Swale Borough Council:

Net Zero Policy Development

Output iii: Evidence base and policy recommendations

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Bioregional

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Glossary of terms and acronyms

Albedo	Measure of the reflectivity of a surface, defined as the fraction of incident light or radiation that is reflected by that surface.
Agrivoltaics	The combination of agriculture and solar PV generation on the same land. The solar panels provide shade, which helps reduce plant stress and water evaporation, while the plants help cool the panels, increasing their efficiency.
BRE	Buildings Research Establishment. The UK's building science research institution which develops and/or tests various building products, techniques, standards, and qualifications and data. Originally a UK civil service body, but now independent.
CAPEX	Capital expenditure. Upfront capital costs required to acquire and develop land or properties.
Carbon, or carbon emissions	Short for 'carbon dioxide emissions' but can also include several other gases with a climate-changing effect, that are emitted to the atmosphere from human activities (see 'GHG', below).
Carbon budget	Amount of greenhouse gas that can be emitted by an individual, organisation or geographic area. Usually set to reflect a 'fair share' of the global amount that can be emitted before reaching a level of atmospheric carbon that causes severely harmful climate change.
Carbon intensity/ carbon factors	A measure of how much carbon was emitted to produce and distribute each kWh of grid energy at a certain point in time. For electricity, this has been falling as coal-fired power stations have been phased out over years. It also varies on an hourly basis: at times of high renewable energy generation, the carbon intensity is lower than at points where gas-fired electricity dominates the generation mix.
Cool building materials	Cool building materials are designed to reduce overheating in buildings by reflecting more sunlight and absorbing less heat. These materials typically have high albedo and high infrared emittance, which help keep surfaces cooler and reduce the amount of heat transferred into the building.
CCC	Climate Change Committee
SBC	Swale Borough Council
CIBSE	Chartered Institution of Building Services Engineers.

Circular economy	A circular economy is an economic model designed to minimise waste and make the most of resources. Unlike the traditional linear economy, which follows a "take, make, dispose" approach, a circular economy emphasises keeping products and materials in use for as long as possible through strategies like sharing, leasing, reusing, repairing, refurbishing, and recycling.
CO_2	Carbon dioxide. Often shortened to 'carbon'.
CO_2e	Carbon dioxide equivalent. The sum of a mixture of gases, in terms of their climate-changing impact in a 100-year period expressed as the amount of CO_2 that would have the same effect. Often shortened to 'carbon'.
DESNZ	Department of Energy Security and Net Zero
Embodied carbon	Carbon that was emitted during the production, transport and assembly of a building, infrastructure, vehicle or other product, before the product is in use. As opposed to 'operational carbon' which is emitted due to energy use when operating the building / infrastructure / vehicle / other product.
EUI	Energy use intensity, a measure of how much energy a building uses per square metre of floor. Expressed in kilowatt-hours per square metre of floor space per year.
GIA	Gross Internal Area
GHG	Greenhouse gas (CO_2 and several other gases: methane, nitrogen dioxide, and fluorinated refrigerant gases). Often collectively referred to as 'carbon'; see above.
HEM	Home Energy Model
kW	Kilowatt. A unit of energy generation capacity.
kWh	A unit of energy, which can be either generation or usage.
kWp	Kilowatt-peak. A measure of energy generation capacity typically used to describe the size of a solar PV array in terms of the maximum amount of energy it can generate under optimum conditions.
LETI	Low Energy Transformation Initiative. A coalition of built environment professionals working to establish and achieve the energy performance needed for net zero.

MCS	Microgeneration Certification Scheme. MCS certifies, quality assures and provides consumer protection for microgeneration installations and installer of renewable energy.
MVHR	Mechanical Ventilation with Heat Recovery
MW	Megawatt. A unit of energy generation capacity.
Net zero terminology	At a global scale, net zero carbon is defined as the balance between the amount of greenhouse gases emitted into the atmosphere and the amount removed from it. Net zero carbon at a built environment level means that the net annual *operational* carbon emissions value from a development is zero. Zero carbon is defined as absolute zero operational carbon emissions from a development. Net zero energy is defined as on-site renewable energy generation being equal to total energy consumption on an annual basis.
NPPF	National Planning Policy Framework. A central government document laying out how the planning system should function, including plan-making and decisions.
Offsetting	Offsetting in the built environmental is a financial contribution to an official body (e.g. local authority) to compensate for a shortfall in the required amount of carbon emissions reduction on-site. For this study, carbon offsetting is referred to as the above. Energy offsetting (as for policies A4 and B4) follows the same principle but refers to financial contributions where there is a shortfall is matching the on-site renewable energy generation to the total energy consumption on-site.
Operational carbon	Carbon dioxide emitted during the operational phase of a development.
OPEX	Operational expenditure. These are the operational costs of a development or building.
Part L	Building regulations section that sets basic legal requirements regarding buildings' energy and CO_2.
Performance gap	The difference between the amount of energy a building is predicted to use during design, versus the actual amount of energy it uses. The gap is due to poor prediction methodologies, errors in construction, and unexpected building user behaviour.
PV	Photovoltaics: solar panels that generate electricity.
PHPP	Passivhaus Planning Package – a tool to accurately predict a building's energy use. It is used to design buildings that seek Passivhaus certification but can be used without pursuing certification.
POE	Post Occupancy Evaluation
Regulated energy or carbon	Carbon emissions associated with energy uses that are 'regulated' by Building Regulations Part L. This covers permanent energy uses in the building, (space heating, space cooling hot water, fixed lighting, ventilation, fans, and pumps).
REPD (should be in row above)	Renewable Energy Planning Database
RIBA	Royal Institute of British Architects
RICS	Royal Institute of Chartered Surveyors
SAP	Standard Assessment Procedure – the national calculation method for residential buildings' energy and carbon, used to satisfy building regulations Part L. SAP is based on BREDEM model, but with fixed assumptions and thus less flexibility.
SBEM	Simplified Buildings Energy Model – the national calculation method for non-residential buildings' energy and carbon, used to satisfy building regulations Part L.
Sequestration	Removal and storage of carbon dioxide (or other GHGs) so that it cannot perform its harmful climate-changing role in the atmosphere. Currently only achieved by trees/plants and soil. May be achieved by technologies in future.
Space heat demand	Amount of energy needed to heat a building to a comfortable temperature. Expressed in in kilowatt-hours per square metre of floor space per year.
TER	Target Emission Rate – a limit set by Part L of building regulations on CO_2 emissions per square metre of floor, from regulated energy use in the building.
TPER	Target Primary Energy Rate – limit set by Part L of building regulations on 'primary energy' use per square metre of floor. Unlike metered energy, 'primary energy' takes into account energy lost to inefficiencies during power generation and distribution.

TFEE	Target Fabric Energy Efficiency – limit on space heat energy demand per square metre of floor, set by Part L of building regulations. Based only on fabric; not affected by building services like heating system, lighting, ventilation[i].
TM54	A method to accurately calculate buildings' energy use. Devised by CIBSE (as above).
UKGBC	UK Green Building Council.
Unregulated energy or carbon	Carbon associated with energy use in a building or development but which is not covered by Building Regulations Part L. Includes plug-in appliances, lifts, escalators, external lighting, and any other use not covered by Part L.
Upfront embodied carbon	Upfront embodied carbon refers to the greenhouse gas emissions associated with the initial stages of a building or infrastructure's lifecycle. This includes the emissions from the extraction of raw materials, their transportation, manufacturing, and the construction process itself, up until the building is completed and ready for use
U-value	A measure of how much heat is transmitted through a building element, such as the walls, floor, roof, windows or doors. Lower U-values mean a greater retention of heat within the building.
Whole life carbon	Whole life carbon refers to the total greenhouse gas emissions associated with a built asset throughout its entire lifecycle. This includes all emissions from the extraction of raw materials, manufacturing, construction, operation, maintenance, and eventual demolition and disposal of the asset
WMS	Written Ministerial Statement. A formal statement made by a Government minister that can form a relevant statement of national policy that needs to be a material consideration in the creation and examination of local plan policies. In this report, where appended by a year (e.g. 2015 WMS, 2023 WMS) this denotes a specific written ministerial statement made in that year that has been referred to and explained in a prior paragraph of this report.

Introduction

Bioregional and Edgars are appointed to provide an assessment of options available within the local planning system to address climate change and to inform local plan policy development within Swale Local Plan (SLP).

Our appointment to support Swale Borough Council (SBC) in this effort comprises of the following three outputs (i – iii below):

1. **Assessment of powers, duties and policy options:**
   i. Literature Review & position statement: Exploring the powers, duties, precedent policies, and links to SBC's existing climate commitments.
   ii. Policy options & 'risk matrix': Devise a range of potential policy approaches to carbon reduction in buildings, and evaluate the relative merits of each of these.

2. **Evidence and draft policies:**
   iii. Preparation of an evidence base to close any gaps in necessary evidence beyond what was already identified in the Literature Review (part 1.i, as above), as necessary to support SBC's chosen policy option (that will have been chosen as a result of stage 1 above) with draft recommended policy wording

A meeting was held with Swale officers on the 7th August 2024 to review the policy options, which were presented to members on 23rd September 2024. Following these meetings, the policy team at Swale outlined the policy option they wanted to progress. This report represents policy recommendations and the evidence base to support the formation of policy in Swale's Local Plan.

This report comprises Output iii of Part 2, which includes:

- Executive summary of the Literature Review (Part 1, output i)
- Policy recommendations on the following scopes
  a. Net zero operational carbon in new build residential buildings
  b. Net zero operational carbon in new build non-residential buildings
  c. Sustainable design and adaptation principles
  d. Embodied carbon and waste
  e. Renewable energy development and infrastructure
- Policy implementation and monitoring recommendations and guidance
- Energy Statement example format

Terminology used throughout this report

Throughout the report, a range of terminology relating to net zero is used. At a global scale, net zero carbon is defined as the balance between the amount of greenhouse gases emitted into the atmosphere and the amount removed from it.

Net zero carbon at a built environment level means that the annual *operational* carbon emissions value from a development is zero, which typically is achieved through a wholly electrified system that has on-site solar PV. Because the development will not be powered entirely by the on-site solar PV every hour of every day, net zero carbon is the term used rather than zero carbon because development will still rely on the UK electricity grid for electricity during periods of low solar PV electricity generation – the UK grid still contains fossil fuel electricity generation and therefore grid electricity results in carbon emissions. On the other hand, there will be periods where the on-site solar PV produces surplus electricity, which is what balances the overall carbon emissions to zero on an annual basis.

Zero carbon is defined as zero operational carbon emissions from a development. Once the UK grid is fully decarbonised, what we currently call a net zero carbon building will be called a zero carbon building.

This study also refers to net zero energy, which is largely interchangeable with net zero carbon, as the amount of energy used or generated corresponds to how much carbon is emitted. Specifically, net zero energy refers to the policy approaches set out for A- and B-suite policies where energy metrics are used to achieve net zero emissions on an annual basis, rather than carbon metrics.

It is important to note that where net zero carbon is referred to for buildings, this is not a wholly net zero carbon building because the definition only applies to operational carbon, not embodied carbon. To achieve a wholly net zero carbon building, the embodied carbon of a building would need to be offset or removed from the atmosphere.

Executive summary of the Literature Review

This executive summary summarises the key topics outlined in the Literature Review (Output i). Additional information or evidence published between the preparation of the Literature Review (August 2024) and the production of this report is included in a blue box.

Climate change and legislation

The international and national context

The UK is a signatory to the international Paris Agreement 2015, brokered via the United Nations. This commits all signatories to ensure global average temperatures rise is limited to 2˚Celsius on pre-industrial levels, and to pursue a limit of 1.5˚C.

The UN's Emission Gap Report in October 2024 highlighted that globally nations are not on track to achieve 2030 targets for limiting carbon emission which means that it would be impossible to limit global warning to 1.5°C.

The report outlines that nations must deliver ambitious policy immediately to set a credible and achievable pathway for emission reductions. To delay action or a lack of ambition would lead to more significant reduction's year-on-year, and would lead to a failure to curb temperature rise to within 2 °C which would have catastrophic consequences for the world's population.

In 2019 the UK Government declared a climate emergency and updated the legally binding carbon reduction goal for 2050 enshrined in the Climate Change Act 2008. The new goal is to achieve a net zero carbon UK by 2050. The Act also comes with interim 5-yearly carbon budgets that are devised by the independent Committee on Climate Change (CCC). The last (sixth) carbon budget mandated a 78% reduction in carbon emissions by 2035 (this would be roughly equivalent to a 65% reduction compared to current levels, which would require an average drop of about 4.3% a year). The seventh carbon budget is expected before February 2025 and will mandate carbon reductions until 2042.

The carbon budgets require that the sectors of buildings, energy and land transport should all achieve steep and rapid reductions and reach zero or near-zero emissions on their own terms. Given that all sectors face a huge challenge in achieving their own required reductions, this means there is very little room to offset emissions in one sector by reductions or removals in another sector, and it is therefore essential that buildings achieve net zero carbon without offsetting from other sectors.

Why must the local plan act on climate change?

Legal duty to mitigate climate change through the plan

The local plan is legally obligated to design its policies "to secure that the development and use of land in the local planning authority's area contribute to the mitigation of, and adaptation to, climate change" (Planning & Compulsory Purchase Act, Section 19[ii]). This duty is further underscored by similar wording in the more recent Levelling Up & Regeneration Act 2023[iii] in which the obligation is to design the plan, not just the individual policies, to achieve that goal.

The National Planning Policy Framework (NPPF) defines climate change mitigation as:

> "Action to reduce the impact of human activity on the climate system, primarily through reducing greenhouse gas emissions".

Therefore, the local plan's duty is not simply to minimise the amount of new emissions that new development adds to the district, but rather to ensure that its local plan reduces the overall amount of carbon emissions of the district. This means that the more carbon new development is permitted to emit, the greater the reductions that will be needed in existing buildings, business, industry, transport, energy production, and land use within the council in order to fulfil that duty to deliver an overall mitigation.

Given that the local plan can only ensure change via the granting or refusal of planning permissions (and raising of funds as a condition/obligation of permission), it cannot force changes to existing buildings, transport, industrial/business operations, or land use. Its only certain route to climate mitigation, therefore, is in ensuring that proposed developments are designed and located to actively reduce the amount of emissions associated with the District.

Standalone renewable energy can actively mitigate the district's carbon emissions, as can provision for public transport, walking and cycling. New buildings, however, will only help to actively mitigate the district's carbon emissions if the new building exports more renewable energy than they consume in grid energy, or if it replaces an existing building that had greater carbon emissions. This is therefore a strong argument that new buildings are only logically compatible with the duty to mitigate climate change if they are, at least, net zero carbon in their own right or are delivered in step with sufficient renewable energy to match or exceed that building's energy demands.

What degree of mitigation is justifiable?

The NPPF provides detail illustrating the extent to which this mitigation should go. In particular:

- "The planning system should support the transition to a low carbon future … shape places in ways that contribute to radical reductions in greenhouse gas emissions, [and] encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy" (Paragraph 157).
- "Plans should take a proactive approach to [mitigation] … In line with the objectives and provisions of the Climate Change Act 2008" (Paragraph 158 and footnote 56).

Logically therefore, a local plan should aim to proactively ensure the changes necessary to hit the carbon targets set by the Climate Change Act 2008. That Act sets the legally binding net zero target for 2050, and requires fixed carbon budgets for each 5-year period between 2008 and 2050. The Climate Change Act 2008 commits the UK to limit climate change to no more than 2°C above pre-industrial global average temperatures, and to pursue a lower limit of 1.5°C.

The UK's five-yearly carbon budgets also detail a combination of actions necessary to stay within the budgets. A full list is included in the literature review, but the key measures relating to the built environment include:

- No new homes connected to the gas grid from 2025 at the latest (and ideally be zero carbon), instead using low-carbon heat such as heat pumps or gas-free heat networks
- New homes to have a very low space heat demand of only 15-20kWh/m2/year (a 60-70% reduction on a new home that just complies with the previous 2013 building regulations)
- Construction materials to be used more efficiently and switching to low carbon materials
- Dramatically increase the rollout of electrical heat/heat pumps to existing buildings
- Increase in renewable energy generation capacity to reach 60% of total grid electricity generation by 2030 and 80% by 2050

The Committee on Climate Change's analysis found that the government's policy plans are insufficient to deliver the full suite of necessary actions for the carbon budgets. The 2021 building regulations do not rule out gas (and many buildings granted under the 2021 regime will actually be completed post-2025). The Future Homes Standard (2025) is expected to deliver gas-free new homes, but will not deliver a low enough space heat demand nor make buildings net zero carbon from first operation, nor include any regulation around low-carbon materials or material efficiency.

The local context – Swale Borough Council's commitments

In recognition of the urgency to tackle climate change, Swale Borough Council declared a Climate Emergency in 2019. SBC have committed to:

- be a net zero Council by 2025
- be a net zero Borough by 2030

The SBC Climate and Ecological Emergency Action Plan followed in 2020 and outlined key actions required to decarbonise the district. Those relevant to this study include:

- Prior to the adoption of the new Local Plan, use a planning condition based on a 50% improvement over current building regulations, ratcheting to 75% and 100% improvement by 2025 and 2028 respectively
- Use the local plan review to investigate the potential to introduce minimum requirements for on-site renewables on new developments
- Investigate the potential of a carbon offset fund (106 Agreements) where on-site measures (renewable energy or carbon reductions) cannot be delivered
- Incorporate a policy on climate change adaptation in the local plan review

The work of this study, and subsequent policy recommendations in this report align with the actions set out in the SBC's Climate and Ecological Emergency Action Plan and more widely with the Borough's ambitions to be net zero by 2030.

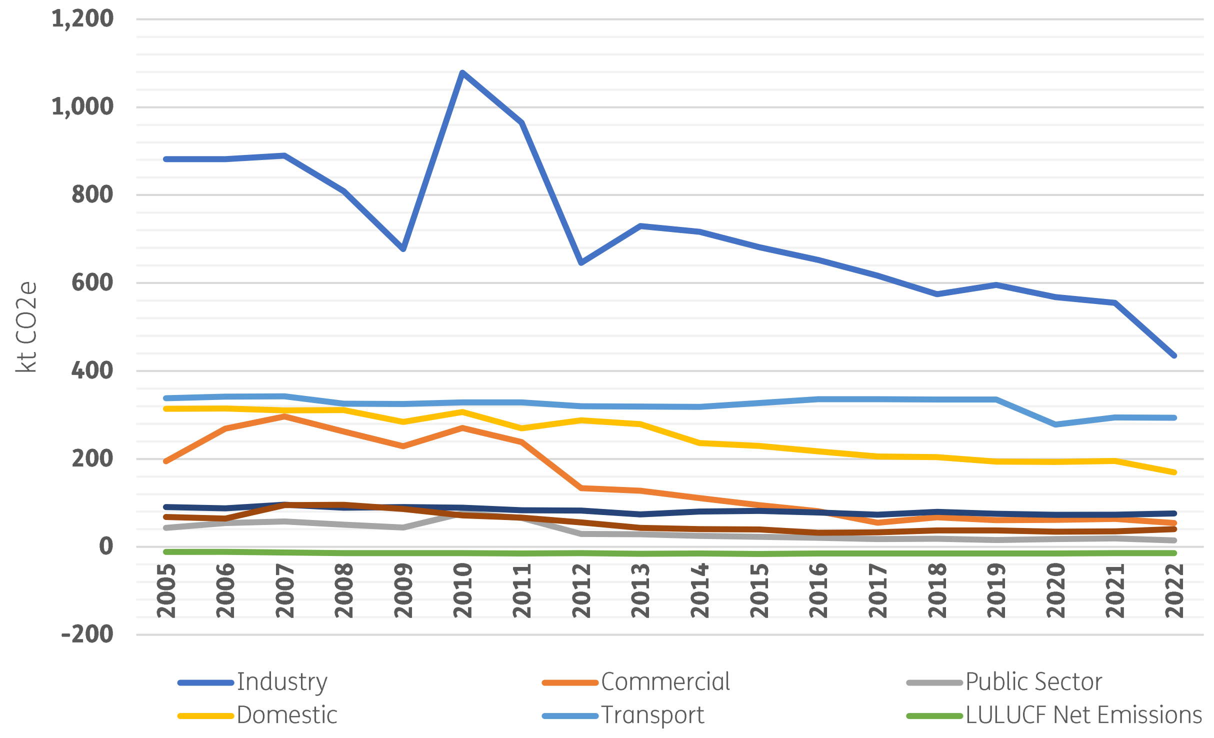

Figure 1: Sectoral emissions trajectories in Swale from 2005-2022 – BEIS/DESNZ UK local authority greenhouse gas emissions (2024).

Figure 1 illustrates that there is significant progress required to allow Swale to become a net zero borough by 2030. Whilst industry and commercial emissions have proportionally reduced their emissions the most, domestic building emissions only show a modest reduction. Local plan policy has a significant impact on influencing future emissions contributions from the domestic and commercial sectors by limiting the energy consumption of buildings and ensuring that building can generate renewable energy for their own use and support grid decarbonisation more widely.

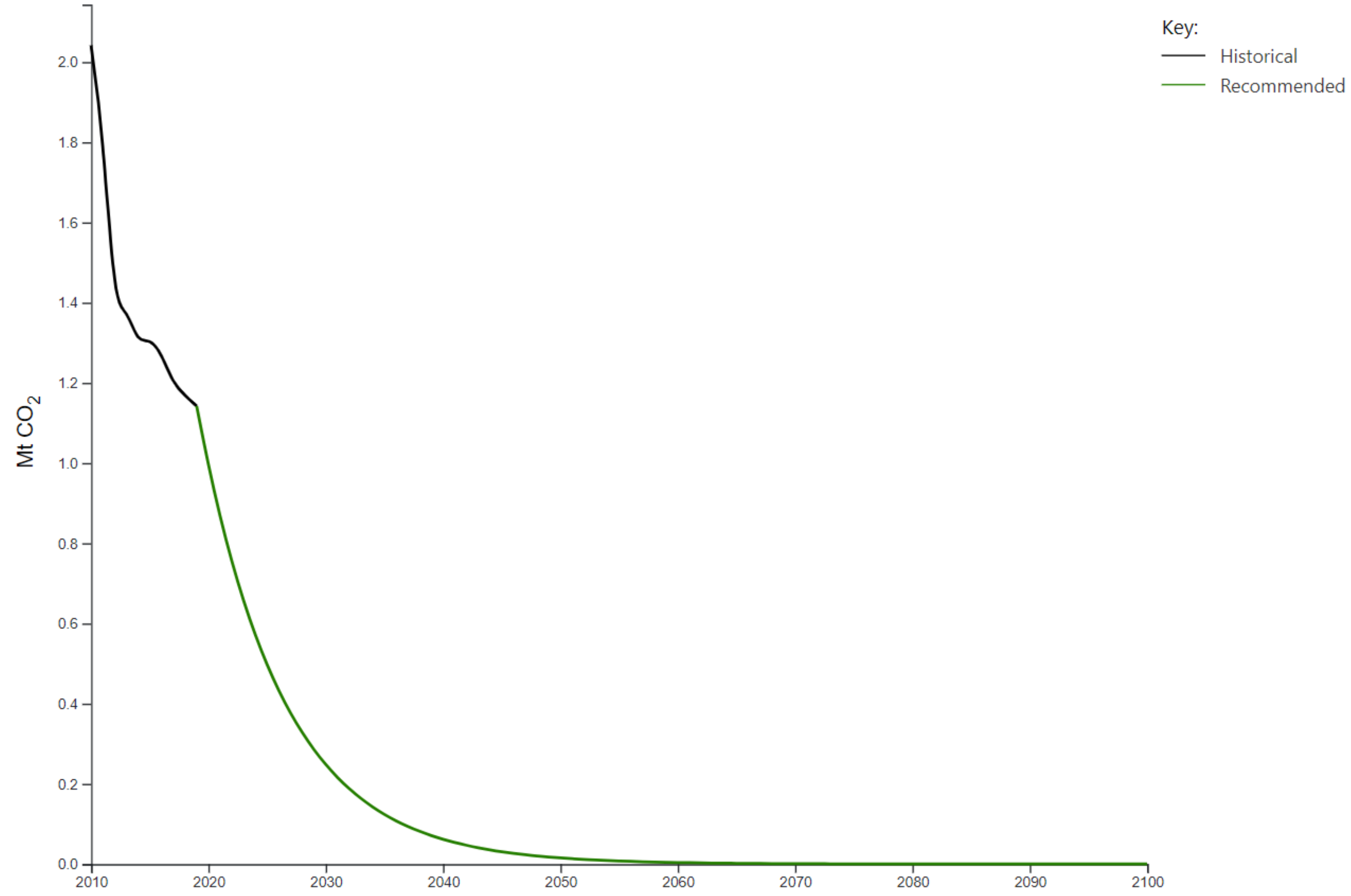

Figure 2: Emissions reduction pathway for energy-only CO2 emissions to fulfil carbon budgets for Swale from 2018 to 2100 compatible with the Paris Agreement. Tyndall Centre (2024).

Academic experts at the Tyndall Centre have conducted an exercise for all local areas of the UK but with different assumptions about the fairest way to derive the local budget, and the activities that should be accounted for at national level rather than local level. Unlike the national carbon budgets that are legislated through the Climate Change Act 2008, the Tyndall Centre does not presume that carbon removal technology will appear in the future.

The Tyndall Centre's recommended pathway to net zero within the Swale carbon budgets are represented in Figure 2. To avoid exceeding the Tyndall carbon budget, Swale emissions would need to fall sharply starting from the 2018 baseline. This pathway amounts to a required annual 13% reduction to energy-related CO2.

The challenge of bringing forward net zero carbon new buildings, scaling up retrofit of existing buildings, and decarbonising transport and the wider energy system, will not be possible without the support of the local plan. By shaping what kind of development happens and where, the local plan can help to realise Swale's ambitions.

A local plan that achieves dramatic carbon reductions will help to avoid contributing to the risk of Swale's residents being impacted by financial and health-related harms that would come with climate change. If the local plan does not take all possible steps within its grasp to achieve rapid and drastic carbon reductions, it would arguably be failing to deliver not just on its carbon reduction duties, but also its duties to protect the natural environment and the wellbeing of its population.

The local plan's duties and powers to address carbon are explored next.

Legislation that defines powers that the local plan may use towards achieving net zero carbon

Primary legislation relating to mitigation of climate change is included in the Planning and Compulsory Purchase Act 2004 and Planning & Energy Act 2008.

Planning and Compulsory Purchase Act 2004

This is the key foundational legislation that enshrines the local plan's duty to act on climate change. Section 19, paragraph 1a, states that:

> "Development plan documents must (taken as a whole) include policies designed to secure that the development and use of land in the local planning authority's area contribute to the mitigation of, and adaptation to, climate change".

Mitigation of climate change means reduction in the impact of human activity on the climate system[iv], primarily by reducing the level of greenhouse gas in the atmosphere[v],[vi].

Planning & Energy Act 2008

The Planning & Energy Act is the source of the local plan's most important power to influence the energy and carbon performance of development.

It grants the local planning authority the power to set 'reasonable requirements' for:

1. Energy efficiency standards higher than those set by building regulations
2. Renewable or low carbon sources 'in the locality of the development' to supply a proportion of energy used at the development.

Policies using these powers "must not be inconsistent with relevant national policies"; that is, those relating to energy from renewable sources, low carbon energy, or furthering energy efficiency.

The Act defines 'energy efficiency standards' as ones that are set out or endorsed by the Secretary of State. This may imply only the methods used to demonstrate compliance with Part L of Building Regulations (SAP or SBEM despite their shortcomings – as outlined in Output i –, or TM54). As TM54 is one of the methods endorsed by Part L as of 2021, it appears the Act would therefore permit local energy efficiency to account for *total* energy use, not just regulated (see glossary).

The Act does not define 'energy used at the development'. It therefore appears to empower the local plan to set requirements for renewable energy to meet a proportion of the new building's *total* energy, not just 'regulated' energy (see glossary). We interpret this to mean that a policy could require renewable energy to supply a 'reasonable proportion' of the *total* energy use of the development, not just the share that is 'regulated' by Part L of building regulations. This could arguably be a 100% proportion, if it can be shown why this requirement is 'reasonable' – for example in its necessity or effectiveness to meet the duty for climate mitigation, with evidence of its technical feasibility and its cost for viability testing.

The Act does not define 'renewable energy', 'low carbon', or 'in the locality of development'. Presumably therefore the local planning authority is free to define these.

The Act furthermore does not specify whether these powers can be used in new or existing development. The implication therefore is that these powers could be used to set local plan policy that applies to proposals regarding existing buildings, not only new development. However, this would still be subject to the requirement to be 'reasonable'. This study does not recommend existing buildings policies as this is out of scope.

Town and Country Planning Act 1990

Includes provision of planning obligations (Section 106[vii]). Enabling the collection of payments for the purpose of making an otherwise unacceptable development into an acceptable one.

Secondary legislation (i.e. national planning policy or statements) form a material consideration to local plan making and policies for mitigating against climate change, these are noted below.

National Planning Policy Framework

The NPPF (December 2023 edition) reaffirms various ways in which it is appropriate to pursue carbon reduction policies or other undefined sustainability improvements through the local plan:

- Paragraph 159b: "New development should be planned for in ways that … reduce [carbon] emissions, such as [via] location, orientation and design … Local requirements for [buildings'] sustainability should reflect the Government's policy for national technical standards".
- Paragraph 160a-b: "Plans should … provide a positive strategy for energy from [renewable and low carbon] sources … consider identifying suitable areas for [these] and supporting infrastructure … [and] identify opportunities for development to draw its energy supply from [these sources]".
- Paragraph 196: "Set out a positive strategy for the conservation and enjoyment of the historic environment, including … putting [heritage assets] to viable uses consistent with their conservation". This may be relevant in that a building's energy efficiency affects whether use of that building is viable.

Written Ministerial Statement 23rd December 2023 (2023 WMS)

On 13th December 2023, Government released a Written Ministerial Statement. The 2023 WMS purports to place quite stringent new limitations on the exercise of existing powers held by local planning authorities to require improvements in the energy and carbon performance of proposed new buildings in their area. The WMS does not remove the ability to set improved local standards, but it purports to limit them by stating:

1. **Energy efficiency policy must be expressed as percentage reductions on the Building Regulations Part L TER (Target Emissions Rate)**, using a "specified version of SAP".
2. Policies that exceed building regulations should be "**applied flexibly … where the applicant can demonstrate that meeting the higher standards is not technically feasible**, in relation to … local energy infrastructure … and access to … supply chains."

The WMS also emphasises that **any such policies must have a "well-reasoned and robustly costed rationale that ensures that development remains viable, and the impact on housing supply and affordability is considered** in accordance with the National Planning Policy Framework".

For new buildings, the 2023 WMS's stipulations make it much harder to fulfil local planning authorities' legal duty to mitigate climate change (Planning & Compulsory Act 2004) and the expectation laid on them to support "radical reductions in greenhouse gas emissions … [taking] a proactive approach … in line with the objectives and provisions of the Climate Change Act 2008" (National Planning Policy Framework).

The main reason the WMS make this duty harder to fulfil are:

- Pushing the use of a carbon metric, when contrarily the goal is energy efficiency: the biggest problem is that the WMS asks for energy efficiency policies to be expressed using the Part L TER metric – but TER is in fact not an energy efficiency metric, but a carbon emissions metric. Furthermore, SAP methodology is notoriously poor at estimating the actual energy performance of a building, and therefore any of the SAP metrics would not reliably ensure that buildings have the absolute energy efficiency performance that is known to be a necessary part of the UK's legally binding carbon goals
- Forcing the use of a 'specified version of SAP' for the required metric: by specifying the version of SAP, the WSM2024 risks being out of date by not keeping pace with changes to SAP or future version e.g. Home Energy Model (HEM).
- Creating a hostile climate towards buildings energy and carbon improvement policies: beyond constraining on how policy is expressed and implemented, the WMS sets a tone that is generally discouraging (albeit not prohibitive) towards any local policy that goes beyond "current or planned building regulations", stating that the government does not "expect" this. However, the WMS does not actually prohibit the use of such policies so long as they are well-justified.

National Planning Policy Guidance (NPPG)

The NPPG is a resource of further guidance to help interpret various sources of government policy regarding planning, including written ministerial statements and the NPPF.

The NPPG section on climate change[viii] still echoes the now superseded WMS2015 supposed limit on energy/carbon reduction policies (i.e. no more stringent than Code for Sustainable Homes Level 4). However, that limit is now obsolete because the Code is no longer a national standard and should be considered irrelevant. We note that this section of the NPPG has not been updated since 2019 and is thus outdated. This is further evidenced in that it refers to the "national target to reduce the UK's greenhouse gas emissions by at least 80% … by 2050" – this is now incorrect as the target is now a 100% reduction, as established by the 2019 update to the Climate Change Act.

In contrast to its obsolete advice on housing energy standards, the NPPG section on climate change confirms that local plans "are not restricted or limited in setting energy performance standards above the building regulations for *non-housing* developments" (emphasis added).

It also emphasises that where local plan standards for buildings' sustainability or carbon are set, they must be "based on robust and credible evidence and pay careful attention to viability."

Regarding energy improvements to *existing* buildings, the NPPG does not clarify how local policy should approach these, but notes that the planning authority "should ensure any advice to developers is co-ordinated to ensure consistency between energy, design and heritage matters", and notes that many energy improvements may not need planning permission.

Balance of power between legislation, NPPF and Ministerial Statements

It is important to note that legislation, and the powers granted, or duties imposed by it, cannot legally be undone by national policy. As such, legislation holds far more material weight than a WMS. Moreover, legislation and policy which is subject to public consultation should also be considered to have been made or published democratically, having considered views of the public or organisations in a transparent manner, unlike the 2023 WMS.

At the time of publication of the 2023 WMS, the then government did not indicate there was any assessment against how the WMS would affect a Council's ability to fulfil its legal obligation under the Planning & Compulsory Purchase Act to 'contribute to the mitigation of climate change', nor align with legally mandated carbon emission budgets under the Climate Change Act 2008.

Open legal advice on this topic notes that it has been established in case law that a WMS "cannot lawfully countermand or frustrate the effective operation of any … relevant statutory power" (such as the duty to mitigate climate change and the power to require higher local standards) and that "any WMS must lawfully be applied subject to relevant statutory powers, and … justifiable local exceptions, rather than in a blanket fashion".

It is therefore essential that a Local Plan aligns with the legal mandates of primary legislation, as well as taking national policy or statements as material considerations.

In local plan making, the NPPF plays an important role in setting the overarching set of principles by which the Inspector will conduct the Examination in Public of the submitted local plan, to see if the plan can be considered 'sound', before it can be adopted. A Local Plan is expected to align with the NPPF, which includes the overarching goal of achieving 'sustainable development' and the Local Plans' role in securing radical carbon emissions, among many others.

The role of the 2023 WMS in Local Plan formation is therefore as a 'material consideration', i.e. one of the relevant considerations that the plan must take to account in order to be found sound and adopted. Evidence submitted in support of Local Plan policy should therefore clearly outline the justification where there is a departure from national policy or statements.

Defining net zero carbon buildings

If carbon emissions are not consistently accounted for, there will be a risk of not reducing emissions but simply displacing them – or failing to account for the full emissions of new development.

When devising local plan policies for Swale, it will be vital to make sure those policies use a definition of 'net zero carbon development' that fully contributes to the achievement of a net zero carbon Swale and net zero carbon UK and aligns with the UK's legal mandate under the Climate Change Act 2008.

Operational energy and carbon: Building Regulations Part L (and the Future Homes Standard)

Building Regulations Part L sets the minimum national standard of operational energy and carbon performance of new buildings. It only covers "regulated energy uses": space heating, hot water, fixed lighting, fans, pumps and ventilation. It does not regulate other energy uses in the building, for example appliances or plug-in lighting. These *unregulated* energy uses can be 50% of a building's total energy use[ix], or between 23%-54% of a building's operational carbon[x]. This means a 'zero carbon' building using Part L is not truly zero carbon.

Over time, the target emissions rate (TER) set under Part L has been reduced, with the current version of Part L (2021) representing a target emission rate 31% lower than 2013 standards. Looking forward, The Future Homes Standard, expected to arrive in 2025, should deliver a further 75% reduction of in carbon emissions against the Part L 2013 baseline.

The current version of Part L in place is Part L 2021, which came into force in June 2022. Prior to this, Part L 2013 was in place from 2013-2022. The next update due to Part L is the Future Homes Standard (FHS) (or Future Buildings Standard, FBS, for non-residential) which Government has indicated will be introduced in 2025. However, it is not yet clear which of the two proposed options outlined in the 2023 consultation will be selected.

Part L works by modelling an imaginary ('notional') building of the same shape and size as the proposed building, with a certain minimum set of building elements applied (such as the amount of insulation, airtightness, the type of heating system, and the amount of solar panels). This sets the target limits for energy use and carbon emissions that the proposed building must meet. This means the targets vary by the shape and size of the building, as shape and size strongly affect how much heat is lost through external walls, roofs and joins. The FHS will update the standards in that 'notional' building – for example a heat pump instead of gas. However, the latest consultation[xi] shows that neither of the proposed options will improve the insulation or airtightness.

Compliance with these targets is established through a calculation method titled 'SAP', in homes, or 'SBEM' in non-residential buildings (see glossary). Part L sets the following targets:

- TER, Target Emission Rate: A carbon emissions metric. All building types (residential and non-residential) are subject to a TER.
- TPER, Target Primary Energy Rate: A measure of energy consumption of the building, taking into account the 'raw' energy that was used up in order to generate and transmit the energy used by the building (including the losses in converting one type of energy to another – for example burning gas in power stations to produce electricity – and the losses that occur in transmission of gas or electricity through the grid before it reaches the home). TPER also applies to all building types.
- TFEE, Target Fabric Energy Efficiency: A measure of energy demand for *heating and cooling*, based only on the building's fabric, irrespective of the heating system efficiency.

Additionally, the SAP or SBEM calculation methods can be used to extract other pieces of estimated data for a building, such as space heat demand or total energy use (for example, both of those were estimated using SAP10.2 in the 2023 modelling by the Future Homes Hub). However, these other data points are not part of the compliance metrics that Part L requires.

Unfortunately, even for the regulated energy uses, SAP and SBEM are not accurate predictors of a building's actual performance. In operation, buildings have been repeatedly documented to use far more energy than the SAP or SBEM methods predicted[xii,xiii,xiv]. This difference between SAP/SBEM-predicted energy performance and *actual* performance in use is termed in industry the 'Energy Performance Gap'. This is not common knowledge for home renters or purchasers, who may rely on the EPC certificate (which reflects the building's SAP calculation). In particular, space heat demand is dramatically underestimated by SAP[xv,xvi]. This is a real problem for climate mitigation given the aforementioned importance of the 15-20kWh/m^2/year space heat demand within the UK's route to hit its legislated carbon budgets.

Although SAP also contains an 'Appendix L' that tries to calculate unregulated energy use too, this overestimates the unregulated energy use[xvii] because it is based on outdated data about the efficiency of appliances. That data was collected many years ago and does not reflect the much more efficient typical appliances of today. Still, the *over*estimation of unregulated energy use does not fully balance out SAP's *under*estimation of space heat demand and total energy use.

Government has stated that when the Future Homes Standard is introduced, SAP will be replaced with a new model named HEM. As only an early-stage consultation version of HEM has been released to date, it remains to be seen whether HEM will avoid the inaccuracies of SAP.

The current Part L 2021 and FHS do not deliver the 15-20kWh/m^2/year space heat demand limit found to be necessary by the Committee on Climate Change as previously noted. To achieve that limit, improved fabric would be needed. This is true whether calculated with SAP (for example see the Future Homes Hub 'Ready for Zero' report and appendix[xviii]) or a more accurate energy prediction method[xix,xx]. The 'Ready for Zero' work shows that a building fabric similar to that of Option 1 in the recent FHS consultation would result in a space heat demand of up to 54 kWh/m^2/yr depending on home type, even before taking into account SAP's underestimation of this.

Despite the Committee on Climate Change recommendation for "rapid and forceful pursuit of zero-carbon new-build"[xxi], the current Part L 2021 and the FHS do not make buildings net zero carbon. Government has described the FHS as "zero carbon ready", but this only means the building will be all-electric (no gas) and thus will eventually get to net zero carbon only when the national electricity grid is entirely zero carbon. Also, the latest FHS consultation[xxii] shows that one of the options under consideration would have heating bills twice as high as a current new build home, due to switching from gas to electric heating without improving fabric at all.

Beyond Part L compliance, there are other more accurate methods that are used in the more forward-thinking parts of the buildings industry to better predict the energy performance of a given building design (and to improve it):

- PHPP: Passivhaus Planning Package. Can be used for any building. Does not require the pursuit of Passivhaus certification; can be used as a standalone tool.
- CIBSE TM54 (Technical Memorandum 54 by the Chartered Institute of Building Services Engineers). Intended for use primarily with non-residential buildings.

The use of PHPP outside the cutting-edge of the sector is in the minority, but growing. However, TM54 is recognised in Part L 2021 as a suitable method for the 'energy forecasting' that is now legally mandatory for non-residential buildings of 1,000m^2 or greater size[xxiii]. This means TM54 can be said to comply with the Planning & Energy Act definition of 'energy efficiency standards' as ones that are 'endorsed or laid out by the Secretary of State' (paraphrased). However, Part L 2021's requirement for energy forecasting is not linked to the achievement of the actual *targets* set by Part L (TER, TPER, and TFEE, as previously noted).

Regarding embodied or whole-life carbon of buildings (the carbon emitted in order to construct the building (including material extraction, product manufacturing, transport of materials to site, use of energy during construction): National Government has continued to neglect this despite opportunities to implement it. For example, a forward-thinking industry coalition in the development sector drafted and proposed a "Part Z" to building regulations. This was then put forward by a House of Lords member as an amendment to the Levelling Up & Regeneration Act but was never debated and thus never implemented.

In the absence of any action by national government to introduce mandatory standards for whole-life carbon, the industry has acted to develop these. There is a single formal established standard for the accounting of whole-life carbon (BS/EN15978) and this has been translated into a methodology or 'Whole Life Carbon Assessment' by RICS. In turn, forward-thinking bodies and coalitions within the industry have developed benchmarks and targets using that RICS methodology, differentiated by building type. The prominent examples are the RIBA and LETI aligned carbon targets[xxiv]. Given that target-setting policy is necessary on embodied carbon in order to fulfil the UK's carbon budgets, and given the absence of any national government standard with which local policy needs to be consistent, there is a clear role for the local plan to play and no reason why the LETI/RIBA targets could not be adopted if feasible and viable.

Two main types of approach to net zero carbon buildings policy – and their variations, strengths and weaknesses

There are two broad categories of policy that extant and emerging local plans in other local authorities fit into with regards to requiring enhanced energy and carbon performance in new buildings:

- Policy type 1, Using building regulations metrics: Policies that require a % improvement on the Target Emissions Rate that is set by Part L of building regulations (in some cases is a 100% reduction) and/or improvements to be demonstrated in other Part L metrics.
  - Adopted examples: London Plan 2021 policy SI 2; Milton Keynes 2019 policy SC1; Reading 2019 Policy H5, Warwick Net Zero Carbon DPD 2024; many others.
- Policy type 2, 'True net zero operational carbon' using energy-based metrics: Policies set fixed energy efficiency targets in terms of 'space heat demand' and 'total energy use intensity' (EUI), and renewable energy provision to match 100% of the development's total annual energy use. This follows the recommendations of expert green building coalitions LETI and UKGBC.
  - Adopted examples: Cornwall, Bath & North East Somerset; Central Lincolnshire.

In addition to the operational carbon policy types described above, there is one adopted and several emerging local plans that require reporting and/or specific targets in embodied carbon. In some cases, the 'embodied carbon' can also include the maintenance and eventual demolition/disposal of the building at end of life – in which case the scope is termed 'whole life embodied carbon'. If the 'embodied carbon' scope is only considered up to building completion, that is termed 'up-front embodied carbon'.

There is no current national building regulation that regulates embodied carbon, nor any nationally described standard for reporting it. However, the industry has developed its own standards for reporting on embodied carbon (the RICS Whole Life Carbon Assessment methodology). The London Plan is the most well-known adopted example that requires whole-life carbon reporting, yet it does not set any targets that must be met. The only precedent plan that we are aware of that sets such a target is Bath & North East Somerset (B&NES) Local Plan Partial Update (adopted 2023).

Existing buildings

It is not yet known when the Government will phase out the installation of gas boilers in existing buildings, which is currently muted for 2035. The Committee on Climate Change has shown (and Government has recognised) that in order for the UK to meet its legally binding carbon reduction goals, it is vital that the existing building stock must be decarbonised via three main courses of action:

- Upgrades to building fabric and other energy efficiency measures
- Switching from gas or oil boilers to low carbon heating (largely heat pumps; some heat networks; and a small role for hydrogen in some areas in the future)
- Decarbonisation of the electricity grid via increases in wind and solar electricity generation to allow phase-out of fossil fuelled power stations.

In respect of existing buildings, the variety of types, ages, uses and conditions of existing buildings make it impractical to devise universal requirements for their energy and carbon performance that could be reasonably sought through local plan policies. Local plans also have only a very limited influence on the carbon and energy performance of existing buildings, as they can only seek changes to buildings where the building owner is seeking to require a change to the building that requires planning permission. However, Local Plan policies can be used to support retrofitting by providing positive weight to proposals that improve fabric efficiency, energy efficiency and lower carbon emissions in existing buildings, including seeking alternatives to fossil fuel heating.

Local Plans, in combination with embodied carbon themes, can also place greater weight to the retention, reuse and refurbishment of existing buildings in recognition of the embodied carbon they have inbuilt in the structures, and the cause of new emissions in replacing existing buildings.

Summary of policy objectives

To summarise the key ingredients for a policy that would ensure it thoroughly fulfils the local plan's legal duty to mitigate climate change:

- **New development's energy demand must be minimised** so as to minimise the needed amount of new renewable energy generation and grid reinforcement, given that all other sectors' net zero transition (e.g. transport and industry) will also place high demands on the UK's finite capacity for renewable energy, and other land uses (e.g. afforestation and farming) – considering the limited land supply and the embodied carbon of new energy equipment. This energy efficiency is vital to protect people from excessive energy bills in the ongoing cost of living crisis.
- **New development should not use fossil fuel on site** given that the UK needs to transition its building stock away from gas, not add new gas users to the grid – and also given that heat pump technology exists that is three times as efficient as gas
- **New development should ideally come with enough new renewable energy generation to 'meet the energy used on site'**, so that it does not worsen the existing huge challenge of weaning existing buildings, transport and industry off fossil fuel to electricity – when this condition is met, the building is 'net zero carbon in operation'. Evidence found in other existing and emerging local plan precedents elsewhere (Uttlesford/Essex, Greater Cambridge, South Oxfordshire & Vale of White Horse, Central Lincolnshire, Cornwall, Bath & North East Somerset) showed this is feasible in an array of typical types of building, so long as the building is energy efficient as above.
- **The energy/carbon metrics used in Building Regulations are unsuited to deliver the performance described above** therefore other more accurate methods are needed. As the national carbon budgets are absolute, the performance standards for new buildings should also be absolute limits, not percentage improvements on standard practice.
- **Therefore, the ideal policy for climate purposes would adopt absolute targets** for space heat demand, total energy use intensity per square metre, and 100% renewable energy on site (or payment towards off-site installation), and that all of the above should be demonstrated using an energy modelling approach known to be typically accurate in predicting the building's total energy performance. This approach has been taken in several successfully examined and adopted local plan precedents (Central Lincolnshire, Cornwall, Bath & North East Somerset) albeit these were examined and adopted prior to the Written Ministerial Statement 2023.
- **In light of the Written Ministerial Statement of December 2023, the robustness and thoroughness of evidence on feasibility and viability will be even more vital** in order for any energy efficiency policies to successfully pass examination.

A truly comprehensive plan for buildings' climate mitigation would also include mandatory reporting and targets for embodied carbon. Embodied carbon policies are not affected by the Written Ministerial Statement 2023. However, the local planning authority will need to exercise its own judgement on what size threshold would be reasonable to require either reporting or targets, using the local authority's insight into the typical size and type of development in the area and the viability headroom to cover the cost of an embodied carbon assessment.

Policy recommendations

Swale Borough Council has been informed on a range of potential broad policy options, set out in the diagram overleaf, in light of the 2023 WMS in addition to the range of other material considerations and evidence. The options that have been presented to SBC are displayed in the diagram overleaf. Upon review of the issued outputs and further liaison between Bioregional and SBC, **Option 3 has been selected by SBC as the preferred policy approach.**

The following policy recommendations are therefore a more detailed iteration of Option 3. Recommendations expand upon what was presented to SBC as part of Output i.

The previous exploration of three different policy approaches addresses the requirement of local plans to explore reasonable alternatives prior to selecting a preferred policy suite. The approaches were assessed by determining risk levels on the following topics:

- **Planning powers**
- **Climate impacts**
- **Cost and future disruption to occupants**
- **Impact on grid capacity/infrastructure**
- **Ability of Development Management to assess policies**
- **Sector readiness**
- **Viability/capital cost**
- **Compatibility with national approach [e.g. policy goals, legislated goals, and technical standards]**

Option 3 was selected by SBC as a result of balancing risk levels among topics, of which 'climate impacts' and 'cost and future disruption to occupants' were given significant weight in the decision-making process. The selection of Option 3 results in higher risk of compatibility to the 2023 WMS, yet SBC are confident that sufficient evidence is provided through this study to justify departure from the statement. Industry consensus is that policies as per Option 3 should still be pursued and are defensible at examination.

Due to viability constraints, the embodied carbon policy approach in Option 3 has been slightly reduced in level of emissions reductions to remain viable.

Potential policy approaches considered by SBC

Least effective for climate ⟷ Most effective for climate

1. WMS compliant	2. Test the boundaries of the WMS	3. Industry best practice (beyond WMS)
63% TER improvement from energy efficiency measures	63% TER improvement from 'energy efficiency features' (And *guideline-only* targets and reporting for energy use intensity & space heat demand)	Energy Use Intensity and space heating demand limits
Use of a quality assurance methodology to reduce the energy performance gap in practice		
On-site renewable energy generation to get to 100% TER reduction (equivalent to matching total ***regulated*** energy use)	On-site renewable energy generation to match total energy use (***regulated and unregulated***, calculated using Building Regs methods)	On-site renewable energy generation to match total energy use (***regulated and unregulated***, calculated with more accurate methods)
Offset any remaining regulated carbon emissions (£/tCO_2)	Offset any shortfall in on-site renewable energy generation (£/MWh)	Offset any shortfall in on-site renewable energy generation (£/MWh)
Report on embodied carbon for major development LETI embodied carbon targets set as limit for large-scale development	Report on embodied carbon for major development LETI embodied carbon targets set as limit for large-scale development	Report on embodied carbon for major development LETI embodied carbon targets set as limit for large-scale development

Relevant policy themes

Operational energy

Operational energy is an area of policy development where the local plan can push boundaries and ensure the provision of buildings that are fit for the future, both in terms of reduced energy consumption and holistic integration of design decisions that address climate adaptation.

As explored in Output i, recent examples have detached from the previously typical CO_2 % reduction approach that had been driven by metrics used for Building Regulations compliance. These examples now assess operational energy based on three key metrics:

1. **Space heating demand**

Space heating demand simply represents the thermal energy efficiency of a building, which is primarily controlled by insulation properties of external and internal building elements, air tightness and thermal bridging. Unlike EUI, space heating demand is agnostic to any technology that requires powering within a building; rather the space heat demand metric is a measure of how many units of heat are required to provide sufficient comfort levels for occupants of the building. Whatever technology is used, whether this is a heat pump or gas boiler, will not change the space heating demand value as it is solely based on the fabric efficiency of the building.

2. **Total energy use (Energy Use Intensity)**

This is the total energy consumption of the whole building, measured in kWh/m^2/year. Energy Use Intensity (EUI) takes account of regulated *and* unregulated energy. This is important because the scope of Part L of Building Regulations does not include unregulated energy, meaning any policy based on Part L cannot result in a truly net zero building.

It is a crucial metric because it can essentially prevent inefficient heating technologies (e.g. gas boiler or 'direct electric') from being used in designed buildings that are aiming to achieve policy compliance – setting the right value can therefore implicitly ban inefficient technologies as compliance with an EUI requirement is not possible due to significant energy use inefficiencies. For example, for one unit of energy used, a gas boiler will produce slightly less than one unit of heat (or a direct electric heater will produce one unit of heat), whereas a heat pump will produce three units of heat. Therefore, the heat generation proportion of the final EUI value will be three times less with a heat pump when compared to gas boiler or electric, to produce the same amount of heat. This saves bills for the occupant, and puts less stress on the electrical grid than if the building were to use direct electric heating.

3. **On-site renewable energy generation**

Under this energy-based policy approach – instead of a carbon-based approach – with these three key metrics, on site renewable energy generation typically is set at a level that requires equivalent annual on-site generation to match annual total energy use. This final metric therefore provides the final piece in achieving a low energy consumption, energy efficient, net zero energy (and therefore net zero operational carbon) building.

The lower the required EUI limit in policy, the less on-site renewable generation is needed to reach an on-site net zero energy balance. Generation is most easily achieved via rooftop PV.

Key benefits from the approach taken in this theme include:

- A truly operationally net zero building
- Low energy consumption
- Zero fossil fuel use
- Significantly reduced operational costs for residents
- Reduced reliance on grid decarbonisation
- Simple post-occupancy monitoring to understand performance gap
- Potential for decentralised energy networks
- High levels of building comfort for occupants

Embodied carbon

Operational energy policy requirements are gradually becoming more consistently set at levels necessary to align with UK carbon budgets and its eventual 2050 net zero target. However, as operational energy and carbon are reduced, the proportion of embodied carbon becomes larger than ever as a share of the building's lifetime carbon emissions. This means that reductions to embodied carbon will require increased attention going forward.

The definition of net zero is key when considering operational and embodied carbon, since a truly net zero carbon building (over its entire lifetime) would require zero embodied and operational carbon emissions. The vast majority of nominally 'net zero' buildings today only consider operational emissions. In working towards a wholly net zero carbon building, local plan policy would need to address embodied carbon with equal weight, if not more, than operational energy/carbon policy.

A number of local authorities have now implemented embodied carbon policies that require reporting for development above a certain threshold, typically only larger development. However, where viability allows, requirements for embodied carbon targets to be hit should be promoted and integrated into local plans.

Overheating and sustainable design

The link between overheating and operational energy is becoming ever important and must now be put at the forefront of local plan policy, simultaneously with operational energy and embodied carbon policies.

As climate change impacts worsen, particularly more extreme and more variable temperatures, the need for overheating assessments to be undertaken for new buildings is crucial for current and future occupant comfort. In particular, new buildings that meet ambitious space heating demand requirements (previously described) will be at increased risk of overheating due to the ability of the building to retain heat well. Clearly, throughout winter this is a key comfort benefit, yet during summer this can result in the opposite effect if not otherwise mitigated with measures to enhance ventilation and avoid excess solar gain, in warmer months. It is therefore paramount that overheating risk is sufficiently assessed and integrated into decisions throughout design stages to ensure high fabric efficiency standards are not achieved at the detriment of internal comfort and temperature levels.

In addition to addressing overheating with building-related measures, overheating mitigation measures can also be integrated alongside blue and green infrastructure policies. Benefits here are further intertwined, whereby overheating risks can be mitigated whilst also improving the biodiversity of a site. For example, green roofs, walls and trees are effective at reducing surface temperatures through natural shading and evapotranspiration.

Renewable energy and energy management

The UK grid is becoming increasingly powered by renewable energy, primarily through solar and wind technologies. This is a vital part of the UK's carbon reduction trajectory, which will need[1] near-total grid decarbonisation by 2035 and a mix that includes 80% renewables by 2050 while catering for a doubling of electricity demand between 2020 and 2050.

However, it is more important now than ever to ensure that the future energy network is resilient to increasingly variable weather patterns, which will require a balanced mix of generation and storage technologies. Without resilient energy networks at local and national levels, a reliance on fossil fuels will remain when solar and wind power generation is low due to weather constraints.

Partly due to the current rise in large-scale renewable energy installations, some local grid substations are at risk of reaching full capacity in coming years without infrastructure reinforcement investments. As the industrial, commercial, domestic and transport sectors continue to electrify (switching from gas, coal and oil) at increasing rates, local policy must support as best it can the development of smart grids and energy sharing networks to relieve pressure on local areas at risk of reaching full grid electricity capacity. On-site energy management systems will play an important role in achieving this, through the provision of battery storage alongside solar PV generation and enabling peak-demand response management systems throughout new buildings. A permissive policy approach towards applications for standalone grid-connected battery storage can also play a role in readying the energy system for the UK's renewable-heavy, electricity-led future.

As local renewable energy generation schemes become more prominent and take up a larger proportion of land, it is also important to ensure that adverse impacts are not inflicted on local communities. Therefore, whilst local policy should support renewable energy generation schemes as much as possible, it should also set criteria that mitigates potential negative impacts, such as addressing community co-benefits and improving biodiversity on-site.

[1] Committee on Climate Change (2020), The Sixth Carbon Budget: The UK's path to net zero.

Outline of recommended policies

The following policy recommendations have been split up according to development type or policy theme. This mix seeks to best ensure the utmost ease of policy implementation, considering the roles of developers/applicants and the Development Management team to respectively demonstrate and assess policy compliance.

This section sets out policy recommendations for:

a) **Net zero operational carbon new build in residential development**

b) **Net zero operational carbon in new build non-residential development**

c) **Sustainable design and adaptation principles**

d) **Embodied carbon and waste**

e) **Renewable energy development and infrastructure**

The recommended policies are organised in 'modules' which reflect requirements across the sub-sections of the title policy's objective. SBC may choose to redraft or relabel how the modules appear in the Local Plan, and we leave this at the Council's discretion according to how other local plan policies are presented. Where no threshold is stated, the policy recommendation applies for all new development.

Beneath each of the above policy recommendations, we provide commentary assessing the following:

- **Scope for future improvements in next local plan review**
- **Alignment with national policy (including 2023 WMS)**
- **Implementation considerations**
- **Development industry capability to deliver policies**
- **Development Management capability to assess policies**
- **Costs and feasibility**
- **Co-benefits**

A. Net zero operational carbon in new build residential development

All new build dwellings (use class C3 and C4) are required to submit an energy statement demonstrating that the development meets the following requirements:	
A1. Total energy use	≤ 35 kWh/m²/year GIA
A2. Space heating demand	≤ 15 kWh/m²/year GIA (or <20kWh/m²/year in bungalows only). The use of fossil fuels and connection to the gas grid will not be considered acceptable.
A3. On-site renewable energy	On-site annual renewable energy generation capacity to at least equal the predicted annual total energy use. Where an on-site net zero energy balance is not possible[2], it must be demonstrated that the amount of on-site renewable energy generation equates to ≥120 kWh/m$^2_{\text{projected building footprint}}$/year. Where a building in a multi-building development cannot individually achieve the requirements of A3, this shortfall is to be made up across other units on-site before energy offsetting (A4) is considered. Large-scale development (50 residential units or more) should demonstrate that opportunities for on-site renewable energy infrastructure (on-site but not on or attached to individual dwellings), such as solar PV canopies on car parks, have been explored. Renewable energy output should be calculated in line with MCS guidance for the relevant technology (expected to be PV in most cases).
A4. Energy offsetting	Only in exceptional circumstances and as a last resort where it is demonstrably unfeasible to achieve an on-site net zero regulated and unregulated energy balance, any shortfall in on-site renewable energy generation that does not match energy use is to be offset via a S106 financial contribution, reflecting the cost of the solar PV that will need to be delivered off-site. The energy offset price is set as £2.31/kWh[3]. This price is based on cost of solar PV data from the Department for Energy Security and Net Zero, and includes inflation and a 10% margin to enable administration of the offset fund to deliver off-site solar PV by the Council or its appointed partners. The price should be revised annually. This is set as a one-off payment, where the shortfall in annual on-site renewable energy generation is multiplied by the energy offset price.
A5. Reduced performance gap	An assured performance method must be implemented throughout all phases of construction to ensure operational energy in practice performs to predicted levels at the design stage.
A6. Smart energy systems	All proposals should demonstrate how they have considered the difference (in scale and time) of renewable energy generation and the on-site energy demand, with a view to maximising on-site consumption of energy generated on site and minimising the need for wider grid infrastructure reinforcement. This may include smart local grids, energy sharing, energy and thermal storage, demand-side response, vehicle-to-grid charging provision, and/or solutions that combine elements of the above.
A7. Post-occupancy evaluation	Large-scale development (50 units or more) is to monitor and report total energy use and renewable energy generation values on an annual basis. An outline plan for the implementation of this should be submitted with the planning application. The monitored in-use data are to be reported to the local planning authority for 5 years upon occupation.

Supporting text and notes

A1 sets a requirement for total energy use (or Energy Use Intensity) per m² per year, and such covers both regulated and unregulated energy use within a dwelling. The policy acts as a limit on the energy consumed within a building on an annual basis. A2 sets a requirement for space heating demand using the same metric. A2 is agnostic to any technology in the building for heating and is determined by the level of insulation and air tightness specified for the building, it is therefore driving fabric efficiency to ensure that demand for heat is minimised in the first place. Space heating demand is the number of units of heat required to sufficiently heat spaces within the building.

The purpose of A3 is to deliver an on-site energy balance on an annual basis, by providing enough renewable energy generation to equal the total energy use value in A1. The secondary requirement, using the kWh/m$^2_{\text{projected building footprint}}$/year, acts as a mechanism to ensure that on-site renewable energy generation is maximised where an on-site net zero energy balance is not feasible. The value set is aligned to roughly 70% of roof space being covered by high efficiency solar PV panels.

Policy elements A1, A2 and A3 are to be addressed at the design and post-completion stages, to ensure that the development has been built to intended standards. Post-completion resubmission of

[2] Exceptional circumstances where an on-site net zero energy balance is not achieved may only be found acceptable in some cases, for example with taller flatted buildings (4 storeys or above) or where overshadowing significantly impacts solar PV output.

[3] The price is determined from the median cost of solar PV bands of 4-10kW and 10-50kW, and assumes a conservative panel efficiency rate of 850kWh/kWp. These bands have been selected as they are likely to represent the scale of PV projects that the offset fund contributes to.

the original energy statement including energy performance calculations, informed by the relevant tests to systems and fabric, should be required as a condition as part of the planning application process. A5 and A7 compliance should also be demonstrated post-completion through planning conditions.

A1 – A7 are to be demonstrated at the planning application stage through submission of an energy statement, which should include associated output reports from energy modelling software (e.g. PHPP, or HEM when available for general use).

Steps to calculating and narrating amount of renewable energy provision

Policy A3 should contain the following steps, to be expressed in an energy statement:

- First calculate the total predicted annual energy use in kWh for all proposed new buildings (whole buildings, regulated and unregulated)
- This is to be modelled in PHPP. The Council may later take a view on whether the incoming Home Energy Model (HEM) is a suitable method for energy use prediction when the final form of HEM is available.
- Then calculate the annual renewable energy generation for whole site in accordance with the MCS guidance for the relevant renewable energy technology (anticipated to be solar PV in most cases as this is typically the most suitable technology in an urban setting). This does not have to be exclusively on the buildings themselves, and can include provision of new standalone renewable energy installations within the site. The figure does not include renewable heat delivered by heat pumps, as that would count instead towards Policy A1.
- Deduct the annual renewable generation from the annual energy use. The result should be zero or less.
- If the result is not zero or less, explore how to provide more on-site renewable energy (for example through an adjustment to roof orientation, and ensuring PV area provision has been explored up to at least equivalent of 70% of projected building footprint including roof overhangs and with reasonably efficient panels available on the market).
- If it proves unfeasible to increase renewable energy generation on-site to result in an annual balance of energy generation with energy use, then divide the total annual renewable energy generation by the building footprint. This result should be at least 120 $kWh/m^2_{\text{projected building footprint}}/yr$. If this is not possible, provide evidence as to why this is not possible even with a PV area equivalent to 70% of projected building footprint and reasonably efficient panels available on the market.
- Calculate the residual energy demand (whole building, not per m^2 because the offsetting price is set as £/kWh rather than £/kWh/m^2) for all proposed new buildings, then proceed to use this figure to calculate the required amount of offsetting provision in policy A4.

About the offsetting calculation

This is a one-off payment, where the annual shortfall in on-site renewable energy generation is multiplied by the energy offset price. Because the kWh energy use of the home, and the kWh of energy generation that the offset fund will install, are both annual figures, this amount does not need to be multiplied by any number of years.

The requirement for offsetting may be applied flexibly where it is demonstrated that this makes social and affordable housing unviable due to unique site circumstances that result in cost uplifts significantly higher than assessed in the Whole Plan Viability Assessment. The flexibility could include a reduction in the scope of energy that has to be offset, or a discounted price per kWh if the Local Authority is confident it can still deliver the required offset projects within this price (when pooled into the offsetting fund which will primarily consist of full-price offset contributions). This could be determined by testing the cost of solar PV for a specific scheme if there is a pipeline of projects available to be funded by the offset payments. Full price offsetting should still be applied to market housing where the proposal includes both market and social housing. The degree of flexibility will depend on the unique scheme characteristics and evidence submitted to the local authority about what could be viably accommodated.

About assured performance methods

These are processes to follow throughout design, construction, commissioning and building handover that reduce the energy performance gap (the gap between predicted energy use and actual energy use). These not only help keep the building's actual carbon emissions to a minimum (as opposed to their predicted emissions using inaccurate methods like SAP), but they also help to ensure occupant satisfaction. Suitable methods include BSRIA Soft Landings, NEF/GHA Assured Performance Process, and Passivhaus certification. Other processes may be available or become available during the course of the plan. Alternative processes proposed by the applicant will be subject to consideration by the Council about their evidence-based merits. There are also some additional tools in the industry which are not in themselves an assured performance process but can assist in improving the energy performance of a building in-use, such as BS40101.

Applicability to outline applications

Compliance with the policies will be conditioned at outline stage and must be confirmed in detailed reserved matters. However, the Council accepts that the degree of detail provided in the outline energy strategy will be less than for full and reserved matters applications. It is also recognised that this means the outline energy calculations may be largely based on assumptions. The aim should be to demonstrate that options have been identified by which the development could comply with the policy targets, taking into account the broad mix of anticipated floorspace, typologies and site conditions. Statements made about estimated carbon and energy performance based on a high degree of assumptions at outline stage should be reassessed at detailed reserved matters, albeit the reserved matters may diverge in *how* the required compliant performance will be achieved.

Where more detail is known, it should be reflected in the outline application; for example if expecting to connect to a site-specific low-carbon energy source. For a further example, if expecting a limited number of repeated home types, then the energy modelling would ideally reflect similar archetypes and identify a specification by which they could meet the policy targets for energy efficiency and renewable energy (taking into account site conditions). The modelled homes could reflect, for example, a sample of a relevant housebuilder's 'products' most likely to be built on site. This exercise benefits the developer in that it gives an early understanding of the degree of amendment needed to their existing regular specifications, allowing them to set up supply chains and economies of scale well in advance of commencing on site.

The estimated offsetting contribution of outline applications should be stated in the outline Energy Assessment. These will be subject to a Section 106 agreement, but not paid at the time of the outline application. In that case the offset contribution must be recalculated within the subsequent reserved matters application, and paid on or prior to commencement of works on site for the reserved matters scheme (phase of the development). The reason for payment into the offset fund prior to commencement of works is so that the offset fund administrators are able to deliver the offset projects on a timescale not too dissimilar from the timescale for completion and occupation of the development. The aim is to enable, wherever possible, the offsetting project to be producing renewable energy no later than the development's occupants begin to place their demands on the grid.

Scope for future improvements

Policies A1 and A2 could be improved by further reducing the targets for Energy Use Intensity and space heating demand, but this is currently not seen as necessary as the targets are broadly aligned to the current industry best practice (e.g. UK Net Zero Carbon Buildings Standard). Policy A6 could be revisited in future to increase requirements on smart energy solutions depending on how the industry evolves over coming years and what technologies are available in future.

Alignment with national policy

Crucially, all of the policy modules are aligned with the Climate Change Act 2008, since their implementation works towards achieving the legally-binding UK target of net zero by 2050, as set out by the Climate Change Act 2008, and carbon budgets subsequently legislated under the aegis of that Act. These associated carbon budgets are linked to the Climate Change Committee's Balanced Pathway to Net Zero report, which in turn is supported by analysis by the CCC that sets out that all new buildings must be net zero by 2025. Efficiency is key in the delivery of net zero homes, with the CCC recommending a heat demand between 15-20 kWh/m^2/year which aligns with policy module A2.

The Planning and Energy Act 2008 sets out that local standards for energy efficiency in new homes are able to exceed those set in Building Regulations.

The use of no fossil fuels in A2 is aligned to the Government's direction of travel indicated by both the options proposed in the Future Home Standard 2023 consultation, in that no fossil fuel heating systems are proposed.

In the context of the 2023 WMS, explored in detail in the Literature Review (Output i), A1 and A2 policies are not aligned with the requirement in the WMS that requires policies to use the Target Emissions Rate metric of Building Regulations, if policies are to exceed Building Regulations standards. Policies A3-A7 are not impacted by the 2023 WMS as it only applies to energy efficiency standards. A1 and A2 are the only policy recommendations that relate to the energy efficiency perceived constraints of the 2023 WMS. A3 and A4 are not impacted because they address renewable energy, which is out of scope of the 2023 WMS.

As set out in Output i, there is significant scope for local authorities to depart from the requirements of the 2023 WMS where local circumstances are demonstrated. Local circumstances are demonstrated on p.16 (*The role and commitments of Swale Borough Council*) of Output i, through the Borough's net zero target date of 2030. The SCATTER trajectory also demonstrates that urgent reductions are required at a local level.

Demonstration of local circumstances was explicitly addressed in a recent study produced for South Oxfordshire & Vale of White Horse. The study demonstrated local circumstances for a policy suite led by absolute energy metrics through determining a carbon budget for the operational carbon of new housing in the districts. The carbon budget is aligned to the net zero target of 2045 that both districts set under their climate emergency declarations. The study then explored whether the existing draft policy, using absolute energy metrics such as for policies A1 and A2, and WMS-compliant policies were sufficient to remain within the carbon budget.

It was found that only the draft policy was sufficient to remain in line with the carbon budget, whilst the WMS-compliant scenarios resulted in emissions significantly higher than required to sufficiently contribute to the 2045 net zero target. Given that Swale's equivalent net zero target for the Borough is 2030 and more urgent than in South Oxfordshire & Vale of White Horse, there is no doubt the same results would be given under an equivalent study for Swale.

Another important argument found in this study was that the expected emissions from existing buildings are already likely to exceed the carbon budget for the districts by 480%. This reiterates the point that, due to the challenges posed by existing buildings to reduce their emissions at net zero aligned rates, no carbon budget should be apportioned to the new build sector because the overall built environment carbon budget is already highly likely to be exceeded without any input from new buildings. A wholly compliant policy with the 2023 WMS cannot result in zero emissions because the metric required in the WMS only accounts for regulated carbon and therefore leaves scope for emissions to be produced from unregulated energy uses. Therefore, to align with local and national net zero target dates, policies A1 and A2 are undoubtedly required.

Implementation considerations

To support these policies, it is vital that supplementary guidance is provided for the benefit of Development Management officers and the development industry. This is particularly important because specific information for policy compliance must be set such as:

- Examples of assured performance
- Acceptable scenarios where exceptional circumstances are valid for A3 and A4
- Methodologies and assumptions for energy performance calculations (this could explore in more detail the suitable methodologies outlined within the suggested policy text above).

Implementation may also be aided by setting validation criteria/checklist for applications to ensure they are including the right information with their planning application.

Information on the mechanisms of energy offsetting for A4 will need to be included in a planning document that addresses planning obligations.

For A3, renewable energy installations will need to be accompanied with calculations of expected outputs required under the policy by an MCS certifier, which should be set as a planning condition. This is to ensure renewable energy technology has been correctly installed and operates at the predicted output sufficient to deliver an on-site net zero energy balance.

Industry capability

Assuming SBC undertakes appropriate engagement with developers operating in the area throughout the local plan process, the local development industry should be well prepared to deliver on these policies. The policies require enhanced care and detail to be applied through design and construction phases but do not introduce any new skills not currently known and utilised by developers.

The standard of insulation and glazing typically required to achieve A1 are aligned to those set out in the indicative specification for the Future Homes Standard (FHS). Therefore, the development industry should be well prepared to deliver on these policies, particularly as the FHS is understood to be planned for implementation in 2025, and the SBC Local Plan planned for adoption in 2026.

Development Management capability

The capability of Development Management officers to accurately assess these policies is reliant on the degree of training and guidance documents available. It is essential that officers have guidance on hand to assess policies against to ensure that compliance is achieved in accordance with methodologies set out in a subsequent guidance document. Specific upskilling of at least one officer on climate change policies to gain a technical understanding will greatly assist the overall ability of the team to assess policy compliance.

Training for Development Management officers on technical processes involved with net zero carbon development can strengthen internal capabilities to assess whether applications may have submitted over-optimistic building performance values for the sake of policy compliance. These may include:

- Understanding of modelling techniques and tools (e.g. PHPP, HEM)
- Building elements energy performance values (e.g. U-values)
- Low- and zero-carbon heating and ventilation systems/technologies
- Orientation, form factor and design features for solar PV generation

Costs and feasibility

Task 3 of the evidence base produced for South Oxfordshire & Vale of White Horse explores the feasibility of policy requirements. Detached, semi-detached, terraced and flats were all tested as archetypes against metrics set out under A1 – A3. The specific standards set out under A1 – A3 have all been found to be feasible and achievable for these dwelling architypes.

The feasibility of policies A1-A3 is also demonstrated by evidence bases cited in Output i, including Central Lincolnshire (2021[xxv]) and Essex (2023)[xxvi]. As in the South Oxfordshire & Vale of White Horse evidence, the other two studies show that it is possible to match total energy use, including unregulated, on a variety of residential building types up to about 3-4 storeys that meet best practice energy efficiency standards. They also show it is possible to do this in buildings taller than this if optimal energy efficiency is achieved and/or the roof is optimised for PV generation (for example, a monopitch roof facing south). Buildings above this height may struggle to match their own energy use on site and therefore a height over 4 storeys may be considered an acceptable reason for at least partially following the offset route rather than complying entirely on-site.

The feasibility of meeting policy A3 on site will vary by the height of the building. Lower-rise buildings will find it more feasible because they have more roof space (for PV) compared to floor space. Where this becomes a problem, the policy suite offers an alternative route to compliance through Policy A4 (energy offsetting).

No additional cost uplift is assumed for A4 because the offset price is set as the current cost of solar PV and therefore poses no additional cost to what is required on-site to comply with policy A3. Therefore, no change in cost is evident between installing a sufficient amount of solar PV on-site or off-site.

The target of 120 $kWh/m^2_{\text{projected building footprint}}$/year was selected as follows: Several other local plans' energy modelling evidence (Central Lincolnshire, Essex, South Oxfordshire & Vale of White Horse) has evidenced that a target of in those locations with a PV area approximately equivalent to 60-70% of the building footprint area using current typical PV panels (and the area required will reduce as PV technology improves in future). According to the Global Solar Atlas, the specific solar PV output potential of Swale (1,094 kWh/kWp) exceeds that of South Oxfordshire & Vale of White Horse (1,030 kWh/kWp). Therefore, the 120 $kWh/m^2_{\text{projected building footprint}}$/year value is proven to be feasible in Swale as it was in South Oxfordshire & Vale of White Horse.

Task 4 of the South Oxfordshire & Vale of White Horse evidence base explores the costs associated with the policy requirements set out above. To achieve A1 – A3, the following cost uplifts (from Part L 2021) are incurred:

- Detached: 4%
- Semi-detached: 6%
- Terraced: 7%
- Flats: 6%

In the draft Viability Assessment (May 2024) produced by HDH Planning and Development Ltd., a limit of 8% is set for net zero carbon policy to remain viable across development types. As seen above by the residential capital cost uplift values stated, all development types remain comfortably within the 8% limit set. For clarity, the energy performance standards set out in Task 4 of the South Oxfordshire & Vale of White Horse study are identical to those set out under A-suite policies, which means the cost uplift values are directly transferable to this study. According to the draft Viability Assessment, we can therefore assume that the policies A1-A3 are viable.

No additional cost uplift is assumed for A4 because the offset price is set as the current cost of solar PV and therefore poses no additional cost to what is required on-site to comply with policy A3. Therefore, no change in cost is evident between installing a sufficient amount of solar PV on-site or off-site.

Cost uplift from Part L 2021

	Part L 2021	Future Homes Standard (2022 Consultation)	Zero operational carbon
Fabric	£0	£1,312	£4,936
Services	£0	£3,082	£3,082
PV	£0	-£4,291	-£931
Total	£0	£103	£7,087

The table above, taken from Task 4 of the South Oxfordshire & Vale of White Horse evidence base, shows the breakdown of capital cost uplifts from Part L 2021 of fabric, services and on-site renewable energy generation (i.e. rooftop solar PV) for a semi-detached home. The zero operational carbon scenario directly represents policies A1-A3. The study the table is presented in predates the 2023 FHS consultation. However, the FHS scenario tested broadly aligns with the specification set for Option 2 under the most recent 2023 FHS consultation.

A similar breakdown can be seen for other residential archetypes. Uplifts are most significant for fabric and services improvements whilst the integration of solar PV on-site is in fact less expensive than under the Part L 2021 scenario (i.e. current Building Regulations). This is because Part L 2021 requires that, where a building uses a gas boiler, 40% of the total floor area is covered by solar PV. As policy A1 limits energy consumption to a level far lower than Part L 2021, the amount of solar PV required on-site to create a net zero energy balance for the zero operational carbon scenario is lower than the 40% requirement under Part L 2021. The FHS scenario tested includes a heat pump but no solar PV, which is why there is such a significant difference between the capital cost of solar PV under the Part L 2021 and zero operational carbon scenarios.

Building value uplift

There is evidence that increased energy efficiency and on-site renewable energy in homes, as sought by policies A1-A3, delivers a value uplift which could be offset against the cost uplift to aid the viability of the scheme. This was evidenced in a 2021 study by Lloyds/Halifax[xxvii], which looked at actual home sale value across all regions of England and Wales, not just surveys of willingness to pay. It expressed the sale value uplift in terms of the % difference between EPC bands. The increase is greater between EPC bands at the lower end (for example a 3.8% value increase from EPC G to EPC F) but there is still an uplift between higher bands (an uplift of 2% from EPC C to EPC B, and an uplift of 1.8% from EPC B to EPC A). All of these values are the average across England and Wales; however, the study confirms that the uplift was evident in all regions and therefore should be reasonably applicable to SBC.

Please note that increased sale value does not necessarily translate proportionally into increased cost of owning and running a home, due to the running cost savings on energy bills that can be achieved via the improved energy efficiency (policies A1-A2) and the on-site solar generation (draft policy A3).

Co-benefits

There are benefits to occupants from setting the policy requirement A1 and A2, as to ensure that occupant bills are not excessive from the costs of running a low carbon heat system (e.g. electrified system) by reducing the overall heating demand through an improved fabric efficiency. Combined with recommended C-suite policies, this suite of policies aims to support new buildings which can support occupant health and well-being by creating more comfortable buildings and greater comfort with less fluctuation in temperatures and reducing financial stress (occupant bills costs). Additionally, improved energy efficiency in homes translates into fewer retrofit needs over time, reducing the future financial burden on homeowners to upgrade their properties to meet evolving energy standards. By reducing energy demand these policies can directly address fuel poverty. Lower-income households stand to benefit from reduced energy bills, which can free up income for other essential needs. Tackling fuel poverty is a key social benefit that aligns with SBC objectives and wider government goals to improve living standards, particularly in vulnerable communities

Annual running costs for semi-detached archetype

	Part L 2021	Future Homes Standard (2022 Consultation)	Zero operational carbon (incl low embodied carbon option)
Gas	£542	£0	£0
Electricity (net of PV generation)	£0	£1,259	£383
PV export revenue	£155	£0	£92
Standing charge	£303	£193	£193
Total	£689	£1,453	£484

Occupant energy bill savings are summarised in the table to the above and show the benefits of a zero operational carbon policy (i.e. A1-A3). The savings are assessed on an annual basis and are driven by the absence of gas bills, lower standing charge and benefits from solar PV exports. The electricity (net of PV generation) for Part L 2021 is £0 because a Part L 2021 building uses less electricity than the zero operational carbon scenario as it uses a gas boiler for heating, rather than an electrified heat pump. The overall operational costs of the zero operational carbon scenario exceed the Part L 2021 and FHS scenarios.

The drive for improved fabric efficiency has dual benefits both from a cost perspective, but also from an embodied carbon perspective as materials do not need to be replaced in a relatively short timescale. By ensuring buildings are future-proofed during the construction stage, policies A1 and A3 actively support the objectives of D-suite policies, which aims to minimise the whole-life carbon footprint of new buildings. The policies work in tandem to reduce the environmental impact over the building's lifespan, aligning with broader net zero ambitions.

Additionally, policies A3 would ease local grid stress by promoting on-site renewable energy generation, thereby matching energy demand more efficiently. In cases where full on-site generation isn't feasible, policy A4??? ensures any remaining energy demand is met through district-wide offsetting initiatives. This helps local authorities meet net zero goals while minimising reliance on external energy sources.

The benefits extend further when combined with policy A6, which promotes the use of smart energy systems. These systems enable buildings to store and use energy during optimal periods, reducing grid demand during peak times. For example, smart systems could manage the timing of electric vehicle (EV) charging or coordinate the use of high-energy appliances (e.g., washing machines or dishwashers) to coincide with periods of lower energy demand or higher renewable energy generation.

While upgrades to local electricity infrastructure may be required to accommodate the increased demand from electric vehicles and electrified heating systems, such upgrades are already anticipated as part of broader infrastructure planning. These improvements would largely replace the need for investments in outdated gas infrastructure. As a result, costs associated with these upgrades are not considered additional burdens but rather necessary steps in the transition away from fossil fuels. By promoting on-site renewable energy generation and energy storage systems, homes reduce dependence on external energy sources, which can be subject to price volatility and supply disruptions. This enhances the resilience of households to energy price hikes or shortages, offering greater energy security.

Furthermore, A-suite policies reduce the reliance and prohibit use of fossil fuels, especially natural gas for heating and cooking, leading to fewer emissions of pollutants like nitrogen oxides (NOx) and particulate matter (PM). This improvement in local air quality can have significant public health benefits, reducing respiratory issues such as asthma and cardiovascular diseases among residents.

Lastly, the requirement for homes to comply with this suite of policies helps stimulate the development of local skills and supply chains, contributing to growth in the green economy. By fostering demand for expertise in low-carbon construction techniques, renewable energy installation, and smart home technologies, the policies create new job opportunities and support local economic resilience. This approach aligns with the UK's wider economic goals for a just transition to a net zero economy, ensuring that the move towards sustainability also delivers social and economic benefits to communities.

B. Net zero operational carbon in new build non-domestic development

All new build non-domestic development (including C1, C2, C2a and C5) are required to submit an energy statement demonstrating that the development is net zero carbon in operation through the following requirements:

B1. Total energy use	Warehouses and light industrial: ≤ 35 kWh/m²/year GIA Offices: ≤ 55 kWh/m²/year GIA Schools: ≤ 55 kWh/m²/year GIA Retail: ≤ 35 kWh/m²/year GIA It is accepted that in some circumstances, unregulated energy loads for the specific use of a non-residential building may result in a total energy use that exceeds the limits set out above. In these cases, applicants are required to demonstrate that regulated energy is limited to 30 kWh/m²/year. Unregulated loads must be justified in an energy statement. Other building types (e.g. heavy industry, data centres etc.) or uses not listed are required to demonstrate that regulated energy is limited to 40 kWh/m²/year. Unregulated loads must be justified in an energy statement.
B2. Space heating demand	All building types and uses: ≤ 15 kWh/m²/year GIA The use of fossil fuels and connection to the gas grid will not be considered acceptable.
B3. On-site renewable energy	On-site annual renewable energy generation capacity to at least equal the annual total energy use. Where an on-site net zero energy balance is not possible[4], it must be demonstrated that the amount of on-site renewable energy generation equates to ≥120 $kWh/m^2_{projected\ building\ footprint}/year$. Where this is not achieved, it must be demonstrated to the satisfaction of the Council that this is due to unavoidable design issues such as natural lighting and utility space. Where a building in a multi-building development cannot individually achieve the requirements of B3, this shortfall is to be made up across other units on-site before energy offsetting (B4) is considered. Large-scale development (5000m² non-residential floorspace or more) should demonstrate that opportunities for on-site renewable energy infrastructure (on-site but not on or attached to individual buildings), such as solar PV canopies on car parks, have been explored.
B4. Energy offsetting	Only in exceptional circumstances and as a last resort where it is demonstrably unfeasible to achieve an on-site net zero energy balance, any shortfall in on-site renewable energy generation that does not match regulated and unregulated energy use is to be offset via S106 financial contribution, reflecting the cost of the solar PV delivered off-site. The energy offset price is set as £2.31/kWh[5]. This price is based on cost of solar PV data from the Department for Energy Security and Net Zero, and includes inflation and a 10% margin to enable administration of the offset fund to deliver off-site solar PV by the Council or its appointed partners. The price should be revised annually. This is set as a one-off payment, where the shortfall in annual on-site renewable energy generation is multiplied by the energy offset price.
B5. Reduced performance gap	An assured performance method must be implemented throughout all phases of construction to ensure operational energy in practice performs to predicted levels at the design stage.
B6. Smart energy systems	All??? Proposals should demonstrate how they have considered the difference (in scale and time) of renewable energy generation and the on-site energy demand, with a view to maximising on-site consumption of energy generated on site and minimising the need for wider grid infrastructure reinforcement. This may include smart local grids, energy sharing, energy and thermal storage, demand-side response, vehicle-to-grid charging provision, and/or solutions that combine elements of the above.
B7. Post-occupancy evaluation	Large-scale development (over 5000 m² floorspace) is to monitor and report total energy use and renewable energy generation values on an annual basis. An outline plan for the implementation of this should be submitted with the planning application. The monitored in-use data are to be reported to the local planning authority for 5 years upon occupation.

Supporting text and notes

B1 sets a requirement for total energy use (or Energy Use Intensity) per m² per year, and such covers both regulated and unregulated energy use within a dwelling. The policy acts as a limit on the energy consumed within a building on an annual basis. B2 sets a requirement for space heating demand using the same metric. B2 is agnostic to any technology in the building for heating and is

[4] Exceptional circumstances where an on-site net zero energy balance is not achieved may only be found acceptable in some cases, for example with non-residential buildings 3 storeys and above or where a specific use of the building results in a high unregulated energy load (e.g. research lab).

[5] The price is determined from the median cost of solar PV bands of 4-10kW and 10-50kW and assumes a conservative panel efficiency rate of 850kWh/kWp. These bands have been selected as they are likely to represent the scale of PV projects that the offset fund contributes to.

determined by the level of insulation and air tightness specified for the building. Space heating demand is the number of units of heat required to sufficiently heat spaces within the building.

Due to high variability of potential unregulated energy loads in non-residential buildings, B1 includes a regulated-only energy use limit to ensure that this scope of energy is limited to best practice levels, whilst high unregulated loads can be justified according to the specific use. This ensures that the core energy use of a building (from heating, cooling and lighting) is limited whilst not prohibiting non-residential applications that naturally have high unregulated energy loads, such as a hotel with a significant amount of estimated electrical plug-in equipment.

The purpose of B3 is to deliver an on-site energy balance on an annual basis, by providing enough renewable energy generation to equal the total energy use value in B1. The secondary requirement, using the $kWh/m^2_{\text{projected building footprint}}$/year, acts as a mechanism to ensure that on-site renewable energy generation is maximised where an on-site net zero energy balance is not feasible. The value set is aligned to roughly 70% of roof space being covered by high efficiency solar PV panels.

Policy elements B1, B2 and B3 are to be addressed at the design and post-completion stages, to ensure that the development has been built to intended standards. Post-completion resubmission of the original energy statement including energy performance calculations, informed by the relevant tests to systems and fabric, should be required as a condition as part of the planning application process. B5 and B7 compliance should also be demonstrated post-completion through planning conditions.

B1 – B7 are to be demonstrated at the planning application stage through the submission of an energy statement, alongside associated output reports from energy modelling software (e.g. PHPP).

About assured performance for energy performance

Regarding assured performance processes (B5), in addition to those mentioned in relation to the equivalent residential policy (A5) in residential, there is also one additional method for non-residential: NABERS UK (administered by CIBSE). NABERS is currently only available for offices but it is expected to be extendedto other building types in future.

About offsetting

The requirement for offsetting may be applied flexibly where it is demonstrated that this makes otherwise desirable development unviable due to the unique energy use profile of the proposed building and site characteristics, where this results in an offsetting cost uplift significantly higher than assessed in the Whole Plan Viability Assessment. The flexibility could include a reduction in the scope of energy that has to be offset, or a discounted price per kWh if the Local Authority is confident it can still deliver specific offset projects within this price. The degree of flexibility will depend on the unique scheme characteristics and evidence submitted to the local authority about what could be viably accommodated. It may also depend on the degree to which the proposed development represents a socially desirable facility that meets unmet community needs (such as for healthcare, education, or similar).

Please see also the supporting text for the equivalent residential policies (A1-A7) regarding:

1. **calculating renewable energy provision and offset payments,**
2. **applicability to outline applications, and**
3. **assured performance processes.**

Scope for future improvements

Policies B1 and B2 could be improved by further reducing the targets for Energy Use Intensity and space heating demand, but this is currently not seen as necessary as the targets are broadly aligned to the current industry best practice (e.g. UK Net Zero Carbon Buildings Standard). Policy B6 could be revisited in future to ramp up requirements on smart energy solutions depending on how the industry evolves over coming years and what technologies are available in future.

Alignment with national policy

All of these policy modules are aligned with national policy goals since their implementation works towards achieving the legally-binding UK target of net zero by 2050, as set out in the Climate Change Act 2008, and carbon budgets subsequently legislated under the aegis of that Act. These associated carbon budgets are linked to the Climate Change Committee's Balanced Pathway to Net Zero in the Sixth Carbon Budget report, which sets out that all new buildings should be zero carbon from 2025, with high levels of energy efficiency and low-carbon heat. It also found that non-residential buildings should phase out high-carbon fossil fuel boilers no later than 2026, and phase out gas boilers in 2030-33, less than 10 years from today (2024), while boilers have a typical lifetime of 15 years.

Therefore, new buildings today should not have gas boilers, to avoid the need for expensive disruptive retrofit less than 10 years after completion which would also waste embodied carbon (even if the need for 'net zero carbon new builds from 2025' did not already effectively rule out fossil fuel boilers). The policy supports these targets by prohibiting fossil fuel connection and improving energy efficiency, which mandate a heating technology similarly efficient to a heat pump (which a fossil fuel boiler cannot meet).

B2 is aligned to the Government's direction of travel indicated by both the options proposed in the Future Home Standard 2023 consultation, in that no fossil fuel heating systems are proposed. Although the FHS does not relate to non-residential buildings, it still represents the national policy direction. B3 and B4 are not impacted because they address renewable energy, which is out of scope of the 2023 WMS.

As stated for A-suite policies, Output i (p. 16; *The role and commitments of Swale Borough* Council) demonstrates local circumstances to show urgent carbon reductions are required at local level, summarised by the Borough's 2030 net zero target date. Enhanced carbon reduction ambitions at a local level are essential to support the national net zero target of 2050.

The 2023 WMS is directed at residential development and does not specifically state any requirements for non-residential buildings. Importantly, the key requirement of the WMS states that any improvements above Building Regulations should ensure that the policy is expressed as a percentage uplift of a *dwelling's* Target Emissions Rate, rather than a non-residential building's Target Emissions Rate. Additionally, the WMS asks for the standards to be expressed through the use of SAP, which is a methodology that only applies to residential buildings. Also, the concern that the WMS purports to address is that "multiple local standards [may] add further costs to building new *homes* … [and therefore] the impact on *housing supply* and *affordability* [must be] considered in accordance with the National Planning Policy Framework". The NPPF only discusses affordability in relation only to homes, not any other buildings.

To conclude, there is significant reference in the 2023 WMS to terminology such as dwellings and homes, whilst non-residential buildings are not explicitly referred to at all. Therefore, for the purpose of this study and setting absolute energy metric requirements for B-suite policies, it is assumed that the 2023 WMS does not apply to non-residential buildings.

Implementation considerations

To support these policies, it is vital that supplementary guidance is provided for the benefit of Development Management officers and the development industry. This is particularly important for B1, B2, B4 and B5 because specific information for policy compliance must be set such as:

- Examples of assured performance
- Acceptable scenarios where exceptional circumstances are valid for B3 and B4
- Methodologies and assumptions for energy performance calculations

Implementation may also be aided by setting validation criteria / checklists for applications to ensure they are including the right information with their planning application.

Information on the mechanisms of energy offsetting for B4 will need to be included in a planning document that addresses planning obligations.

For B3, renewable energy installations will need to be accompanied with calculations of expected outputs required under the policy by an MCS certifier, which should be set as a planning condition. This is to ensure renewable energy technology has been correctly installed and operates at the predicted output sufficient to deliver an on-site net zero energy balance.

Industry capability

With appropriate engagement with developers operating in the area throughout the local plan process, the local development industry should be well prepared to deliver on these policies. The policies require additional levels of skill to be applied through design and construction phases but do not introduce any new skills not currently known and utilised by developers.

Development Management capability

The capability of Development Management officers to accurately assess these policies is reliant on the degree of training and guidance documents available. It is essential that officers have guidance on hand to assess policies against to ensure that compliance is achieved in accordance with methodologies set out in a subsequent guidance document. Specific upskilling of at least one officer on climate change policies to gain a technical understanding will greatly assist the overall ability of the team to assess policy compliance.

Training sessions for Development Management officers on technical processes involved with net zero carbon development can strengthen internal capabilities to assess and scrutinise applications. These may include:

- Understanding of modelling techniques and tools (e.g. SBEM)
- Building elements energy performance values (e.g. U-values)
- Low-and zero-carbon heating and ventilation systems/technologies
- Orientation, form factor and design features for solar PV generation

Costs and feasibility

Task 3 of the evidence base produced for South Oxfordshire & Vale of White Horse explores the feasibility of policy requirements, which are directly aligned to those set out for B-suite policies in this study. An office, school, warehouse and retail unit were all tested as archetypes against metrics set out under B1 – B3. All archetypes are able to feasibly meet the requirement for B2.

Where each archetype has assumed a generic use, the limits set out for B1 are feasible for all archetypes. An on-site net zero energy balance, as required by B3, is feasible for all archetypes but the office. The office archetype shows a small shortfall to matching total energy use, yet feasibly still achieves a renewable energy output of 120 $kWh/m^2_{projected\ building\ footprint}/year$.

The target of 120 $kWh/m^2_{projected\ building\ footprint}/year$ was selected as follows: Several other local plans' energy modelling evidence (Central Lincolnshire, Essex, South Oxfordshire & Vale of White Horse) has evidenced that a target of in those locations with a PV area approximately equivalent to 60-70% of the building footprint area using current typical PV panels (and the area required will reduce as PV technology improves in future). According to the Global Solar Atlas, the specific solar PV output potential of Swale (1,094 kWh/kWp) exceeds that of South Oxfordshire & Vale of White Horse (1,030 kWh/kWp). Therefore, the 120 $kWh/m^2_{projected\ building\ footprint}/year$ value is proven to be feasible in Swale as it was in South Oxfordshire & Vale of White Horse.

For the retail archetype, the targets for B1 and B3 become not feasible when it is assumed to be a grocery shop (instead of clothes shop for example) that has a high unregulated energy load. In these cases of high unregulated energy loads for a specific use, it is essential that the regulated energy limit (feasible for all archetypes) for B1 is demonstrated.

Task 4 of the South Oxfordshire & Vale of White Horse evidence base explores the costs associated with the policy requirements set out above. To achieve B1 – B3, the following cost uplifts (from Part L 2021) are incurred:

- Retail: 8%
- Retail (with residential unit): 5%
- School: 6%
- Office: 5%
- Warehouse and light industrial: 7%

For clarity, the energy performance standards set out in Task 4 of the South Oxfordshire & Vale of White Horse study are identical to those set out under B-suite policies, which means the cost uplift values are directly transferable to this study.

No additional cost uplift is assumed for B4 because the offset price is set as the current cost of solar PV and therefore poses no additional cost to what is required on-site to comply with policy B3. Therefore, no change in cost is evident between installing a sufficient amount of solar PV on-site or off-site.

In the draft Viability Assessment (May 2024) produced by HDH Planning and Development Ltd., a limit of 8% is set for net zero carbon policy to remain viable across development types. As seen above by the residential capital cost uplift values stated, all development types remain within the 8% limit set. According to the draft Viability Assessment, we can therefore assume that the policies B1-B3 are viable.

Building value uplift

We also note that there is **evidence that improved energy performance increases the sale value** in non-residential. For example, research by Knight Frank[xxviii] found a sale value uplift of 8%-18% for buildings with a 'green' rating. This uplift was 10.1%-10.5% for BREEAM (BREEAM Excellent is required for C5) or 8.3%-17.9% for NABERS depending on how high the NABERS score is (NABERS is an energy-only rating that originated in Australia but is now available for offices in the UK). Noting that this study's UK evidence was of prime offices in the London market[xxix], these uplifts should not be assumed to directly apply to all non-residential buildings in SBC. However, they do provide a strong rationale for the viability assessment to assume some degree of sale value uplift for the draft policies described here (which would be likely to translate to a high NABERS rating).

Co-benefits

The suite of policies outlined under policies B1 and B2 aims to drive significant improvements in energy efficiency and the reduction of operational carbon in new non-domestic buildings.

By improving energy efficiency, these measures mitigate financial stress on businesses, particularly small and medium enterprises (SMEs), which can reinvest savings into growth, productivity, or workforce development. The use of absolute energy metrics directly reduces energy bills and promotes operational resilience. These metrics also limit reliance on large solar PV installations if energy consumption was not limited, which would reduce capital investment requirements. Additionally, improved energy efficiency standards reduce the need for future costly retrofits to meet tightening regulations, protecting building owners from future carbon compliance costs as the UK moves toward more stringent climate targets. For SBC, this means fewer buildings requiring energy performance upgrades in the future, aligning with national and local net zero goals.

The policy suite, particularly through B1 contributes to healthier and more comfortable indoor environments. By reducing energy demand and improving thermal efficiency, buildings will experience more stable temperatures, reducing overheating in summer and improving comfort in winter. This benefits occupant well-being by creating a healthier work environment, enhancing productivity and reducing absenteeism due to health issues. Moreover, the shift to all-electric systems (B2) eliminates reliance on gas, improving air quality inside and outside the building, and reducing the incidence of respiratory illnesses associated with fossil fuel combustion.

The limits set on energy consumption under B1 and the focus on on-site renewable energy generation under B3 significantly contribute to the reduction of carbon emissions. These measures help decrease a building's operational carbon footprint and support the local authority's climate targets by ensuring non-domestic buildings align with the UK's pathway to net zero by 2050.

The integration of on-site renewable energy generation under B3 helps to alleviate stress on the national grid by increasing local energy resilience and self-sufficiency. This reduces reliance on external energy sources, contributing to energy security and lowering the risk of grid overload, particularly during peak demand periods.

Additionally, the removal of fossil fuels and connection to the gas grid under B2 further accelerates the transition to a clean energy system, helping to eliminate carbon emissions from heating systems and future-proofing non-domestic buildings against rising energy costs and carbon taxes.

The drive for energy efficiency and on-site renewable generation under B1 and B3 also reduces the need for costly and carbon-intensive retrofits. By meeting higher performance standards from the outset, buildings are less likely to require significant upgrades to meet future regulations, thus avoiding the embodied carbon associated with frequent material replacements or renovations.

Moreover, the focus on energy-efficient design under B1, including reducing energy use and space heating demand, ensures that non-domestic buildings are future-proofed for changes in energy demand, climate conditions, and regulatory environments.

By prioritising on-site renewable energy generation through B3 and encouraging the adoption of smart energy systems under B6, the policy suite enhances energy resilience. Smart systems help to optimise energy consumption, ensuring that energy generated on-site is stored and used during periods of peak demand. This reduces the need for costly grid reinforcements and supports more efficient use of renewable energy. Additionally, the ability to integrate energy storage and smart local grids helps to reduce energy waste and enhances self-sufficiency, making businesses and buildings less vulnerable to external energy price fluctuations and supply interruptions.

The requirement for post-occupancy evaluation under B7 ensures that buildings perform as predicted, closing the performance gap between design and operation. This promotes energy accountability and transparency, helping SBC monitor progress toward their climate targets while allowing building owners to adjust operations to optimise energy use over time.

The emphasis on high energy performance standards, on-site renewables, and smart energy systems creates demand for a wide range of skills, driving growth in local green supply chains. Policy suite B encourages investment in green technologies, supporting the development of local expertise in renewable energy, energy-efficient building design, and smart energy management. This can stimulate job creation and economic growth in the local area, while also supporting the transition to a green economy.

By setting high energy efficiency and renewable energy generation targets, the policies align with the UK government's broader net zero by 2050 commitments.

In summary, the co-benefits of B-suite policies extend beyond just carbon reduction. The policies look to drive economic savings for building occupants, improve health and well-being, foster energy resilience, and promote local economic growth through the creation of green jobs.

C. Sustainable design and adaptation principles

All new build residential and non-residential buildings should mitigate against climate change and adapt to climate change by employing sustainable design and construction principles.

Applicants are expected to demonstrate these elements have been considered, and evidenced where appropriate by the corresponding assessment methodology, in an Energy Statement. The following measures should be demonstrated:

C1. Sustainable construction	All new developments must minimise their carbon footprint and energy impact through sustainable design and construction practices. Proposals should demonstrate efforts to reduce greenhouse gas emissions by considering factors such as site location, building orientation, design, landscaping, and planting strategies, while prioritising a "fabric-first" approach.
C2. Cooling hierarchy	All development proposals should show how designs have optimised the internal and solar heat gains to balance the need to minimise space heating demand with the need to passively maintain comfortable temperatures during hot summers. This should be shown by demonstrating that overheating risk measures have been incorporated in accordance with the cooling hierarchy which prioritises measures, as follows: • Minimise internal heat generation through energy-efficient design and equipment selection. • Reduce and manage the amount of heat entering the building in summer using: a. Building orientation b. Shading c. Albedo d. Fenestration e. Insulation • Manage heat within the building through exposed internal thermal mass and high ceilings. • Passive ventilation, including cross ventilation through a building wherever possible. Passive stack and wind-driven ventilation, night purging and designing windows to allow effective and secure ventilation. Single aspect developments are discouraged. • Natural cooling measures including green and blue infrastructure. • Use of mixed-mode cooling such as low-energy mechanical cooling (fan-powered ventilation). • Mechanical ventilation (which, if it has a heat recovery function, should also have a summer bypass mode).[6]
C3. Overheating assessment	All major residential developments should complete CIBSE TM59 overheating assessment as their route to compliance with Building Regulations Part O (or future equivalent assessment methodology). The simplified Part O route will not be considered acceptable. All major non-residential developments should complete CIBSE TM52 overheating assessment (or future equivalent assessment methodology). Certain aspects of building design intended to increase energy efficiency and reduce heat demand, such as increased glazing and airtightness, can also exacerbate heat risk and cause uncomfortable living conditions. The inclusion of CIBSE TM52/59 overheating assessments provides the flexibility needed to manage this balance, as these assessments allow for more detailed design solutions compared to the simplified approach in Part O of Building Regulations.
C4. Resilience to climate change	All development should incorporate measures that increase resilience to extreme weather events and a changing climate, including increasing temperatures and frequency and intensity of rainfall. All developments should: ▪ Reduce the risk of flooding and conserve water ▪ Employ sustainable urban drainage Reduce the 'heat island' effect through the use of cool materials and green and blue infrastructure within the development. Additionally, all new developments should be designed to enhance resilience to the anticipated effects of climate change. Proposals must incorporate measures to adapt to changing climate conditions, including resilience to extreme weather events, rising temperatures, stronger winds, droughts, heavy rainfall, and snow. Water conservation and storage measures should also be integrated into designs, taking into account best practices and future climate projections.
C5. BREEAM	New major non-residential developments (including C1, C2, C2a and C5) of 1,000sqm or more are required to achieve BREEAM 'Excellent'.

[6] Please note that mechanical ventilation heat recovery units will be required to support policies A1 and B1 due to the assumed specification having a very low air tightness value, meaning the ventilation units are required to ensure sufficient flow and fresh air into the external spaces. Therefore, mechanical ventilation heat recovery units should be supported from an operational carbon perspective, since the heat recovery gains balance out increased electricity demand. However, if mechanical ventilation units without heat recovery are proposed, these should not be supported and would be viewed as a last resort in the cooling hierarchy.

Supporting text and notes

Compliance with C1-4 should be demonstrated within an energy statement at planning application stage, whilst C3 should also be supported by output reports from CIBSE assessments.

Scope for future improvements

This policy focuses on the general principles of sustainable design and construction, and so there are no numerical targets to improve as you would find in the energy and carbon policies above.

Alignment with national policy

Part O of Building Regulations requires overheating assessments to be undertaken in residential development, with CIBSE TM59 provided as one route to compliance for residential buildings. Therefore, C3 is aligned with national policy approaches.

However, Part O does not require that TM59 is completed, as the Simplified Method can be alternatively used. The Simplified Method does not reveal specific insights on which areas of the building are most exposed to overheating risk, or when that may occur during the day. Therefore, the CIBSE assessment is essential to understand overheating risk in buildings at a granular level to make meaningful and precise design decisions to mitigate the risk. CIBSE TM52 is not referenced because Part O does not relate to non-residential buildings.

The Housing Update Written Ministerial Statement (15 December 2021) states that there is no need for local policy to duplicate Part O policy. The cooling hierarchy (C3) is not referenced in Part O and CIBSE assessment are not *required*, therefore C2 is not a duplicate of national requirements.

The extensively referenced 2023 WMS does not impact C1 – C4 as the scope of the WMS only impacts energy efficiency standards.

Implementation considerations

Specific information on overheating assessments should be set out in supplementary policy guidance. Implementation may also be aided by setting validation criteria / checklist for applications to ensure they are including the right information with their planning application and within the Energy Statement. Examples of SPDs and checklists which are comparable are: Warwick Net Zero Carbon Buildings SPD and Pro-Forma and Nottingham & Broxtowe Reduction of Carbon in New Buildings SPD (currently under consultation). See also RBWM Sustainability SPD on adaptive climate measures.

Although mechanical ventilation is listed down the cooling hierarchy as part of C2, the use of mechanical ventilation with heat recovery (MVHR) should not be viewed negatively as this may assist compliance with operational energy policies. However, MVHR should have the ability to bypass the heat recovery function in periods of warmer weather in order to support the overheating risk mitigation goal.

Industry capability

Overheating assessments are a requirement of Building Regulations Part O (for residential), and is a common measure performed in the design of good-quality non-residential new buildings. Therefore, it should not inflict any significant additional burden on the development industry to deliver on C2 and C3. BREEAM is well established as an existing policy requirement in Swale so the development industry should be familiar with the assessment process that comes with C5.

Development Management capability

The cooling hierarchy is simple to follow and assess to grant policy compliance, assuming some officers have had training carried out and have guidance to refer to. CIBSE overheating assessments (referred to in Policy C3) give results in terms of passing or failing certain criteria (or percentage of rooms in the building that pass or fail the criteria). Those criteria vary by type of building or room. Guidance on how to assess CIBSE overheating assessments will make policy compliance simple to grant or not. C5 should be straightforward for officers to assess and implement given that BREEAM is already integrated into Swale's existing local plan.

Costs and feasibility

No evidence of costs available. Feasibility is evidenced in that Part O of Building Regulations essentially includes the TM59 process and will require some buildings to undertake that assessment even in the absence of the policy (SBC is unlikely to be categorised as a 'high risk location', but TM59 is still triggered in Part O where a building exceeds certain glazing ratios). As Part O already requires overheating assessments, it is not considered that any cost uplift will be associated with C3.

Capital cost uplifts for C5 are minimal, as follows:

- School: 0.7%
- Industrial: 0.4%
- Retail: 1.8%
- Office: 0.8%
- Mixed Use: 1.5%

It should be noted that the cost uplift associated with operational energy performance and sustainable materials is already absorbed by B- and D-suite policies. Whilst this contribution is not quantified specifically, there is high confidence that the remaining cost uplift associated with C5 is negligible. Additionally, the capital cost uplift is outweighed by rental premiums for offices that achieve BREEAM accreditations, providing premiums of 3.7 – 12.3%. As Swale's existing policy already requires BREEAM Very Good for development of the same scale that C5 is subject to, many of the costs associated with C5 are already being spent and therefore the uplift is even less significant than stated above.

Co-benefits

While A-suite and B-suite policies ensure that new dwellings and non-residential buildings are energy-efficient, C-suite policies address the critical need to mitigate the risks associated with overheating and climate vulnerability. This is essential in light of rising global temperatures and the increasing frequency of extreme weather events. Without effective design interventions, factors such as building orientation and glazing ratios could elevate the risk of overheating. To respond to this, C-suite policies include modules C2 (the cooling hierarchy) and C3 (overheating assessments), which ensure that new developments do not contribute to unacceptable levels of overheating risk.

The cooling hierarchy prioritises passive design measures (e.g., shading, natural ventilation, thermal mass) over mechanical cooling systems, creating more comfortable indoor environments that promote occupant health and comfort. This approach reduces the need for air conditioning and other energy-intensive systems, contributing to lower operational energy demands and improved thermal comfort throughout the year. In the context of rising global temperatures, maintaining safe and comfortable indoor conditions helps prevent health risks associated with heat stress, particularly for vulnerable populations such as the elderly, children, and those with pre-existing health conditions.

By prioritising passive cooling measures over mechanical systems, C-suite policies help occupants avoid the additional financial burden associated with running air conditioning or other cooling technologies. This aligns with the overarching goals of policies A and B by further reducing operational energy demand and occupant bills. Through cost savings on energy use, particularly in warmer months, C-suite policies support both affordability and energy resilience.

Policy module C4 emphasises adaptive measures such as sustainable drainage systems (SuDS) and the incorporation of green and blue infrastructure, linking closely with other local plan policies on flood risk management and biodiversity. These measures not only mitigate the impacts of extreme weather events, such as flooding and drought but also provide co-benefits like enhanced biodiversity and improved well-being for occupants. Access to green spaces and natural environments has been proven to improve mental health, promote physical activity, and foster community resilience.

Policy C works holistically with other local plan policies to create environments that are more resilient to climate change. Through strategies like flood management, green infrastructure, and passive cooling, Policy C looks to ensure that occupants are safeguarded from the risks posed by climate events, such as heat waves, flooding, and water shortages. This comprehensive approach not only reduces the likelihood of future retrofitting (which can be disruptive and costly) but also promotes future-proofing of new developments, ensuring long-term sustainability and occupant well-being.

The integration of green and blue infrastructure within the policy framework offers additional social and environmental co-benefits. Green spaces, tree canopies, and water features improve urban cooling by reducing the heat island effect, enhancing air quality, and provide recreational opportunities, which directly benefit both physical and mental health. This contributes to social well-being, promoting healthier, more connected communities. Moreover, these features enhance biodiversity, supporting local wildlife and contributing to ecosystem resilience in urban areas.

Policy C, in conjunction with Policies A and B, contributes to a comprehensive approach to sustainable building design that promotes healthier, more comfortable living environments, enhances climate resilience, and reduces financial stress by limiting energy and water costs. By addressing overheating risks, improving water efficiency, and integrating climate-adaptive infrastructure, Policy C supports the creation of future-proof buildings that align with long-term sustainability goals. This policy ensures that new developments are not only energy-efficient but also resilient to the impacts of climate change, creating environments that enhance occupant well-being and reduce future retrofitting needs.

D. Embodied carbon and waste

Residential and non-residential buildings (thresholds given below) must meet the following requirement:

D1. Embodied carbon reporting	All major new residential (10 dwellings or more) and non-residential (1000m[2] floorspace or more) developments are required to complete a whole-life carbon assessment in accordance with RICS Whole Life Carbon Assessment guidance and the BS EN 15978 standard.
D2. Limiting embodied carbon	All large-scale major development (50 dwellings or more; 5000m[2] non-residential floor space or more) is required to limit embodied carbon (RICS/BS 15978 modules A1 – A5) to 600 $kgCO_2e/m^2$ GIA.
D3. Building end-of-life	All new buildings are to be designed to enable easy material re-use, adaptation and disassembly, subsequently reducing the need for end-of-life demolition.
D4. Demolition audits	All major development sites that contain existing buildings or structures must carry out a pre-redevelopment and/or pre-demolition audit, following an established industry best practice method (e.g. BRE), for larger structures or significant demolitions. For smaller-scale demolitions, such as individual walls or small outbuildings, developers are required to consider material re-use where feasible, without the need for a full audit. A simplified, proportionate approach should be taken to assess potential material recovery and reuse.
D5. Narrative on embodied carbon in minor development	Proposals for new development of 1 or more homes or ≥100m[2] non-domestic floor space, but below the size thresholds for embodied carbon reporting and targets as noted above, should demonstrate how the embodied carbon of the proposed development has been minimised (including general narrative on options considered and where possible, decisions made).

Supporting text and notes

Compliance with D1, D2 and D3 and D5? are to be demonstrated within an energy statement. If applicable, output reports for D4 should be submitted alongside an energy statement.

For D5, it is accepted that the level of detail will be lower the smaller the development proposal. The aim is to ensure applicants explore the topic of embodied carbon, but without setting requirements that are impractical or excessively costly at small sites. Points of narrative encouraged in the fulfilment of D5 could include, but are not limited to:

- Reuse of existing features and materials on site, where present
- Design for material efficiency (reducing the amount of material needed) such as through structural design or use of space and layouts to avoid unnecessary material use
- Substitution of higher-carbon materials (such as steel, aluminium, and Portland cement) with low-embodied-carbon materials (such as timber)
- Material sourcing for reduced ‘product miles’ or from manufacturers with low-carbon manufacturing credentials

Construction processes that reduce the typical rates of material wastage.

Scope for future improvements

There is significant scope for future improvements for embodied carbon and waste policies. In particular, standards set for D2 should be lowered in future local plan reviews as embodied carbon policy becomes integrated into local and national policy, for example in line with the 2030 target set by LETI/RIBA (subject to evidence of feasibility and cost at the time of adopting such targets).

As policy is implemented on embodied carbon, industry will become better placed to deliver on ambitious policy requirements and move towards net zero embodied carbon emissions.

Alignment with national policy

Embodied carbon is not part of Building Regulations currently. Therefore on this topic, there is no particular national policy with which the local policy can be expected to align.

The industry proposal of Part Z, as an additional document to Building Regulations, has been going through the parliamentary process and could be integrated before the adoption of this local plan. This would require that whole-life carbon reporting is implemented in Building Regulations and that emissions limits are set from 2027. It is aligned with the RICS Whole Life Carbon method, the same as specified in the draft SBC policies above. More recently in early 2024, a further coalition of respected industry standard-setting bodies has released a policy paper pressuring the next Government to introduce Part Z.

The Environmental Audit Committee states that embodied carbon assessments must be undertaken for new development and that if embodied carbon emissions are not actively reduced, the UK will not remain within its carbon budgets nor achieve its 2050 net zero target. Therefore, there is a clear justification for local authorities to require embodied carbon assessments and limit emissions arising from the construction of new development.

Policy D in combination with policies A and B, seeks to ensure that carbon emissions are limited across the whole life cycle of a building. Without this combination of policies, large amounts of carbon emissions would be missed (as much as 50% of a building's lifetime carbon emissions result from upfront embodied carbon). The Committee on Climate Change has also identified that decarbonisation of the manufacturing & construction sector (including through resource efficiency and production fuel switching) is an essential component in the future scenarios for the UK’s 6th carbon budget (part of the Climate Change Act).

Whilst there is no explicit reference to embodied carbon in the NPPF, the NPPF references to 'low carbon development' and 'low carbon economy' could readily include embodied carbon as an implicit part of the equation. Additionally, embodied carbon is a design issue and therefore should logically fall under the NPPF's instruction that "New development should be planned for in ways that … can help to reduce greenhouse gas emissions, such as through its … design". The case for addressing embodied carbon is justified by the increasing proportional importance of these emissions as a share of buildings' total carbon footprint as the power grid is decarbonised.

The previously referenced 2023 WMS is not relevant to policy D1 – D5, as the scope of that WMS only impacts energy efficiency standards.

Implementation considerations

Information and requirements on embodied carbon assessments will need to be set out in supplementary policy guidance to enable developers to sufficiently demonstrate policy compliance. Methodologies and the scope of embodied carbon assessment should be clarified, alongside other potential implications such as third-party verification.

Similarly, acceptable methodologies (i.e. RICS Whole-Life Carbon Assessments guidance) to comply with D1 and D2 should be set out in guidance. An example of an SPD which includes guidance on WLCA is: [Warwick Net Zero Carbon Buildings SPD](#).

Industry capability

The required embodied carbon limit set within point D2 represents an ambitious but achievable target for developers, acting as a backstop to prevent large-scale developments from excessive embodied carbon emissions.

The expectation set by point D3 (demonstrating ease of future building disassembly for future reuse) and D4 (pre-demolition or pre-redevelopment audit) are both within the industry's current capability in that they are part of the most common environmental certification system used across the industry (BREEAM), with widespread take-up (especially within the non-domestic sector):

- Pre-demolition or pre-redevelopment audits are not uncommon in the development sector, as they are one of the actions that developers often choose to take in order to gain certain credits within the very widespread BREEAM certification (relevant credit: BREEEAM 'Wst 01'[xxx]). The industry in London is familiar with these as part of that region's requirement for circular economy statements; as a result many of the major nation-wide built environment consultancies have had exposure to these. Alternatively, these audits are offered as a service by the BRE itself, and by some demolition contractors. Guidance on best practice is available from the BRE[xxxi].
- BREEAM credit (Wst 06) requires the applicant to produce "a study to explore the ease of disassembly and the functional adaptation potential" of several different design options, and from that study to "develop recommendations or solutions … during or prior to concept design, that aim to enable and facilitate disassembly and functional adaptation". This would be relevant to the recommended policy point D4. Also, any industry body that is also active within London will also have gained exposure to this concept through the GLA's requirement for circular economy statements, whose guidance[xxxii] notes that three of the six 'circular economy principles' are 'building in layers', 'designing for adaptability or flexibility', and 'designing for disassembly'. While such analysis may not be commonplace outside London, it is not unheard of, and this policy is designed to boost the practice by increasing the demand and thus encouraging the local development industry to grow its capacity to produce this analysis that will be a vital part of the local and national transition to net zero. Other than the GLA, guidance is available from several sources online including ISO[xxxiii] and UKGBC[xxxiv,xxxv].

Development Management capability

The capability of Development Management officers to accurately assess these policies is reliant on the degree of training and guidance documents available. It is essential that officers have guidance on hand to assess policies against to ensure that compliance is achieved in accordance with methodologies set out in a subsequent guidance document. Specific upskilling of at least one officer on climate change policies to gain a technical understanding will greatly assist the overall ability of the team to assess policy compliance. Officers could familiarise themselves with the following to better understand and assess embodied carbon calculations:

- Different scopes of carbon (e.g. upfront embodied carbon vs. whole-life carbon)
- Knowledge of RICS whole-life carbon assessment guidance
- General understanding of low-carbon materials
- Good practice efficient structural design choices to reduce embodied carbon

Costs and feasibility

For Policy D1: No robust industry-wide evidence is available about the costs of the embodied carbon assessment, but anecdotal experience in recent years suggests this could be around £10,000-15,000 depending on the size and complexity of the project. If this figure is used in viability testing, it should only be applied where the policy applies.

Alongside testing the feasibility of operational energy policy requirements, the South Oxfordshire and Vale of White Horse evidence base also explored the feasibility and costs of embodied carbon emissions limits on the tested residential and non-residential archetypes. The limit set out under D2 has been shown to be feasible for all archetypes, as modelled under a Part L 2021 scenario.

Using typical materials required to comply with Part L 2021 (i.e. current industry standard), no archetype exceeded 559 $kgCO_2/m^2$ GIA. Therefore, this can be considered a cost neutral limit since the Part L 2021 scenario represents business-as-usual. The only costs therefore associated with D1 and D2 only arise from the cost of an embodied carbon assessment, which generally comes at a cost of no more than £15,000. Given that D1 only applies to large-scale development, the relative cost uplift of an embodied carbon assessment is negligible.

To achieve industry best practice targets aligning with LETI guidance[xxxvi], cost uplifts increase but also assume that the archetype has achieved net zero status accounting for both regulated and unregulated energy. These can be summarised from the results of the evidence base as follows:

- Residential (excluding flats) (from 2025): **300 $kgCO_2e/m^2$ GIA**
- Non-residential and flats (from 2030): **350 $kgCO_2e/m^2$ GIA**

If these more ambitious embodied carbon targets were therefore adopted alongside the A- and B-suite policies, the following cost uplift values would be expected to be lower. Please note the following cost uplifts do not apply to the draft SBC target of 600kg/m² but are provided here to give a general idea of the scale of the cost that could be incurred if the policy were amended to more ambitious targets.

- Semi-detached: 10%
- Terraced: 9%
- Detached: 6%
- Flats: 12%
- Retail: 12%
- School: 10%
- Office: 7%
- Warehouse: 9%

Another evidence study produced by WSP[xxxvii] for West of England authorities in 2021 found an embodied carbon limit is 900 $kgCO_2e/m^2$ GIA to be cost neutral, which was subsequently adopted by Bath & North East Somerset Council as a policy. The difference between cost neutral limits of 900 $kgCO_2e/m^2$ GIA, in the 2021 study by WSP, and 550 $kgCO_2e/m^2$ GIA, in the 2024 South Oxfordshire and Vale of White Horse study, suggests that industry and supply chains can now achieve embodied carbon limits more cost effectively. This pattern is expected to continue as embodied carbon is increasingly considered throughout industry and policy.

Co-benefits

Policy D establishes a framework to reduce the environmental impact of both residential and non-residential buildings by targeting embodied carbon—the emissions associated with materials and construction processes throughout a building's lifecycle. By addressing embodied carbon and promoting sustainable construction practices, this policy could deliver a range of co-benefits that extend beyond carbon reduction, supporting wider economic, environmental, and social goals.

The requirement for whole-life carbon assessments under D1 ensures that all major developments assess and mitigate the full carbon impact of building materials and construction. By limiting embodied carbon in large-scale developments (e.g., to 600 kgCO2e/m2 GIA under D2), Policy D plays a pivotal role in reducing the carbon impact of construction, which can represent up to 50% of a building's total emissions.

By promoting circular economy principles, particularly in D3 and D4, which focus on material reuse and the ease of disassembly at the end of a building's life, the policy encourages more resource-efficient construction. This not only reduces waste generation but also lowers costs associated with future demolition, material procurement, and disposal. Designing buildings for disassembly and material reuse helps reduce dependency on raw materials and limits costs related to sourcing and transporting new materials. It also promotes long-term economic savings for developers and property owners by maximising the value of materials throughout their lifecycle.

The embodied carbon limits and reporting requirements stimulate the adoption of innovative construction methods and low-carbon materials. Developers and builders will explore new technologies, such as modular construction, prefabrication, and the use of low-carbon materials like timber, reclaimed steel, or recycled aggregates. This shift drives demand for green building products, creating opportunities for local businesses and manufacturers, particularly within the green economy, while fostering local supply chains that specialise in sustainable materials and techniques.

The requirement for demolition audits under D4 ensures that before any building is demolished, the potential for reusing or recycling materials is thoroughly assessed. This reduces the amount of waste sent to landfill and encourages the repurposing of valuable materials within the construction industry, supporting circular economy principles. By maximising material reuse, the policy mitigates the environmental impacts associated with resource extraction, waste disposal, and material production, aligning with national waste reduction targets.

By designing for disassembly and material re-use (D3), new buildings will be more adaptable and future-proofed, capable of being modified, extended, or dismantled with lower environmental impact. This leads to greater building longevity and flexibility, enabling spaces to evolve without the need for significant new construction. This adaptability contributes to reduced lifecycle costs and makes buildings more resilient to changing demands, whether for residential or commercial purposes.

The policy's focus on limiting embodied carbon and promoting sustainable construction aligns with broader goals for climate resilience. Buildings that are designed to limit embodied carbon are often constructed with materials that perform well in diverse climate conditions (e.g. green roofs and walls to mitigate overheating risk), further supporting long-term sustainability. Additionally, the reduction of carbon emissions through material choices and construction processes ensures that new developments have a smaller climate impact, helping to mitigate global warming and the associated risks of climate change.

The requirement to provide a narrative on embodied carbon for smaller developments under D5 encourages developers of all scales to consider sustainable construction methods and communicate their choices. This fosters greater awareness and engagement with sustainable practices, promoting social responsibility within the construction industry. It also encourages community involvement by ensuring that developers actively consider the long-term environmental impacts of their projects, which can contribute to positive relationships with local communities concerned about the environmental footprint of new developments.

E. Renewable energy development and infrastructure

E1. Smart site allocation	Proposals for large-scale renewable energy development (≤ 10MW) are encouraged to choose a site that is well supported by sufficient grid capacity. Support will be given to proposals for standalone electrical grid capacity upgrades, local smart grids, and development of grid-connected energy storage especially if co-located with large-scale renewable energy generation installations.
E2. Energy storage	Support will be given to proposals that form part of the transition to a net zero carbon district and county, which must involve a range of renewable energy storage technologies. This could include energy storage facilities (e.g. battery and thermal storage) and upgraded or new electricity facilities. Battery storage is essential to provide local grid resilience during periods of peak demand and helps to ensure that renewable energy is not wasted during periods of high generation. Battery storage facilities will be accompanied by health and safety assessments to ensure no fire risk is posed to nearby communities. Proposals for renewable energy generation are encouraged to provide at least an additional 10% of energy storage (e.g. battery storage) of the overall energy generation.
E3. Co-benefits	Proposals for renewable energy generation over 20MW are required to provide an option to offer 5% community ownership to the local community (e.g. Parish Council area). Positive weight will be given to schemes led by the community and community energy groups.
	All proposals are to undertake community engagement sessions with the local community and? to mitigate any potential impacts to the community as a result of the development.
	All proposals are to demonstrate how the renewable energy generation site can be restored to its original or an improved state following removal of technologies and mitigate any biodiversity loss. Proposals will be subject to a condition requiring the submission of an end-of-life removal scheme setting out how the impacts of decommissioning will be mitigated. The removal scheme should demonstrate how any biodiversity net gain that has arisen on the site will be protected or enhanced further, and how materials to be removed would, to a practical degree, be re-used or recycled.
E4. Grid reinforcement	All development for renewable energy generation, or development that includes renewable energy generation, is to demonstrate how options for energy storage, smart grids, and energy sharing networks have been explored to reduce the need for grid capacity upgrades.
E5. Refusal of fossil fuels	Any applications for exploration and extraction of fossil fuels will not be supported.
E6. Support for innovative energy generation	Support will be given to innovative renewable energy generation approaches, such as 'agrivoltaics' – the combined use of land for solar PV generation and agriculture. Although these sites may not specifically be identified as suitable in land sensitivity assessments, they should be not refused without an appropriate individual assessment of land suitability based upon the specific innovative use of land.
E7. Protecting infrastructure	Any development should not significantly harm: a. Technical performance of any existing or approved renewable energy facility. b. Potential for optimisation of strategic renewable energy installations. c. Availability of the resource, where the operation is dependent on uninterrupted flow of energy to the installation.
E8. Mitigation of negative impacts	Support will be given to proposals that demonstrate mitigation measures are implemented for: a. Scale, siting and design and impacts on landscape character, visual amenity, biodiversity, flood risk, townscape, heritage, historic landscape and highway/rail safety. b. Impacts on aviation and defence navigation systems/communications. c. Impacts on the amenity of sensitive neighbouring uses (local residents) included issues such as noise, dust, odour, shadow flicker, air quality and traffic.
E9. Heat networks and masterplans	Developments must demonstrate through that connection to, or development of heat networks has been considered according to the following hierarchy: 1. **Connection to heat networks:**

- Connect to an existing or new low- or -zero-carbon heat network[7] from the point of occupation, where it can be demonstrated that the heat network results in lower energy demand and carbon emissions than an individual heating system approach.
- Use communal or individual renewable heating systems that are fossil fuel-free where connection to a heat network is not feasible.

2. **Future-proofing**:
   - Major developments in areas where a low- or zero-carbon heat network is planned but cannot be connected from the point of occupation must, where feasible, include infrastructure for future connection to the district heat network.
3. **Creation of new heat networks**:
   - For large-scale development proposals involving more than 50 homes or 5,000m² of floorspace within or adjacent to growth and regeneration areas identified in the development strategy, a feasibility study should be conducted to determine the potential for establishing a new low- or zero-carbon heat network. If feasible, a heat network should be included in the development proposals.

Under each stage of the above hierarchy, it is essential that any connection or development of heat networks must demonstrate that they result in a lower on-site energy demand and carbon emissions than an individual renewable heating system approach.

The heat network feasibility study should assess the potential for implementing low-or-zero carbon heat networks, which should include assessment of 4^{th} and 5^{th} generation networks that can offer higher efficiency and flexibility (4^{th} and 5^{th} networks operate at lower temperatures than conventional systems, reduce heat losses and combine other energy sources , local energy storage and offer potential for energy exchanges amongst users). Feasibility studies should cover:

Technical assessment:

- Evaluation of heat sources (renewable and waste)
- Carbon reduction optioneering between alternative heating options
- Infrastructure requirements (piping, storage etc.)
- Capacity for future connection and expansion
- Alignment with local or national carbon targets

Economic viability and assessment

- Cost analysis – including CAPEX, OPEX and maintenance
- Projected savings in energy costs and emission reductions over time
- Comparison of cost alternatives heating options

Links to other policies

Due to the requirement for new residential and non-residential buildings to have an on-site net zero energy balance, for which renewable energy generation is crucial, policies E1, E4 and E9 are inherently linked to A1 – A4, A6, B1 – B4 and B6.

Net zero new buildings can reduce additional stresses of new development on grid capacity (E4), particularly if battery storage is integrated on-site. Grid infrastructure reinforcement is critical for net zero development, primarily because as the significant amount of on-site renewable energy generation will be connected to the electricity grid. Therefore, mitigating energy consumption through A1 and B1 reduces stress on the grid.

Offsetting policies A4 and B4 could be benefited by successful implementation of E1, since having sites identified for renewable energy generation reduces time lags for large-scale energy offsetting projects.

Scope for future improvements

No scope for specific improvement on policies as numerical requirements are primarily not set, but improvements are possible on the delivery and information to support policy development and implementation. For example, a more prescriptive approach on what technologies need to be brought forward could be set, alongside improving co-benefits such as the degree of community engagement and biodiversity net gain levels.

Alignment with national policy

Renewable energy is a key component towards the fulfilment of the Climate Change Act 2008 and associated 2050 net zero target. Therefore, if the UK it to successfully transition to net zero, renewable energy opportunities must be maximised.

National policy requires community engagement to be demonstrated, as per the NPPF, and supports growth of renewable energy generation and specifically requires that sites are allocated to identify suitable areas for installations.

Policy E9 is directly aligned to the national policy position on heat networks as the UK government has introduced a regulatory framework for heat networks through the Energy Security Bill. This includes the establishment of heat network zones and the regulation of prices to ensure fair costs for consumers. The UK aims to increase the share of heat provided by heat networks from the current 2%

[7] A low- or zero-carbon heat network can be considered to be a system run by large heat pumps that are either partially or entirely powered by renewable electricity.

to around 18% by 2050. This expansion is part of the broader Heat Network Transformation Programme, which includes significant investment to scale up low-carbon heat network deployment.

Feasibility and costs overview

No feasibility or cost implications.

Implementation considerations

Supplementary guidance is essential to the delivery of these policies to set expectations of what is required from developers to demonstrate policy compliance, particularly E2, E3, E4 and E9.

Requirements for developers on community benefit and engagement should involve Swale Borough Council planning officer participation and members from the local community. Similarly, ecology officers should be involved in assessments to demonstrate biodiversity net gain.

Industry capability

All the policy elements set out involve existing themes within the renewable energy development industry and should be deliverable. Biodiversity net gain has been introduced as a national standard and will therefore be a familiar concept to the industry by the time of policy adoption.

Development Management capability

Due to the wide-ranging potential impacts of renewable energy generation and storage development, technical expertise from various internal officers will be necessary to appropriately assess policy compliance. Input will be needed from officers who have expertise in:

a. Biodiversity/ecology
b. Highways
c. Landscape
d. Heritage/conservation

Policy compliance is likely to be determined on a process of liaison with the renewable energy developer and dependent on the degree of cooperation with council officers, particularly when addressing community-based implications.

Policy implementation and monitoring

Policy adoption is key, yet policy implementation is essential to ensure effective delivery of required standards. It is recommended that the Council put together a group that includes policy officers, development management officers (and conservation/heritage) and building control officers to design an effective monitoring system.

Policy compliance

Adoption of ambitious local plan policies is crucial to work towards a net zero future. However, without reliable implementation and monitoring mechanisms, intended benefits of these policies will not be experienced and their reputation hindered.

Implementation is key to the success of policy delivery in practice and should be treated equally as important to policy development. Therefore, Development Management officers will need to gain an understanding of how the policies are intended to operate in practice and initially be guided through how to assess policy compliance.

To ensure that policies on net zero operational carbon, embodied carbon and overheating are delivered as intended, two key stages of assessing compliance are necessary: planning application/design stage and post-completion stage. Submission of data throughout design stages is what will determine policy compliance for the full planning application, yet this must be verified with as-built data to confirm true policy compliance; this only applies for recommended policy components A1 – A4, B1 – B4, C3, and D1 – D2. Pre-commencement and pre-occupation conditions must therefore be set at the planning application stage, which could include:

- Photographic evidence of building fabric, heating systems and ventilation technologies
- Air tightness tests whilst the air barrier remains accessible (to allow improvements to be made if required standards are missed)
- As-built reports for building energy performance, embodied carbon assessments and overheating measures

In cases where standards fall below required levels at the post-completion stage, it is important to have enforcement mechanisms in place to regularise non-compliant applications. This is a difficult issue to deal with as buildings cannot be deconstructed but the council should explore options with the Enforcement team on how to mitigate as-built risks.

Monitoring standards

Understanding how policies work in operation can assist the future development of improved policies and informs other local authorities on what is deliverable. SBC should develop a reliable monitoring system that enables the collation of policy performance data both for compliance at application stages and once the building is in use. This should be made available in a standardised format for ease of data input for developers and subsequent sharing of data. SBC could look to distribute this standardised reporting form to neighbouring authorities to form a regional understanding of policy implementation. Examples of suggested monitoring indicators for new buildings and also renewable energy include:

Indicator	Source	Policy link
Average in-use Energy Use Intensity of new buildings	Development data	A1 and B1
Average on-site renewable energy generation per m^2 building footprint (kWh)	Development data	A3 and B3
MW capacity of solar PV installed on buildings (kWp)	Planning portal or MCS data	A3 and B3
MW capacity of solar PV installed as standalone scheme (above 1MW)	DESNZ Renewable Energy Planning Database (REPD) data	E-suite policies
MW capacity of wind turbine installed as standalone scheme (above 1MW)	DESNZ REPD data	E-suite policies
MW capacity of battery storage installed	DESNZ REPD data	E-suite policies
£ contribution to renewable energy offsetting fund, £spent, and kWh generation delivered via the fund	Local Authority's own S106 records	A4 and B4
Number of heat pumps installed	Planning portal or MCS data	A1 and B1
Average embodied carbon of new development	Development data	D1 and D2

As required by policies A7 and B7, Post-Occupancy Evaluation (POE) is key to understanding in practice success of net zero operational energy policy. The primary purpose of undertaking POE is not for policy compliance but to better understand the performance gap between design stage energy performance predictions and the as-built performance of the building. Once the building is in use by occupants, developers cannot be penalised if reported values on energy consumption exceed the policy requirements because operational energy consumption is largely dependent on occupant behaviour.

Due to the influence of occupant behaviour on values reported through POE, there are privacy concerns with residents associated with these exercises. Therefore, developers cannot force residents to participate in POE but should show to the best of their ability that the building performs as intended with a minimal performance gap with the amount of data available. Implications of this potential risk are that data collection of energy performance may not be possible and future policy iterations are less informed.

Mitigating the performance gap

UK buildings are consistently victim to a performance gap between the energy performance of the building at the design stage and operational performance. The delivery of truly net zero buildings therefore requires rigorous systems to be in place to mitigate such a gap in energy performance, which are explored below.

Often the first point of failure of below-par operational energy performance is at the modelling stage, which in the UK is led by use of inaccurate compliance tools for Building Regulations, SAP and SBEM.

If local policy is to more effectively deliver net zero buildings, alternative methodologies, such as PHPP, should be used to gain an understanding of building energy performance at the design stage. Proven alternatives are available for both residential and non-residential buildings, which are required for A- and B-suite policies[8]:

- Residential: Passivhaus Planning Package
- Non-residential: CIBSE TM54 with Passivhaus Planning Package or IES-VE

It is also worth noting that the use of accurate energy modelling tools, like PHPP or TM54, is often a first step within process-based assured performance methods (see later subheading in this section).

A new residential energy modelling tool for building regulations Part L is current in development nationally: the Home Energy Model, HEM. Although efforts are being made to remedy the inaccuracies of SAP within HEM, the final form and in-practice effectiveness of HEM is not yet known. The Council is encouraged to return to this topic once HEM is well-established and its accuracy evidenced, to consider whether this would be a suitable step within efforts to reduce the performance gap and/or comply with the policies A1-A2 and B1-B2.

Accurate assessments are equally important for policies on overheating and embodied carbon. For overheating, the simplified method on offer for Part O of Building Regulations is an inaccurate tool, hence why CIBSE overheating assessments should be completed so that more specific and accurate overheating measures specific to the at-risk building can be implemented.

Embodied carbon assessments require reliable and up-to-date data on the carbon content of various materials and products. Accurate data is the key to robust embodied carbon assessments. Since embodied carbon is not a national policy requirement, there is no approved methodology, but the RICS Whole Life Carbon Assessment guidance is generally accepted as the industry standard.

Third party verification

The use of accurate assessment and modelling tools is essential to the eventual performance of buildings, but human inaccuracies and errors throughout stages remain a risk to exacerbating a performance gap. Therefore, requiring third-party verification mechanisms to assess the accuracy of the approach, inputs and assumptions to modelling and/or assessments can further mitigate performance gap risks. There is currently no recognised collection of third-party verification systems and should therefore be a council-led decision on what would constitute an acceptable third-party verification process demonstrated by a developer. An acceptable third-party verification approach would be the submission of an audit undertaken by a third-party consultancy who are able to undertake the calculations themselves but are independent to the development. Additionally, if the assured performance schemes (as below) are used, this would constitute an effective third-party verification process.

Assured performance

Once accurate modelling and assessments have been completed to the best of abilities, following the processes above, assured performance schemes should be employed as the final element of performance gap mitigation. These are procedural toolkits that are designed to deliver a reduction in the performance gap through following optimal steps during design and construction to make assumptions and modelling more accurate and then to deliver correctly on what was designed. Building Control at local authorities firstly do not have control over all development sites and even at those where the authority does, regular on-site checks are not always carried out. Management systems to ensure high levels of construction quality are necessary to deliver energy performance standards as predicted.

For example, air tightness and thermal bridging are key components of the net zero operational energy policies recommended in this document. These need to be checked throughout construction phases, meaning that a simple confirmation of insulation thickness is insufficient to assess construction quality.

Acceptable schemes to demonstrate compliance with policies A5 and B5 should be set out in supplementary policy guidance. Several schemes are available and proven to be reputable, as listed below:

- Passivhaus Certification (residential and non-residential)
- AECB Building Standard (residential and non-residential)
- NABERS UK (non-residential)
- Assured Performance Process (residential)
- National Energy Foundation (residential).

[8] In some cases, particularly for minor development, SAP may still be used in combination with tools such as the Energy Summary Tool (used by Cornwall and Bath & North East Somerset Councils), which aims to minimise inaccuracies that arise with the use of SAP for energy performance modelling.

Energy Statement guidance

The example Energy Statement structure below is based on a residential application and sets out the information that should be addressed to sufficiently assess policy compliance. Formats may consist of Excel spreadsheets or automated digital tools that summarise policy compliance efficiently for Development Management officers to utilise.

Existing examples of Energy Statements and supporting forms are listed below:

- Bath & North East Somerset Council Sustainable Construction Checklist SPD
- Cornwall Council Energy Summary Tool
- Central Lincolnshire Energy Efficient Design and Construction guidance and reporting tools

The examples above are linked to the three examples of adopted policies that align with the policy recommendations for operational carbon in this report. Swale BC may decide to take a similar route to the examples given above or explore their own options for assessing, reporting and monitoring policy compliance.

Example structure

1. **Cover page:**
    - Include the date of drafting, the scheme's location, and the details of the person completing the Energy Statement, including their qualifications or memberships.

2. **Executive summary:**
    - Key features of the site or design approach.
    - Built fabric specifications (U-values for walls, windows, doors, floor, and roof; materials; ventilation system; airtightness standard).
    - Proposed heating system and confirmation of no gas network or bottled oil/gas use.
    - Efficiency rating of appliances and expected unregulated energy use.
    - Overall space heating demand and energy use intensity.
    - Proposed renewable energy sources and their adequacy.
    - Post-construction testing and monitoring plans by a qualified person.
    - Justifications for any standards not met.

3. **Information checklist:**
    - Detailed PHPP or SAP (if correction tool is used e.g. Cornwall Energy Summary Tool) calculations, including:
        - Total energy use
        - Space heating demand
        - On-site renewable energy generation
    - Any energy offsetting contribution proposed
    - Details of glazing, insulation, ventilation, heat supply, and renewables.
    - Location of heat pump and renewables.
    - Orientation and solar gains plans.
    - Assessment of embodied carbon (for major developments).
    - Details of known appliances and lighting.
    - Commitment to as-built verification by a qualified individual.

4. **Introduction and context:**
    - Provide a brief introduction with policy context, location details, and a summary of the proposal.

5. **Site-wide considerations**
    - This section should discuss the approach taken, detailing choices and their impacts, and any site limitations like shadowing or wind direction.
    - Includes decisions on building form to optimise efficiency and energy generation, referencing relevant plans.
    - Detailed measures for heat resilience, such as shading, landscaping, green walls, or roofs. Use images and plan extracts to clarify decisions.
    - If demolition is proposed, provide detailed justification, including carbon assessments for both retaining and demolishing the building.
    - For outline applications, explain what details are provided and what will be established at reserved matters stage. Conditions may secure details at this stage, with considerations for layout, orientation, and built form.

6. **Building-level energy performance**
    - Proposed building fabric, including materials and performance specifications for walls, floors, roofs, windows, and doors, with U-values.
    - Airtightness level and approach to achieving it.
    - Ventilation strategy, specifying methods, locations, and operations.
    - For major applications, include decisions on embodied carbon, comparing materials to demonstrate benefits.
    - For multiple buildings, provide details for each house type.
    - For outline applications, commit to a fabric-first approach and specify deliverables where possible.

7. **Technology systems**
    - Proposed heating and hot water systems, typically heat pumps.
    - Details of other efficiency systems like smart meters, vehicle-to-grid charging provision and water-saving fixtures, highlighting their benefits.
    - Describe how smart grids and energy sharing networks have been considered and/or adopted.
    - Reference plans showing system locations.
    - For multiple buildings, detail any differences.
    - Provide instructions for future occupants on efficient system use.
    - For outline applications, commit to a general approach if specific details are not yet known.

8. **On-site renewable energy**

- Describe the type and expected output of renewable energy systems, such as PV panels, based on building orientation.
- For multiple buildings, summarise generation by house type and orientation.
- Reference plans showing system locations.
- If shared systems are proposed, explain how they will be managed and maintained.
- For outline applications, indicate the proposed generation type and likely locations, with specific details to be confirmed later.

9. **Assured performance and post-occupancy monitoring:**
   - Detail proposed post-occupancy monitoring strategy by a qualified individual.
   - Address any shortfalls in achieving standards and propose mitigation measures, such as additional renewables.
   - Ensure future occupants understand system operation and provide necessary information.
   - For outline applications, include testing and monitoring plans if possible, or condition them for later stages.

10. **Conclusion:**
    - Summarise key information and achievements, indicating clearly whether policy compliance has been achieved or not.

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