA Stage 3 Developed Design and the RIBA 2030 Climate Challenge (2021) provide useful targets and a checklist. Early consideration of all the various building elements including the materials, construction methods, energy efficiency and thermal efficiency will help identify what changes can be made to reduce carbon emissions.

The RICS provide one such methodology which is internationally recognised; the 'Whole life carbon assessment for the built environment'[2]. This methodology has further been recommended by RIBA as the most comprehensive and consistent approach available to the industry.

There are several recognised design approaches that refer to the RICS methodology that can assist designers and developers. These include the following design guides:

- Net Zero Carbon Toolkit, by Levitt Bernstein, Elementa, Passivhaus Trust and Etude commissioned by West Oxfordshire, Cotswold and Forest of Dean District Councils, funded by the LGA Housing Advisers Programme.
- Climate Emergency Design Guide, London Energy Transformation Initiative (LETI) (Jan 2020)
- Net Zero Carbon Buildings: A Framework Definition, UK Green Building Council (UKGBC) (April 2019).

Embodied emissions

Policy SWDPR 05 require the development proposals prioritise the use of sustainable construction techniques and materials and minimise their ecological and carbon footprints.

Embodied emissions in buildings refer to the greenhouse gases released throughout the entire lifecycle of construction materials, from raw material extraction and manufacturing to transportation, installation, maintenance, and eventual disposal. Embodied emissions are 'locked in' before a building is even occupied, making them a critical focus for reducing the built environment's overall climate impact. The UKGBC have stated that embodied carbon from the

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[2] Whole life carbon assessment (WLCA) for the built environment

construction and refurbishment of buildings currently makes up 20% of UK built environment emissions[3].

While the greater focus and progress have been on reducing operational energy in buildings, there is increasing attention on embodied carbon, highlighting the importance of low-carbon materials, circular design strategies, and whole-life carbon assessment in modern construction.

Reducing embodied emissions in buildings starts with choosing low carbon materials and designing for resource efficiency. Prioritising products with high recycled content, using alternatives to carbon intensive materials (such as timber, low carbon concrete, or recycled steel), and selecting suppliers with transparent environmental product declarations all help lower upfront carbon. Designing buildings for durability, adaptability, and eventual disassembly further reduces impacts by extending material life and enabling reuse at end of life. Minimising waste through efficient structural design, optimising material quantities, and favouring local supply chains also cuts emissions tied to manufacturing and transport. Together, these strategies form a whole life carbon approach that significantly decreases the climate impact of construction.

Best Practice Standards

Best practice standards for low embodied carbon, with nationally recognised targets, have been included for RIBA's 2030 Climate Challenge, LETI's Climate Emergency Design Guide and UK Green Building Council's Net Zero Whole Life Carbon Roadmap.

Table 1:Comparison on embodied carbon targets by RIBA and LETI

Building Type	**RIBA 2030 Target**	**LETI 2030 Target (Upfront / Total)**
Domestic / Residential	< 625	< 300 / < 625
Offices / Non-Domestic	< 750	< 350 / < 600

[3] Embodied Carbon | UKGBC

Schools	< 600	< 350 / < 600

More recently, the UK Net Zero Carbon Buildings Standard (UKNZCBS) has sought to bring this best practice guidance together to provide industry agreed targets for embodied emissions. The UKNZCBS establishes science-based maximum limits for upfront embodied carbon that development must not exceed, supported by mandatory life-cycle carbon reporting.

The pilot versions of the UKNZCBS provides embodied carbon standards for a range of different development typologies and depending on the year the development commences, starting from 2025; targets become lower leading up to 2050.

The UKGBC's Net Zero Carbon Framework is expected to evolve over time, including when the full version is released, and is expected to provide the definitive methodology for embodied emissions.

Materials

Reusing existing buildings materials onsite should be a consideration for any new development. The reclamation of existing buildings reduces the need for new materials to be sourced, manufactured or transported to site resulting in lower carbon emissions.

The materials used in a development are a key part of its sustainability. The design, method of construction and materials chosen to have a significant impact on the total carbon emitted during a building's lifetime. Embodied carbon can account for more emissions than operational carbon, during the lifetime of a building. The structural system of a building is usually the largest source of embodied carbon in a building, whether this steel or concrete or both.

Consideration of materials at the early design stage can help reduce the buildings overall carbon emissions. The RICS Whole life Carbon assessment for the built environment is recommended as an approach for identifying opportunities to reduce emissions over the course of a building's lifetime. The Construction Material Pyramid (Fig. 3) produced by the Centre for Industrialised Architecture is also a useful tool understanding the impact of different building materials and calculating the carbon emissions.

Fig, 3: The Construction Material Pyramid

Source: The Construction Material Pyramid - https://www.materialepyramiden.dk

Key principles:

- Reuse existing buildings onsite where practical
- Source materials responsibly (e.g. local materials)
- Use recycled materials or materials with a recycled content
- Use material that can be recycled when the building comes to the end of its life
- Use renewable materials (e.g. FSC timber, sheep's wool insultation)

Some building materials can be reused or recycled such as bricks, hardcore, timbers, doors and window frames. Re-using materials is preferable over recycling because the former entails less embodied energy. Where materials are to be reused or recycled these will need to be inspected by the developer or a structural engineer if necessary to ensure they are suitable for the development and do not need any repairs. This can reduce the number of raw materials used in the construction of a building and help retain the character of an existing building or area. This is particularly important when working on a listed building or in a Conservation Area.

When sourcing materials, care should be taken to use products that minimise impacts on biodiversity. For example, avoid sourcing wood from forested areas at an unsustainable rate or using materials such as peat, weather worn lime-stone or other materials from vulnerable habitats. Materials that have a long lifespan are of greater environmental benefit and a lasting benefit to occupiers of the building. They should exhibit characteristics of durability, low maintenance and use of waterproofing agents that are not harmful to the environment.

In some cases, more environmentally friendly alternatives or versions of traditional and familiar building materials and products are available on the market. There are lower carbon versions of concrete, lower emission paint options and various types of LED lighting. New products, materials and technologies are being developed all the time and should be considered.

Waste

In 2022 it has been estimated that in England 63 million tonnes of non-hazardous construction and demolition waste was generated, of which 59 million tonnes was recovered (DEFRA, 2025). Almost half of the waste is recycled and recovered and approximately a quarter ends up in landfill and the rest incinerated, used for backfilling or used for land treatment or released into water bodies.

Backfilling involves using waste in excavated areas such as mines and gravel pits for engineering, landscaping and other reasons.

Carbon emissions that result from the demolition of existing buildings should be considered when carrying out carbon assessments. Consideration should be given to whether demolition is needed for the regeneration and development of the site or whether buildings can be retrofitted to achieve a good outcome for the site. The demolition of existing, structurally sound buildings should be avoided wherever possible to reduce unnecessary waste. Demolition should also be avoided and retrofitting considered where it will result in a reduction in carbon emissions over a development’s life span.

The carbon emissions resulting from waste and waste disposal should be considered and included in whole life carbon assessments of a building.

How to reduce on-site construction waste

Waste creation during construction and at the end of a building's life can be minimised through good design and site waste management planning. It will also reduce the cost of the construction of a new development.

Developers are encouraged to consider, at the design stage, rooms that are designed to use whole or regular sized sheets of plasterboard, so they are not cut to leave unusable off cuts. Bricks can be collected and reused onsite. Bricks from one part of a construction site for example can be used on another part of the site rather than being disposed of in a skip. Materials should be handled with care to ensure they are not broken by being stood on or bruised by impact damage (e.g. wood or plasterboard). Just-in-time deliveries of materials can help minimise the length of time materials will be stored where they are exposed and vulnerable to damage:

1. Reduce amount of waste by not creating it in the first place
2. Limit the amount of material used that will create waste
3. Reusing materials before they are discarded
4. Transform material into another usable material
5. Destroy waste to reclaim energy for consumption
6. As a last resort store or bury waste

How to manage materials from demolished buildings

When a building has reached the end of its life, consideration should be given to its deconstruction prior to demolition so that materials in a condition to be re-used or recycled can be removed. This will reduce the amount of waste taken to landfill. Burning of any wastes on site is not good practice, increases harmful emissions, may cause nuisance, and could contravene waste legislation.

Operational emissions

Policy SWDPR 05 require the development proposals to reduce the energy demand from new development in line with the principles of the energy hierarchy, implementing a fabric first approach to construction and ultra-low energy consumption standards.

Operational emissions refer to the greenhouse gases released during the day-to-day functioning of a building, organisation, or system. These emissions typically arise from activities such as heating, cooling, lighting, powering equipment, and running industrial or commercial processes. Unlike embodied emissions—which are associated with the materials and construction of assets—operational emissions occur continuously throughout an asset's lifespan and are strongly influenced by energy efficiency, fuel choices, and user behaviour. Reducing them is central to most decarbonisation strategies because they represent an ongoing opportunity to cut carbon, improve performance, and lower operational costs.

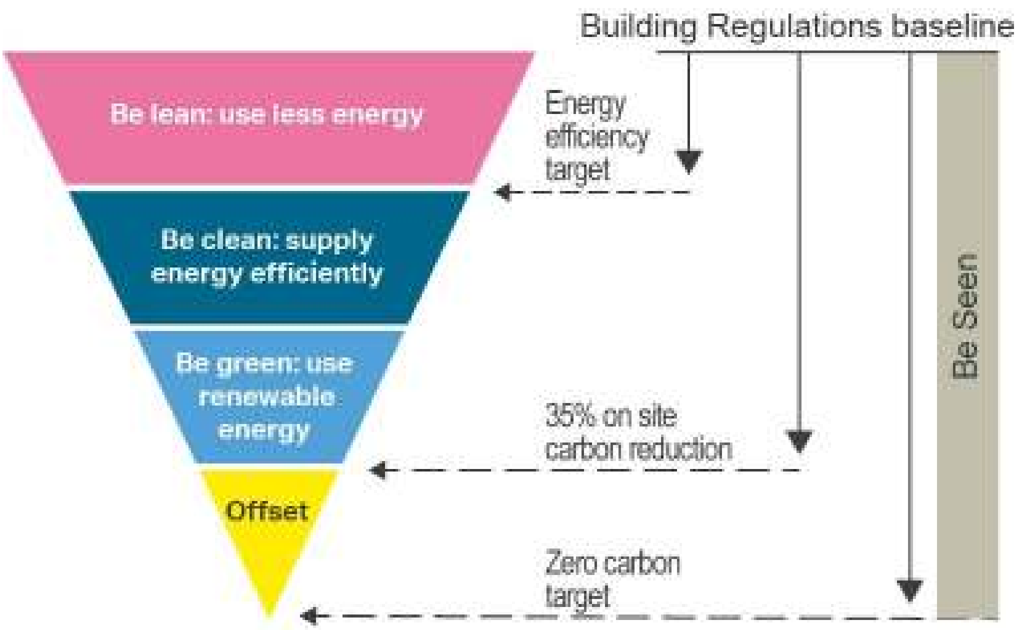
4. Sustainable Energy and Heating

Energy Hierarchy

The energy hierarchy (Fig. 4) sets out a framework for the prioritisation of actions to reduce carbon emissions, operating costs, and energy waste. It advocates following an approach:

1. **Be Lean** → Use less energy (fabric first approach, energy efficiency and passive design)
2. **Be Clean** → Use energy more efficiently (energy efficient and low carbon heating, hot water and cooling systems)
3. **Be Green** → Use renewable sources (Generate or use clean, renewable energy to meet the building's remaining demand)
4. **Be Seen** → Prove it works and keep improving (monitoring and evaluation to ensure the building performs as designed)

Fig. 4: Energy hierarchy



Siting, Form and Orientation (**Be Lean**)

Policy SWDPR 05 and SWDPR 28 require development proposals to design and orientate buildings to maximise the potential for passive heating and cooling, reducing the need for mechanical heating, ventilation and air conditioning.

Siting, form, and orientation are fundamental to energy efficient building design because they determine how a building interacts with its environment before any technology or materials are added. By carefully positioning a building on its site, shaping it to respond to local climate, and orienting it to optimise natural light and solar gain, designers can significantly reduce heating, cooling, and lighting demand. These passive design choices work with natural forces—sun, wind, and shade—to improve comfort, cut energy use, and lower carbon emissions.

Initial site analysis should be undertaken to:

- Determine the position of sun throughout the year
- Establish temperature ranges – both seasonal and daily.
- Identify the direction of the prevailing wind.
- Determine seasonal characteristics e.g. cold northerly winds in winter.
- Identify topographical features that might optimise or degrade the performance of the building(s) e.g. slopes, tree belts, the shape and orientation of the site[4].

The Passivehaus Trust's 'Avoiding summer overheating'[5] document provides useful best-practice design strategies on passive design which will help minimise overheating risk.

Building form

The form of a building should be as compact and simple as possible.

A compact form, with a low ratio of the external building surface area relative to the volume, will help minimise heat loss in winter and heat gain in summer.

Simpler building shapes are generally more thermally efficient than complex designs which include more protrusions, corners or recesses. Simpler shapes, such as square and rectangle forms, reduces the exposed surface area for heat loss and simplifies construction junctions

Roof shapes can support passive strategies e.g., pitched roofs for PV placement or green roofs for insulation and stormwater management. A form that allows for efficient insulation and airtightness is fundamental to energy performance.

Narrower floor plates, atria, courtyards, and well-placed openings can encourage cross-ventilation and stack effect, reducing cooling loads.

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[4] T&CPA Guide 14: Building Climate-resilient new communities (2021) GCG_CC-Adaptation.indd

[5] Avoiding Summer Overheating • Passivhaus Trust

Orientation of buildings

Important early design considerations are the form and orientation of a building. The orientation of a building together with the placement and proportion of glazing impacts on the daylight, solar gain (heat) and natural ventilation that will benefit a building. The more a building can benefit from natural light, heat and ventilation, the less energy it will be necessary for the building to consume.

The orientation and massing of the building should be optimised to allow solar gains and prevent significant overshadowing in winter, while regulating solar gains and avoid overheating in summer. As such, when designing the orientation of buildings proposals should consider the following:

- Orientate the largest building elevations within +/- 30° of south.
- Site layout should maximise number of dwellings with a main living room that has at least one window on a wall facing 90° due south.
- +/- 30° south to capture useful solar gains the largest elevations should be facing as close to south as possible. 30° either side of south is used as an approximate range so designers can make an informed judgement.

There may be constraints within the site and the larger context, such as complementing the existing urban pattern or challenging infill sites where a north south orientation is not feasible. Ensuring that as many facades as possible face south is best practice. An east-west orientation is less optimal for performance, and when this is required, other characteristics such as the ‘form factor and window ratios must be optimised.

The design and orientation of internal rooms should be based on their heating and lighting requirements. Where practicable main living spaces or high use areas should be positioned on the south side to maximise solar gain, taking advantage of the additional warmth and light. Generally, in domestic buildings other spaces can benefit from facing north or east meaning they are cooler or avoid glare. Avoiding bedrooms on west facing elevations helps to reduce the level of solar gain and heat at the close of the day.

There will be a range of site specific and design reasons why it may not be always possible to achieve the orientations described. However, where a design approach orientates main living spaces on southern elevations, this must be paired with adequate shading and ventilation measures to avoid overheating in the summer.

Utility spaces or circulatory / storage spaces / cold spaces, such as bin / bike stores and substations, should be position towards the north elevation of the building where possible.

Orientation of glazing

The window design should be based on orientation, daylight and summer comfort, and should work in tandem with other architectural design factors like proportion and elevational composition. Excessive glazing is the main cause of overheating in the summer and heat loss in the winter.

It is important to minimise heat loss to the north (smaller windows) while providing sufficient solar heat gain from the south (larger windows). North facing windows usually result in heat loss and southern facing windows in heat gain. South facing glazing should be designed to optimise heat gain without overheating in the summer. East and west facing windows often result in overheating due to the low angle of the sun at the start and end of the day.

The LETI Climate Emergency Design Guidance sets out a guide to the optimal glazing ratios for different building elevations. For housing developments, it states the following:

Window areas guide (% of wall area)

- north 10-15%
- east 10-15%
- south 20-25%
- west 10-15%

Shading

Solar shading is an important tool to control sunlight and heat entering a building, reducing cooling energy consumption, preventing overheating, and improving occupant comfort. This is particularly important for buildings that have been designed to maximise solar gain in winter, ensuring that in summer the heat gain is regulated.

Optimal strategies depend on orientation—horizontal, southern, or northern shading works best for high-angle sun, while vertical fins or blinds are crucial for east/west, preventing unwanted heat while allowing daylight:

- Overhangs and Eaves: Ideal for south-facing windows to block high-angle summer sun while allowing low-angle winter sun for heating.

- Vertical Fins/Louvres: Highly effective for east- and west-facing facades to block low-angle morning/afternoon sun.
- Brise Soleil: External, angled louvres (often horizontal) mounted on facades to provide shade while maintaining views.
- Vegetation/Landscaping: Deciduous trees provide summer shade and winter sun, while evergreen hedges provide year-round shade.
- Balconies and Recessed Windows: Structural elements that provide inherent, fixed, and cost-effective shade.

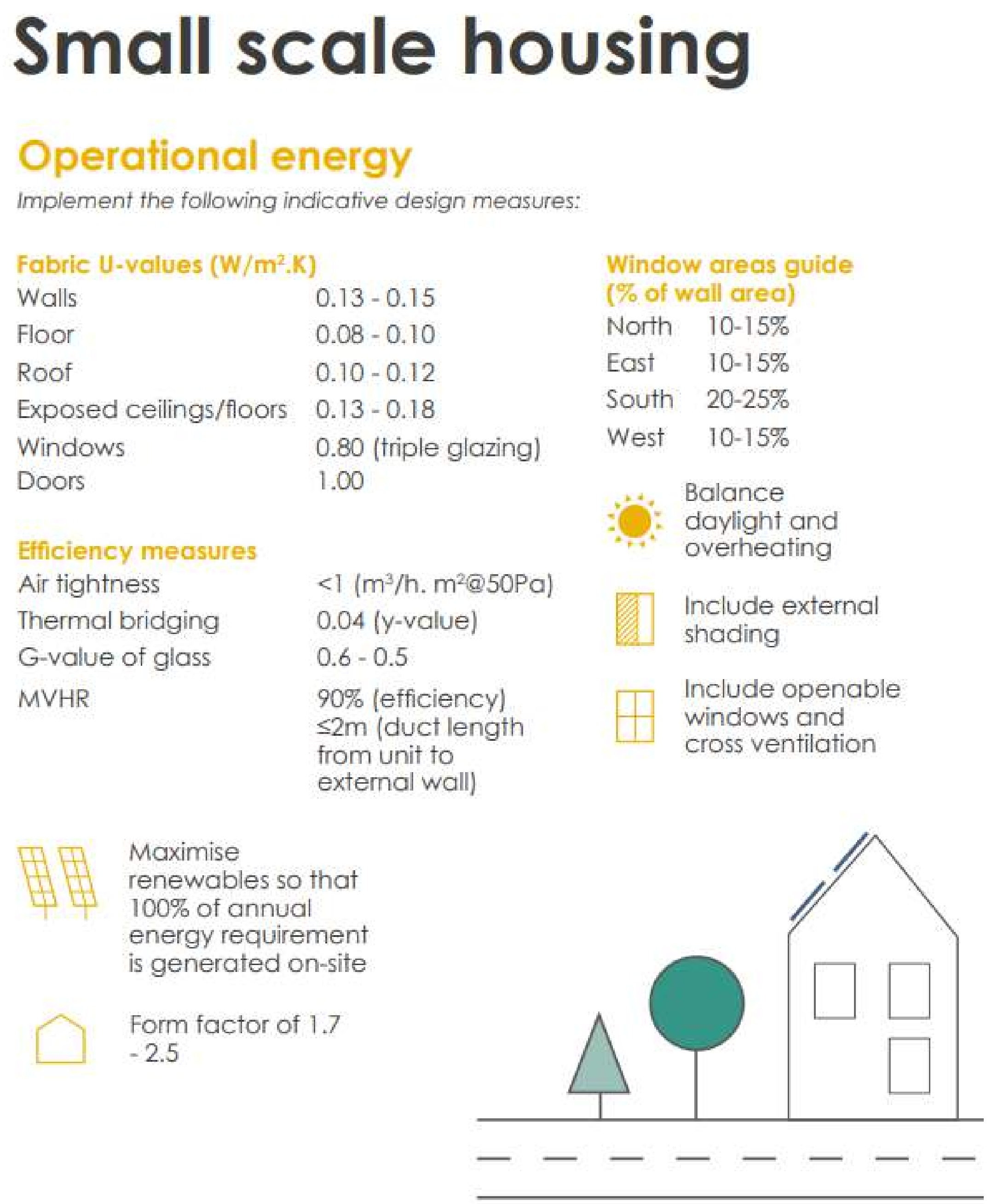
Fabric First (**Be Lean**)

The building 'fabric' is made up of the materials that make up walls, floors, roofs, windows and doors. The more insulation contained within these elements, the better their thermal performance. However, 'fabric' also includes the building's overall airtightness, as well as the impact of thermal bridges where the insulation layer is not continuous.

A fabric first approach is a strategy in building design and construction that focuses on improving the energy efficiency of the building's structure and materials before adding technologies like solar panels or heat pumps.

The LETI Climate Emergency Design Guide sets out best practice targets for fabric efficiency for elements such as walls, windows and doors, as well as for air tightness, thermal bridging and glazing percentage on different elevations. It does this for several different building typologies, including small and medium/large scale housing.

Fig 5: Fabric First approach



The LETI standards for fabric U-values, air tightness and thermal bridging exceed those set out in the FHS. While the FHS represents an improvement from previous building regulation standards, more ambitious standards set out by the likes of LETI represent best practice in achieving building efficiency.

Absolute Energy Metrics (Be Lean)

A criticism of the use of the target emissions rate (TER) approach taken through building regulations and the Future Homes Standard is that it does not represent the most effective way of ensuring efficient, low carbon buildings. That is because the measure of emissions does not necessarily translate into energy use. For example, a building could still have higher total energy use but be compliant with the TER requirements as the building will be reliant of using renewable energy sources, including from a decarbonising grid. This also therefore doesn't ensure that buildings a cheap and efficient for occupiers to run.

Expert bodies, such as such as the UK Committee on Climate Change (UKCCC), the UK Green Building Council (UKGBC), London Energy Transition Initiative (LETI), Royal Institute Building Architects (RIBA), and the Chartered Institution of Building Services Engineers (CIBSE) advocates for the use of absolute energy metrics. The absolute energy metrics are seen as more appropriate way of improving the energy demand of buildings rather than relying solely on carbon emission percentage reductions.

The primary benefit of using absolute energy metrics is that they represent a good indicator for how a building performs in operation. Such metrics are simpler to measure and understand and are widely used in the building industry. They are also more useful to compare design versus in-use performance, helping to reduce the performance gap. Setting targets for absolute energy use means that buildings must be built to a certain standard of efficiency in operation, following a fabric first approach and the energy hierarchy. As such this will have a positive impact on reducing emissions and the TER.

Space Heating Demand and Energy Use Intensity – best practice targets

The two primary metrics consider in this design guide a Space Heating Demand and Energy Use Intensity.

Following this best practice guidance will assistance in meeting the requirements of Policy SWDPR 05 for new development to be built to ultra-low energy consumption standards.

Table 2: Best practice targets for SHD and EUI have been published by LETI, UKGBC and RIBA.

	Energy Use Intensity (kWh/m2 /yr GIA)	Space Heating Demand (kWh/m2 /year)
LETI Climate Emergency Design Guide	35	15
RIBA Challenge 2030	35	-
UKGBC Net Zero Whole Life Carbon Roadmap	35-40	15

More recently, the UK Net Zero Carbon Buildings Standard (UKNZCBS) has sought to bring this best practice guidance together to provide industry agreed targets for operational emissions. The UKNZCBS establishes science-based minimum performance requirements for operational energy and related emissions to ensure buildings align with the UK's carbon and energy budgets.

The pilot versions of the UKNZCBS provides standards for both energy use intensity and space heating demand for a range of different development typologies and depending on the year the development commences, starting from 2025; targets become lower leading up to 2050.

The UKGBC's Net Zero Carbon Framework is expected to evolve over time, including when the full version is released, and is expected to provide the definitive methodology for embodied emissions.

Efficient Heating and Cooling Systems (**Be Clean**)

Once energy demand has been reduced (Be Lean), the focus shifts to supplying the remaining energy as cleanly and efficiently as possible. It's about how energy is produced, distributed, and used within the building, ensuring minimal losses and maximum system efficiency before introducing renewables.

Heating

Through the development of the FHS it has been determined that there is no practical way to allow the installation of fossil fuel boilers while also delivering significant carbon savings and 'zero-carbon ready' homes. As such, fossil fuel heating systems (including hybrid heat pumps and hydrogen ready boilers) are unable to meet the standards. The standards also mean that biofuel systems, including wood and manufactured solid fuels are not compliant. Instead, all space heating and hot water demand should be met through low-carbon sources.

For many buildings, it is expected that electrical based systems for producing heat and hot water are likely to be the primary solution. The UK government considers air source heat pumps to be the primary, preferred low-carbon heating option for most homes to meet net-zero targets, particularly for existing properties and new builds.

Low carbon heating systems to can be implemented on an individual scale, but also on a communal scale for large buildings (such as flats) and even on a district scale (heat network) to cover many buildings.

Air Source Heat Pumps

Air source heat pumps (ASHP) work best in buildings with a strong fabric first design where overall heat demand is low, further emphasising the energy hierarchy requirement for buildings to 'be lean' in their operational requirements.

A high demand will mean that an ASHP needs to operate at higher temperatures which means that efficiency is lower and running costs are higher. Therefore, it is essential that a building's heat demand is low enough to achieve the optimum efficiency. This includes ensuring a system design around lower flow temperatures, ideally less that 45–50°C, and adequate radiator/emitter sizing.

Correctly sizing an ASHP system is essential; under-sizing will mean that the system cannot meet the heat demand and oversizing will result in increased capital and operating costs. To find the correct system size room-by-room heat loss calculations should be undertaken as well as adequate seasonal performance modelling (not just relying on the nominal coefficient of performance). The approach to hot water storage also needs to be considered, including the necessary water cylinders and thermal stores. Appropriate pipe sizing is also needed to maintain flow rates and minimise resistance.

The siting of the external heat pump units is also important. They need to be located where there is opportunity for free airflow (and avoiding recirculation of cold exhaust air) and protection against impacts of wind. Poor placement can reduce system efficiency and cause operational issues. Siting also needs to consider the amenity of the property and neighbouring properties. Units should be placed at suitable distance from doors/windows and other sensitive receptors. Siting is of particular concern when dealing with heritage assets or conservation areas where visual impact is key.

More detailed guidance on the correct installation of heat pumps is available here:

- MCS Best Practice Heat Pump Guide[6]
- Energy Savings Trust **Heat pump installer toolkit**

Ventilation

Mechanical Heat Recovery and Ventilation (MHRV) significantly improve building energy efficiency by reducing the amount of heat lost through ventilation. In a conventional system, warm indoor air is expelled to the outside and replaced with cold external air that must be reheated—often one of the biggest drivers of heating demand. MHRV systems capture 70–90% of the heat from outgoing air and transfer it to incoming fresh air via a high-efficiency heat exchanger. This dramatically lowers the energy required to maintain comfortable indoor temperatures, reducing space-heating loads throughout the year. Some of the key benefits to energy efficiency include:

- Reduces space-heating demand: Recovered heat pre-warms incoming air, lowering the energy needed for heating.
- Supports airtight construction: Airtight envelopes reduce uncontrolled heat loss; MHRV ensures fresh-air supply without opening windows in winter.
- Minimises purge ventilation: Demand-controlled, balanced ventilation avoids energy-wasting 'open-window' ventilation.
- Stabilises indoor temperatures: Less fluctuation in internal heat levels reduces peak heating loads.
- Enables low-energy, low-carbon designs: Particularly effective when combined with fabric-first approaches and low-carbon heating systems.

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[6] Domestic Heat Pumps – A Best Practice Guide - MCS

The combined effect is reduced operational energy use, improved thermal stability, and lower carbon emissions, while still ensuring high indoor air quality.

Heat Networks (**Be Clean**)

Policy SWDPR 37 requires proposals of 100 or more homes or non-residential schemes of more than 10,000 sq. m to examine the potential for a decentralised energy and heat network.

Heat networks (also known as district heating) supply heat from a central source to consumers, via a network of underground pipes carrying hot water. Heat networks can cover a large area or even an entire town or be local supplying a small cluster of buildings. This avoids the need for individual boilers or electric heaters in every building. Ofcom guidance on heat networks is provided here Heat networks | Ofgem

To comply with this policy applicable proposals should carry out an initial feasibility screening that covers the following elements:

- Heat mapping and demand analysis – estimating the total heat demand from the proposed development and identifying any potential anchor loads
- Heat source analysis – identifying any potential low carbon energy sources and an analysis of potential heat network technologies
- Techno feasibility – locating of energy centres, building connection feasibility and network routing practicality
- Economic feasibility – analysis of commercial feasibility, including capital and operational expenditure, Calculation of NPV (Net Present Value) and IRR

Heat demand and source mapping tools for buildings are digital, often GIS-based platforms used by urban planners, engineers, and energy consultants to analyse energy consumption, identify waste heat opportunities, and map urban heat islands. These tools help decarbonise the built environment by optimising district heating, cooling, and retrofitting strategies.

On-site Renewable Energy Generation (**Be Green**)

Policy SWDPR 37 requires new developments over 100 sq. m gross or one or more dwellings should incorporate the generation of energy from renewable or low carbon sources equivalent to at least 20% of predicted total energy requirements.

From March 2027 the Future Homes Standard and Future Building Standard requires that new buildings, with rare exceptions, are built with renewable electricity generation. In many cases, this is expected to be achieved through the installation of solar panels.

As a best practice standard, an energy generation per building footprint target of 120 kWh/m^2/year for on-site renewable energy generation is a high-performance standard, often used to achieve net-zero operational carbon in new, highly energy-efficient buildings.

The UK Net Zero Carbon Buildings Standard (NZCBS) introduces explicit minimum on-site renewable energy generation targets expressed in kWh/m^2 of building footprint per year. These vary by region and building type, but for the Midlands region the minimum target is: 65 kWh/m^2 FP/yr for single-family homes and 40 kWh/m^2 FP/yr for most other buildings. The UKGBC's Net Zero Carbon Framework is expected to evolve over time, including when the full version is released, and is expected to provide the definitive methodology for embodied emissions.

Monitoring and Evaluation (**Be Seen**)

Policy SWDPR 05 require development proposals to minimise the potential performance gap between the built performance of the development and the design performance. A recognised performance gap/assured performance and monitoring tool should be implemented to achieve this.

The performance gap in buildings refers to the difference between how a building is expected to perform, based on design models and predictions, and how it performs once constructed and occupied. In practice, buildings almost always use more energy than anticipated. Research in the UK (e.g., from LETI, CIBSE and Innovate UK's Building Performance Evaluation Programme) has reported that actual energy consumption can 1.5 to 2.5 times higher than predicted for many building types, particularly new housing.

Reducing the building energy performance gap requires integrated action from design through to operation. Robust early-stage modelling based on realistic assumptions helps establish achievable performance targets, while rigorous construction quality assurance ensures insulation, airtightness, and services are delivered as specified. Effective commissioning is essential to confirm that heating, ventilation, and control systems operate efficiently under real conditions. Finally, post-occupancy evaluation and ongoing performance monitoring provide crucial feedback, enabling teams to identify issues, optimise system settings, and refine future designs. Together, these measures help ensure that buildings perform as intended and deliver reliable, low-carbon outcomes. Further guidance and advice is provided here Takling-the-Performance-Gap.pdf; High-Performance Building Procurement Toolkit – Built Environment Plus

Sustainable design and construction in retrofit projects

Retrofitting upgrades existing buildings to reduce energy use, carbon emissions, and improve comfort. This is essential because 80% of buildings that will exist in 2050 already exist today, making retrofit central to meeting net-zero goals.

A whole house retrofit can provide huge financial, comfort, carbon and social benefits. A good retrofit also helps prevent health risks from damp and mould, reduces the risk of fuel poverty and generates local employment. The reductions in energy use and carbon emissions can be as much as 80%.

Retrofitting works generally sits outside of the planning system and is therefore not affected by planning policy. This is due to retrofitting primarily taking place inside of buildings. Although retrofitting to historic buildings may need listed building consent. Most improvements to the thermal and energy efficiency of a building such as the addition of solar panels and double glazing are permitted through general permitted development rights. Developers should be aware that Building Regulations may apply even when an application for planning permission is not required Permitted development and sustainable construction.

Development that is permitted through Permitted Development rights is not required to comply with policies of the development plan, which includes the sustainable construction policies. However, in the interest of improving the quality, usability, longevity, and resilience of buildings in the district, constructing in a sustainable manner by following the guidance in this guide is strongly encouraged.

There is several retrofit specific guidance that can be consulted to assist with projects:

- LETI Climate Emergency Retrofit Guide
- UK Government – Retrofit for the Future: a guide to making retrofit work
- UKGBC Retrofit Guidance
- PAS 2035:2023 Retrofitting Dwellings

Some of the core principles to consider for any retrofit project that are highlighted in these various guidance documents are the following:

- Fabric First: Prioritise the building's physical 'envelope'—insulation, airtightness, and high-performance windows—to stop heat loss before upgrading heating systems.
- Whole House Approach: Treat the building as a single system. This ensures that a change in one area (like insulation) doesn't cause a problem in another (like damp).
- Build Tight, Ventilate Right: As you seal the building to prevent draughts, you must introduce controlled ventilation (such as Mechanical Ventilation with Heat Recovery (MVHR)) to maintain air quality and prevent mould.
- Maintenance First: Repair any existing defects, such as damp or structural issues, before adding new energy-saving measures.
- Professional Oversight: Use qualified experts (like Retrofit Coordinators) to manage risk and ensure the project meets performance standards.

The key recommendations from LETI through their Climate Emergency Retrofit Guide is for retrofit projects to follow the following hierarchy of action:

- Reduce the space heating demand and energy use intensity as far as is practicable for the building/situation.
- Remove fossil fuel heat sources and replace with low carbon alternatives.
- Generate renewable energy on site wherever feasible but do not pursue this at the detriment of reduce space heat demand or removing fossil fuel heat sources.

LETI have also set out best practice targets for retrofit, which they believe are achievable in the majority of UK dwellings.

Fig. 6: LETI retrofit best practice

The UKNZCBS additionally provides standards for Energy Use Intensity for retrofit projects across a variety of different building typologies that reduce over time from 2025 to 2050.

5. Low carbon development and the historic environment

Introduction

South Worcestershire’s high quality historic environment is an important part of its character, and the district is home to many heritage assets including listed buildings, Scheduled Monuments and Conservation Areas. The NPPF supports historic buildings being bought back into sustainable and viable reuse and SWDPR 09 and SWDPR 33 are supportive of measures to adapt historic buildings to improve their energy efficiency and increase the use of renewable energy generation.

In all cases it is advisable to check first with the council’s Conservation team whether listed building consent is required ahead of any retrofitting or adaptation works to heritage assets.

Retrofitting

Retrofitting historic buildings plays a vital role in reducing carbon emissions while safeguarding local heritage. Because older buildings often rely on traditional construction methods, such as solid walls, natural ventilation, and vapour-permeable materials, interventions must be carefully designed to maintain their character, fabric performance and long-term durability. A ’conservation-led’ approach is essential: proposals should begin with a thorough understanding of the building’s significance, construction, and condition.

Measures that improve energy performance without harming heritage value, such as draught-proofing, secondary glazing, roof and floor insulation, low-impact air-tightness improvements, and sensitive upgrades to building services, should be prioritised.

More complex interventions, including external wall insulation or renewable energy installations, require a balanced assessment of visual impact, technical risks, and heritage sensitivity.

Historic England has developed a climate change action hub webpage which provides links to various advice and research: [Delivering on Climate Change Action and Heritage | Historic England]

Their technical guidance provides advice on looking after historic buildings and sites, including climate change adaptation, retrofit and energy efficiency advice. Two key advice notes to consider include:

- Historic England Energy Efficiency and Historic Buildings. Application of Part L of the Building Regulations to Historic and Traditionally Constructed Buildings (2025)
- Historic England Adapting Historic Buildings for Energy and Carbon Efficiency (2024)

Historic England's guidance is clear: successful, sustainable retrofit of historic buildings depends on expert input and timely engagement with local authorities. These steps ensure that energy improvements enhance performance and reduce carbon emissions without compromising the heritage value that makes these buildings unique.

Adaptation

Historic England's 2024 *Advice Note on* Adapting Historic Buildings for Energy and Carbon Efficiency provides a guidance for improving the energy efficiency and carbon performance of historic buildings while safeguarding their heritage significance. It emphasises that historic buildings must also adapt to contribute to climate action, reduce emissions, and remain viable for future generations. The guidance states that building upgrades are possible that can satisfy the dual goals of heritage conservation and climate mitigation and adaptation. Historic England emphasises that all interventions should be planned to employ a 'whole-building approach', considering the building's construction, moisture behaviour, significance, and condition as an integrated system.

The advice note contains detailed, case-by-case guidance on the acceptability of common retrofit and energy-related interventions for historic buildings. It explains when interventions are likely to be acceptable, what permissions are required, and where caution is necessary to protect heritage significance. A summary of considerations for each of the interventions described in the advice note is set out at Table 3.

Historic England's advice note document should be referred to for the more detailed guidance. The acceptability of the interventions described signify only a high-level guide and, in all instances, seeking specialist professional advice when considering and specifying works is strongly recommended. This is particularly as unauthorised changes that affect the significance of a listed building are a criminal offence.

Table 3: Adaption in historic buildings

Specific Interventions	Acceptability & Key Notes	Permissions[7]
Draught-proofing	Generally acceptable; minimal impact on significance; maintain window condition first.	Usually no Listed Building Consent (LBC).
Secondary glazing	Generally acceptable; minimal harm; exceptions in high-quality interiors or where shutters/historic glass present.	Usually no LBC.
Slim-profile / vacuum double-glazing	Usually acceptable in suitable historic frames; exceptions for fragile or significant glass.	LBC usually required.
Replacement of windows	Acceptable if replacements are appropriate to character; original/historic windows should not be replaced.	LBC required.
Loft insulation	Generally acceptable; breathable materials and ventilation required; avoid spray foam.	Usually no LBC unless fabric loss.
Roof-plane insulation	Sometimes acceptable; avoid loss of historic plaster/roof structure; risk to historic interiors and moisture behaviour, maintain ventilation.	LBC normally required.
Between/under floors insulation	Often acceptable; ensure historic surfaces/archaeology not harmed; risk to historic interiors and moisture	LBC may be required.

[7] In all cases advice should be taken from the Council or a suitably qualified independent consultant as to whether listed building consent is necessary.

	behaviour, breathable materials preferred.	
Internal wall insulation	Acceptable only in limited cases; high risk to historic interiors and moisture behaviour; permeable materials essential.	LBC almost always required.
External wall insulation	Generally unacceptable due to harm to appearance and details; few exceptions.	LBC always required.
Insulation within external wall systems	Sometimes acceptable—for example, timber frame infill, cavity walls, or behind cladding, risk to historic interiors and moisture behaviour.	LBC required (except modern cavity walls).
Reinstating historic render	Usually desirable; improves thermal performance and significance; may allow added insulation beneath render.	LBC required.
Mechanical ventilation and heat recovery	Can be acceptable where needed to manage humidity; avoid in high-quality interiors.	LBC usually required.
Heat pumps and low carbon systems	Generally acceptable; careful siting needed; consider impact on fabric and archaeology.	LBC usually required for heat pumps.
Photovoltaic (PV) panels	Likely to be acceptable if discreet or hidden (valleys, parapets, less prominent slopes); not acceptable on principal elevations.	LBC always required; PP often required.
Solar thermal panels	Same considerations as PV panels.	LBC always required.

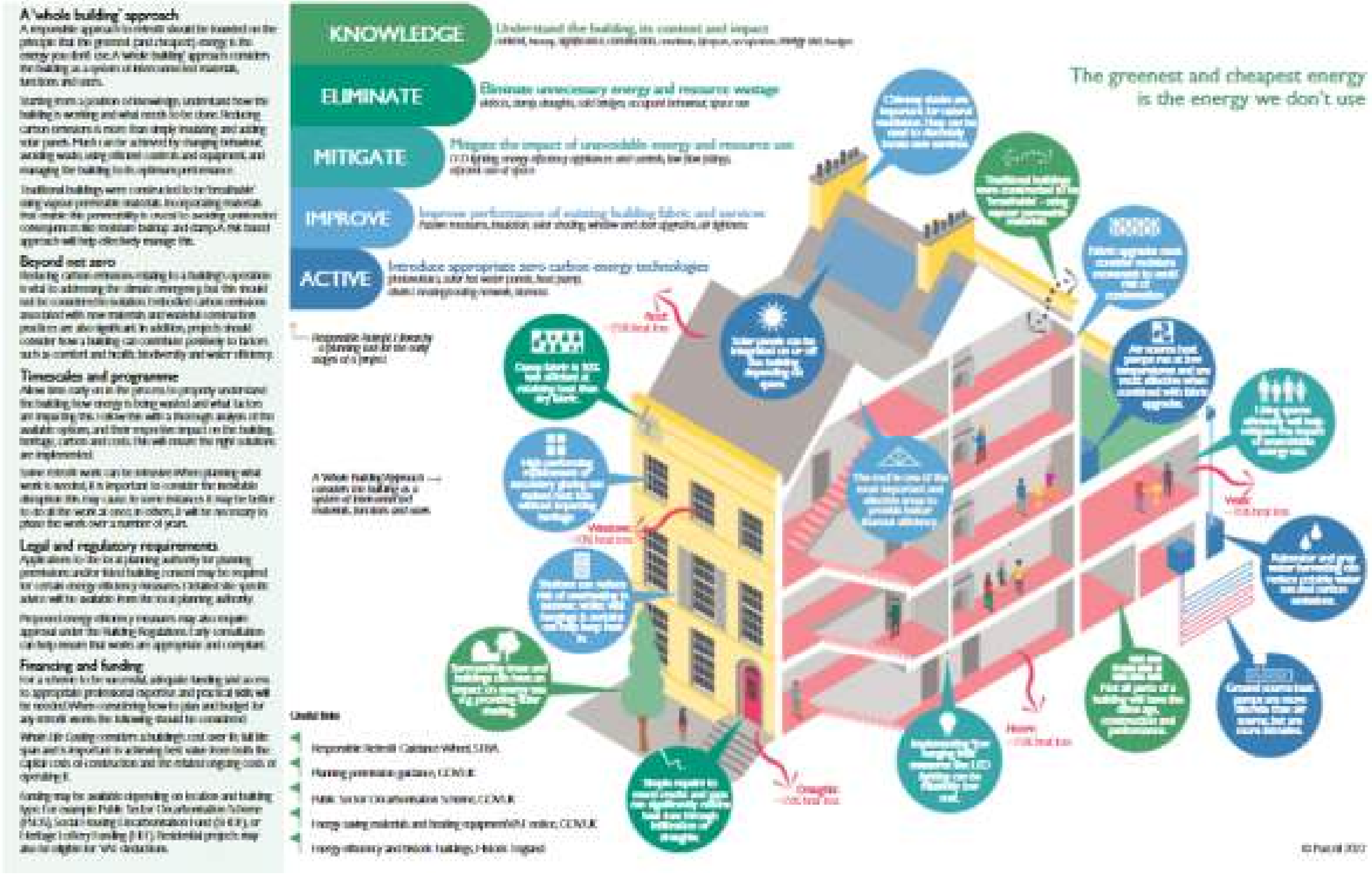
Solar slates	Acceptable only in low significance/low visibility areas; shorter lifespan and poor replication of slate.	LBC always required.
Micro or larger wind turbines	Specific guidance forthcoming; considerations relate to appearance and setting impacts.	Case-by-case.
EV charging points	Generally acceptable if discreet; consider archaeology for ground works.	LBC required for fixings; PP may be required.
External awnings/blinds/shutters	Generally acceptable where historically appropriate; useful for overheating mitigation.	Usually requires LBC (and PP if affecting appearance).
Rainwater goods upgrades	Generally acceptable to manage increased rainfall; use appropriate materials (cast iron, lead).	

Historic England advises to start with reversible and low impact improvements before considering intrusive works. These measures often provide the biggest carbon and comfort gains with lowest cost and minimal intervention. This could include:

- Draught-proofing windows and doors
- Repairing leaking gutters and rainwater goods
- Managing damp
- Improving heating controls and zoning
- Adding loft insulation using breathable materials

They also highlight the importance of ensuring good maintenance and dealing with any underlying problems. prior to seek to add insulation or other low carbon technologies. This could include fixing issues such as roof leaks, blocked gutters, failed pointing, broken window frames etc. (Fig.7). Historic England stress that good maintenance improves energy performance and reduces risks such as mould, heat loss, and structural issues.

Fig 7: Principles for works that can be undertaken to make an historic building more sustainable.



Source: Purcell Architecture, 2022

6. Adapting to the impacts of climate change

Introduction

Policy SWDPR 01 states that the strategic policy aims to ensure that all development minimises its environmental impact and is resilient to the consequences of climate change. Furthermore, Policy SWDPR 05 require proposals to demonstrate how adaptation measures have been incorporated into the design.

The district councils have also produced a specific Climate Change Risk Assessment and Adaptation Plan (2026). It recognises that UK climate is already changing and, without any adaptation, Malvern Hills and Wychavon are likely to begin to feel the effects of the impacts associated with increasing intensity and frequency of flooding, extreme heat, water scarcity and storms. Regarding risk, it identifies the following specific risks, amongst others, relating to buildings and communities:

- Greater frequency and extent of flooding because of climatic changes, leading to displacement of communities.
- Summer and winter temperature changes potentially reducing heating need but increasing cooling need.
- Irreversible damage to heritage assets due to climate changes.

The plan identifies 20 adaptation actions that are allocated a Very High and Immediate priority; one of the actions includes: produce new climate change adaptation guidance for developers.

The Town & Country Planning Association[8] have stated that the design of new development, at all scales, must be driven by the need to build resilience to the climate crisis. This, according to the UK Green Building Council, means upgrading new and existing buildings and infrastructure, as well as supporting people and ecosystems to withstand changes in climate, reducing damage and harm from climate impacts, promoting longevity in the current building stock, and innovating across the supply chain.

There are several built environment specific guidance documents that should be referred to in order to help inform a climate adapted and resilient development:

[8] 17. Designing places for climate resilience

- UK Green Building Council: Climate Resilience Roadmap
- Town & Country Planning Association: Planning for the Climate Crisis: A guide for local authorities (specifically note 17. Designing places for climate resilience)

Much of the guidance set out below is taken from the UKGBC Climate Resilience Roadmap.

In order to comply with the requirement of SWDPR 05 to demonstrate how adaptation measures have been incorporated into design proposals, a climate adaptation statement should be submitted with planning applications. This could be included within the Design and Access Statement, as part of a wider climate change/environment statement or as a standalone document. A template setting out what the adaptation statement should cover is provided at Appendix 2.

General Principles for addressing climate adaptation

Development projects should integrate climate resilience at every stage of the building lifecycle, from site selection and briefing through design, construction, operation and retrofit.

They should start with an assessment of climate-related vulnerability, risks, and potential impacts across the full lifetime of the proposed development, ensuring that multiple future climate scenarios are considered. This assessment should identify how the site, building, occupants, and supporting infrastructure may be exposed or sensitive to hazards such as flooding, overheating, storms, drought, and wildfire.

Proposals should assess how they are designed to remain resilient under future climate conditions, stress testing development under different scenarios. Assessments should use climate projections consistent with UK Climate Projections (e.g. 2°C by 2050 and 4°C by 2100 scenarios) reflecting Environment Agency guidance for scenario-based risk assessment and the requirements of the SWDPR.

From this assessment, strategies to avoid, mitigate or manage any impacts should be developed that include measures that can be implemented within the proposal straight away and further adaptation actions that could be implemented over time as the exact nature of climate change becomes more certain. The project team should also identify how the building can be designed to remain flexible and adaptable, enabling modifications, upgrades, or additional resilience measures to be added during its operational life as climate risks evolve.

This approach supports long-term climate resilience, reduces the likelihood of maladaptation, and ensures that developments can continue to function safely and effectively under a changing climate.

Hazard specific principles

The UKGBC's Climate Resilience Roadmap provides recommendations on measures to take for different hazards at both a site-level and building level (Table 4).

Table 4: Hazard mitigation measures

Hazard	Site-Level Measures	Building-Level Measures	Operational / Management Measures
Flooding	• Detailed FRA/FCA considering depth, duration, frequency, all flood sources • Use sequential test; locate vulnerable uses in lowest-risk areas • Incorporate SuDS, rain gardens, permeable surfacing, green roofs, trees to manage surface water • Create landscaped high ground; provide flood storage areas	• Use flood-resistant and flood-repairable materials (e.g., water-resistant concrete, ceramic tiles, closed-cell insulation) • Install flood doors, barriers, air brick covers, one-way valves • Elevate utilities and critical services above predicted flood levels	• Maintain drainage, barriers and flood resilience features regularly • Update flood warning/evacuation plans; embed in building user guides (BUG) • Plan for safe refuge, evacuation and continuity of operations
Overheating	• Use green/blue infrastructure to mitigate urban heat island effects • Evaluate natural ventilation feasibility	• Prioritise passive measures: external shading, reduced glazing ratios, solar control glass, increased ventilation	• Monitor indoor temperatures; recommission systems post-occupancy (POE) • Provide

	during early design (site constraints: noise, air quality, security)	openings, exposed thermal mass for night cooling • Stress-test against CIBSE TM59/TM52 & multiple DSY future weather files (2050/2080) • Active cooling only where passive solutions insufficient; allow for future system upgrades	management plans for heatwaves and occupant guidance (shading use, night cooling)
Storms (Wind, Rain, Snow)	• Assess wind loading, increased storm intensity and site exposure (using local context and British Standards) • Ensure safe emergency access routes during storm conditions	• Strengthen/fix roofs, façades, cladding and external elements; use storm-resistant materials • Use wind tunnel testing where required; include future climate allowances in modelling • Protect building services and ensure drainage capacity for intense rainfall	• Maintain roof, façade, fixings, services; conduct regular inspections for loose materials • Emergency preparedness and business continuity planning for high winds and power disruption
Drought / Water Scarcity / Subsidence	• Assess local water supply constraints, groundwater levels, drought plans, and soil shrink–swell risk • Use drought-tolerant landscaping and water-retentive design	• Integrate rainwater harvesting, greywater systems, smart irrigation technologies • Design foundations to account for subsidence risk	• Maintain alternative water supply/storage systems; monitor consumption (POE) • Update drought/water risk assessments as conditions change

		linked to soil moisture variation	
Wildfire	• Assess exposure: proximity to vegetated/wildland areas, local weather/terrain, historic incidents • Create defensible space between structures and vegetation; manage fuel loads on and around site	• Use fire-resistant materials in roofs, façades, boundaries; select low-flammability planting • Ensure multiple emergency access routes; consider outdoor air-quality monitoring for smoke events	• Develop wildfire response plans (evacuation, refuge, suppression) • Maintain vegetation management and restore ecosystems after any wildfire event

Appendix 1 SWDPR 05 Compliance Statement

A. Whole Lifecycle Carbon Assessment

If a whole lifecycle carbon assessment has been carried out, please state which methodology was used and what was the scope and assumptions included *(e.g. modules included, lifespan assumptions, data sources)*.

Provide summary results (include full WLCA as an appendix).

Lifecycle Stage	Result ($kgCO_2e$)	Notes
A1–A3 Product		
A4–A5 Construction		
B1–B7 Use		
C1–C4 End-of-Life		
Total Whole Life Carbon		

B. Embodied Carbon

If embodied carbon emissions have been calculated, please provide details of the embodied carbon involved in the proposed building typologies.

Building Type	RIBA 2030 Target ($kgCO_2e/m^2$)	LETI Target (Upfront/Total)	Proposed Development Value

Provide details of how embodied carbon for the project has been minimised, including through actions such as:

- Construction Stage (waste minimisation, construction methods, transport etc.)
- Efficient design to minimise material use
- Material selection (e.g., recycled content, timber, low-carbon alternatives):
- Reuse of existing structures / materials
- Structural strategy (efficiency, optimisation)
- Waste minimisation
- Circularity and design for disassembly

C. Energy Hierarchy

Set out how energy demand from new development is being reduced in line with the principles of the energy hierarchy, implementing a fabric first approach to construction and ultra-low energy consumption standards.
The approach should be described using the Be Lean, Be Clean, Be Green and Be Seen stages.

1. BE LEAN — Reduce Energy Demand (Fabric First and Passive Design)

1.1 Passive Design Measures

Set out what passive design features have been incorporated into the development, this could include:

- Site layout optimises solar gain in winter and minimises summer overheating.
- Building orientation maximises daylighting and reduces artificial lighting demand.
- Overshadowing analysis undertaken.
- Natural ventilation strategies incorporated where feasible.
- Location of key rooms based on daylight and overheating risk
- Glazing strategy by elevation
- Shading strategy (eaves, overhangs, fins, vegetation etc.)

1.2 Fabric Performance (Fabric First)

Set out the fabric performance of buildings within the proposal, including

- Target U-values (compared to Building Regulations requirements).
- Insulation levels
- Thermal bridging
- Air-tightness

1.3 Demand Reduction Modelling

Provide details of any demand reduction modelling undertaken, including:

- Modelling demonstrates reductions in regulated energy demand (e.g., SAP, SBEM, PHPP).
- Overheating risk assessment completed (TM59 for residential / TM52 for non-residential).

2. BE CLEAN — Use Efficient Systems

2.1 Energy-Efficient Building Services

Set out what measures have been incorporated to provide efficient heating, cooling, lighting etc, including:

- High-efficiency, low carbon heating systems specified (e.g., heat pumps)
- High-efficiency ventilation system specified, including any MVHR systems (where appropriate).
- High-efficiency lighting (LED) and controls specified.
- Demand-side response capability considered.

2.3 Smart Controls and Energy Management

- Building Management System or smart controls specified.
- Sub-metering provided for major end uses.
- Load shifting and demand management considered.

2.2 Heat Network Feasibility (required for: >100 homes or >10,000 m² non-residential)

Provide summary of the feasibility study:

- Heat demand mapping
- Anchor loads
- Heat sources assessed
- Technical feasibility
- Economic feasibility (NPV/IRR)

Attach full assessment.

3 BE GREEN — Generate Renewable Energy On-Site

3.1 Feasibility Assessment

- On-site renewable energy feasibility study provided.
- Roof area optimisation for solar PV assessed.

3.2 Proposed Renewable Energy Systems

- Renewable technologies selected and sized based on demand reduction first.
- Estimated annual renewable energy generation provided (kWh/yr).
- Carbon savings from renewables calculated and reported.

3.3 Compliance with SWDPR28

Metric	Value	Notes
Total annual energy demand (kWh/yr)		
Required renewable energy (20%) (kWh/yr)		
Proposed on-site renewable output (kWh/yr)		
% of total demand met		
Energy generation per building footprint ($kWh/m^2/year$)		

4 BE SEEN — Monitor, Verify and Report Performance

Set out any testing and monitoring mechanism that will be put in place to ensure that design meets in-operation performance, including:

4.1 Post-Construction Testing and Verification

- Air-tightness test committed for each dwelling / building.
- As-built SAP/SBEM/PHPP submitted.
- Commissioning of systems planned and documented.

4.2 Operational Monitoring

- Strategy for in-use energy monitoring provided.
- Commitment to post-occupancy evaluation (POE) where required.
- Data reporting mechanisms identified (e.g., smart meters, BMS outputs).

D. BREEAM and Home Quality Mark Assessment

Domestic development - provide a summary of the Home Quality Mark assessment outcomes (Expect all new major residential development)

Non-domestic development – provide a summary of the BREEAM assessment and scoring (Expected for non-domestic developments of 500 sqm of floorspace or above)

If alternative and equivalent assessments are used, then please provide details and summary of the outcomes.

Appendix 2 Climate Change Adaptation Checklist

A. Climate Change Risk Assessment

Assessment Methodology

Provide a summary of:

- Baseline data sources used (e.g., Environment Agency, UKCP projections).
- Methods for evaluating exposure, sensitivity and adaptive capacity
- Climate scenarios assessed (e.g., 2030s/2050s/2080s, multiple DSY weather files)

Identified Climate Hazards

Report the level of current and future risk identified, including for the following hazards:

- Flooding (all sources)
- Overheating
- Storms (wind, rain, snow)
- Drought / water scarcity / subsidence
- Wildfire

B. Site-Level Climate Adaptation Measures

Provide information on the measures that have been incorporated into the development on a site-wide basis to enable resilience to climate change. Focus should be on the issues identified through the climate change risk assessment.

This could include the following:

Flood Risk Adaptation

- FRA/FCA summary (depth, frequency, duration, mechanisms)
- Sequential and/or exception test outcomes
- Sustainable Drainage (SuDS) strategy (green/blue infrastructure, runoff reduction)
- Safe access/egress and flood storage provisions

Overheating Mitigation (Site and Masterplanning)

- Use of green/blue infrastructure to reduce urban heat effects
- Consideration of site constraints (noise/air quality/security) affecting natural ventilation potential

Storm Resilience

- Siting considerations for wind exposure
- Drainage design for intense rainfall events

Drought & Water Resource Resilience

- Anticipated water demand profile
- Landscaping and planting strategy (drought-tolerant species)

Wildfire Risk (where applicable)

- Proximity to vegetated areas
- Defensible space and vegetation management strategy

C. Building-Level Climate Adaptation Measures

Provide information on the measures that have been incorporated into the development on a building level basis to enable resilience to climate change. Focus should be on the issues identified through the climate change risk assessment.

This could include the following:

Flooding (Building Fabric and Systems)

- Flood resistant/repairable materials specification
- Elevated utilities and critical plant
- Use of barriers, flood doors, valves, and waterproofing installations

Overheating Mitigation

- Passive-first strategy (shading, glazing ratios, ventilation openings, exposed thermal mass)
- Overheating modelling outputs (TM52, TM59, DSY files)
- Active cooling justification (only where passive measures insufficient)

Storm-Resistant Construction

- Envelope strengthening measures (roof, cladding, fixings)
- Wind tunnel testing results (if required), including future climate allowances

Drought & Soil Movement Adaptation

- Foundation design responsive to shrink–swell and groundwater variability
- Water reuse systems (greywater, rainwater harvesting)

Wildfire Protection

- Use of fire-resistant materials (walls, roofs, soffits)
- Ventilation, access routes, and fire suppression system features

D. Future Adaptability and Flexible Design

Provide any details about how flexibility has been built into the development to accommodate any future potential adaptation requirements, including:

- Future systems upgrade (e.g., shading, cooling, drainage, flood barriers)
- Trigger based or phased adaptation measures as climate data evolves
- Capacity to adapt over time, in line with the requirement to design buildings to be flexible and adaptable under future scenarios

E. Management, Maintenance and Monitoring

Provide details on any ongoing management or monitoring arrangements that will be put in place to ensure the effectiveness of adaptation measures in-operation, including:

Operational Management

- Maintenance strategy for climate resilience features (SuDS, shading, ventilation systems, vegetation, drainage)
- Emergency plans (flood, storm, heatwave, wildfire)
- Occupant/user instructions included in the Building User Guide (BUG)

Monitoring and Post-Occupancy Evaluation

- Monitor performance (temperature, water use, drainage, infiltration, etc.)

- Conduct a Post Occupancy Evaluation (POE) including thermal comfort monitoring and system testing
- Report against resilience metrics (e.g. exposure, sensitivity, adaptive capacity) as recommended in the UKGBC Climate Resilience Roadmap's metrics framework