South Staffordshire Council Local Plan Review: Sustainable Construction Policy NB6

Task A

Rev 3.0

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Introduction

Bioregional is appointed to provide South Staffordshire Council (SSC) with an assessment of options available within the local planning system to achieve sustainable construction in South Staffordshire to inform Policy NB6 of the South Staffordshire Local Plan.

Local planning authorities (LPA) have a legal duty to deliver carbon reductions through the planning process in line with the Climate Change Act. The Act includes both the 2050 goal for a net zero carbon UK, and sharply-declining five-yearly carbon budgets between today and 2050.

To aid SSC's decision-making for the new Local Plan, this piece of work explores:

- Defining 'net zero carbon' at different scales and how these fit together
- LPA duties to address carbon, as per the National Planning Policy Framework and Climate Change Act
- LPA powers to address carbon and energy granted by key pieces of national legislation, policy and official guidance (and the limitations placed on how the LPA wields those powers)
- Existing and emerging precedents of Local Plans that wield powers regarding energy and carbon of new development
- How potential policies may be justified in terms of necessity, feasibility and viability
- Review of Policy NB6 objections and links back to main report
- Recommendations of amendments to Policy NB6

Glossary of terms and acronyms

BREDEM	Buildings Research Establishment Domestic Energy Model. A methodology for estimate calculations of the energy use and fuel requirements of a home based on its characteristics. BREDEM is the basis for SAP (see elsewhere in this glossary) but BREDEM retains more flexibility by allowing the user to tailor some assumptions made in the calculations to better reflect the project.
Carbon	Short for 'carbon dioxide' but can also include several other gases that warm the climate. 'Carbon emissions' is when human activities emit these gases to the atmosphere.
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.
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'.
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.
GHG	Greenhouse gas (CO_2 and several other gases: methane, nitrogen dioxide, and fluorinated refrigerant gases). Often collectively referred to as 'carbon'.
MVHR	Mechanical Ventilation with Heat Recovery
Part L	Building regulations section that sets basic legal requirements regarding buildings' energy and CO_2.
Performance gap	The 'energy performance gap' is 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 calculate a building's energy use. It is used to design buildings that seek Passivhaus certification, but can be used without pursuing certification.
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).
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 conversion 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 performance; not affected by building services like heating system, lighting, ventilation[i].
TM54	A method to accurately calculate buildings' energy use. Devised by Chartered Institution of Building Services Engineers (CIBSE).
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.

Contents

Table of figures

Executive summary

Defining net zero carbon buildings

There are several ways to define a 'net zero carbon building'. These definitions rely on calculations that cover some or all of the following scopes (varying by the definition chosen), on an annual basis:

- Use of different types of fuels and grid energy at the building: These cause carbon emissions.
- Renewable energy use at the building: Usually from on-site generation, but some definitions/calculations of 'net zero carbon buildings' also allow off-site sources.
- Amount of renewable energy that the building *exports to the grid* at times when the building produces more than it is using): This counts as a *negative* amount of carbon emissions, because it actively reduces the amount of fuel burned in power stations to supply grid energy to others.
- Embodied carbon: Carbon emitted to produce/transport and use the construction materials.

The 'National Calculation Methodologies' for buildings' energy use and carbon emissions are called SAP (for homes) or SBEM (for other buildings). These are used in the Building Regulations Part L, which sets limits per m^2 per year for carbon, heat demand, and 'primary energy'[1] use. However:

- They only cover operational carbon (energy use), not embodied carbon (materials/construction)
- They do not include 'unregulated' energy uses like plug-in appliances, which can be 50% of total energy (or total emissions, depending on the carbon intensity of different fuels used).
- They provide inaccurate predictions because they are based on a theoretical model instead of specific conditions, and their predictions do not get validated in practice. They are compliance tools and not designed to accurately assess building energy performance; buildings typically use two or three times the amount of energy predicted by SAP or SBEM (see *Figure 1*).

Thus a 'net zero carbon' building defined by the Building Regulations is not actually net zero carbon. Updates to Building Regulations Part L, SAP and SBEM are due in 2025 (the 'Future Homes Standard' and 'Future Buildings Standard'). However, even the 2025 update will not deliver[ii] the very low space heat demand that the UK needs for its legislated carbon budgets. This is partly because SAP and SBEM underestimate energy demand and are not verified in operation (as there is no regulatory requirement for the building to actually perform to the SAP/SBEM predictions) and partly because Part L sets energy and carbon targets that vary by the building's form (shape and size), not the absolute targets that are needed for UK carbon budgets. For example, we need[iii] new homes' space heat demand to be ≤15-20kWh/m^2/year. Space heat demand is affected by building form not just insulation and airtightness, but Part L doesn't require better insulation and glazing to counter an inefficient form.

Other calculation methods and definitions are available. The two leading alternatives are:

- LETI operational net zero carbon: A building that (each year) generates as much renewable energy as it uses, sometimes using grid electricity and other times sending renewable energy to the grid. The building must also be gas-free, and meet specific energy efficiency targets that match the performance needed for national carbon budgets.
- UKGBC Framework Definition of Net Zero Carbon: This has two parts:
  - Operational: When the carbon associated with a building's energy use is zero, by use of renewable energy (from onsite or offsite sources) or purchasing verified carbon offsets.
  - Embodied: When the carbon associated with a building's construction up to the point of completion is zero or negative, through the purchase of verified carbon offsets.

Because the LETI and UKGBC definitions are for *actual* operational performance not just modelling, they require the use of *accurate* energy calculation methods during design, specifically PHPP or TM54 (glossary). PHPP and TM54 account for total energy, not just the share that is 'regulated' by Part L.

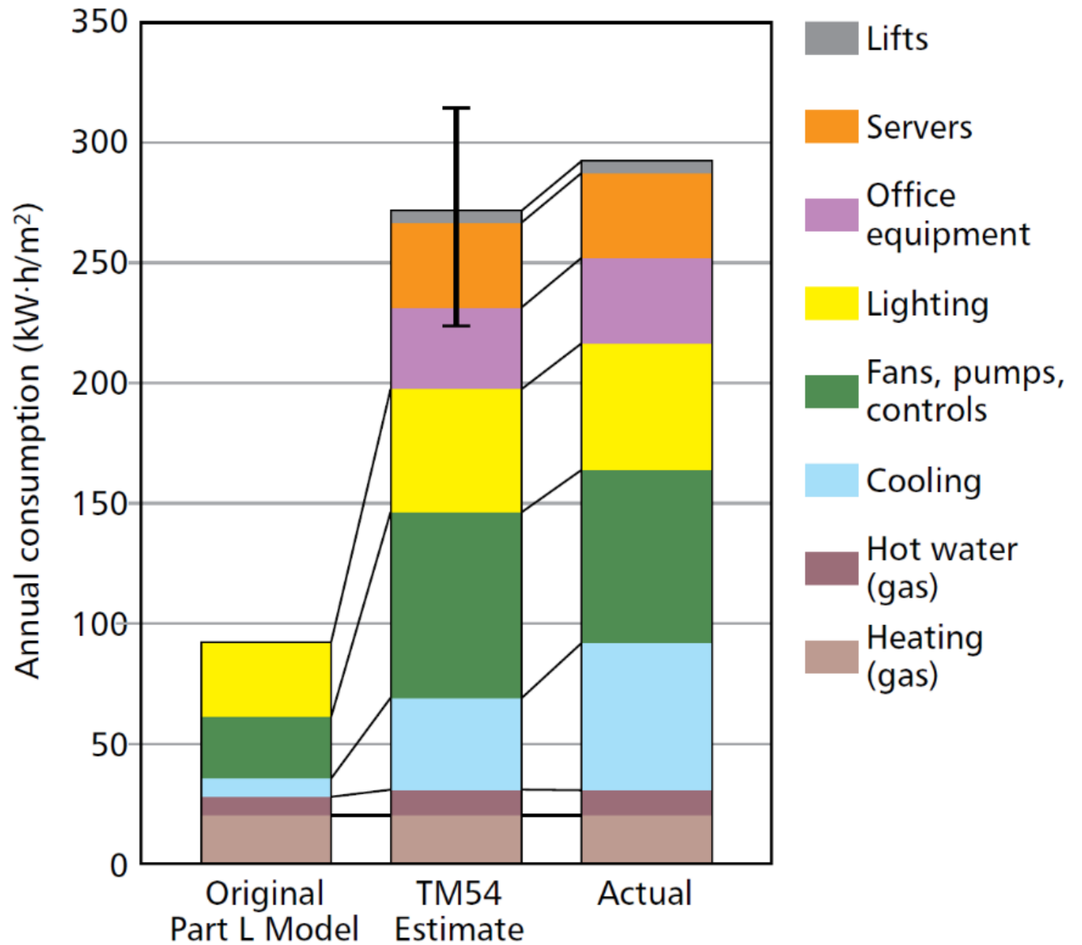


Figure 1: CIBSE graph that reveals the inaccuracies of Part L SBEM prediction of energy use, compared to a prediction using the CIBSE TM54 method, and the building's actual measured energy use in operation. This is for an office building.

[1] 'Primary energy' is the energy from renewable and non-renewable sources which has not undergone any conversion or transformation process. This metric is meant to show the total amount of energy or fuel that must be put *into* a system in order to get one unit of useful energy *out* at the other end, accounting for the losses that occur in (for example) converting fossil fuel to electricity or heat, or in distributing power through the grid.

About the local plan and what it does

A local plan is a land use or spatial plan that responds to identified issues and needs. Preparation of a local plan must conform with specific legal requirements and national planning policy. It must be evidence-based and informed by community engagement, and co-operation with prescribed partners and organisations.

The local plan sets out policies for change in the type, quality and location that will be considered acceptable for a range of land uses in the area, and includes a strategy for delivering future required growth. It includes policies that are used to determine planning applications. It identifies appropriate areas and sites for development, such as new homes, offices, shops, and community facilities. It also identifies circumstances where development is not appropriate, and it can set certain conditions around changes to existing buildings or other land uses.

The local plan is separate from Building Regulations. Building Regulations apply nation-wide and define the national minimum standards that new buildings must meet in order to be legal. These standards cover a wide range of technical topics including quality of materials, structural design, drainage, contaminants, fire and electrical safety, acoustics, ventilation, sanitation, water efficiency, overheating, electric vehicle charging, and energy efficiency/carbon emissions. Building Regulations apply not just to new developments, but also to extensions and alterations.

The local plan must be in accordance with the National Planning Policy Framework (NPPF), which is set by central government (most recently in 2021). The NPPF sets out principles and aims that the planning system should aim to fulfil. After a local plan is drafted and consulted upon, the local authority must then submit the draft plan to the Planning Inspectorate for independent examination before it is adopted and becomes part of the development plan. The Planning Inspectorate will assess the draft local plan to see if it is 'sound'. The NPPF's four 'tests of soundness' are:

- The plan must be positively prepared: It should respond to objectively assessed needs (in particular, needs for housing), and should deliver sustainable development.
- The plan must be justified: Its approach should be appropriate based on evidence and consideration of reasonable alternative approaches
- The plan must be effective: It should be based on effective joint working on cross-boundary strategic matters (cooperation between local authorities), and 'deliverable in the plan period' (e.g. the policies should not make it impossible to deliver the required amount of housing at the time it is envisaged that it will come forward).
- The plan must be consistent with national policy: This means it is in accordance with the other policies in the NPPF and other relevant statements of national policy.

Some decisions about development in the area are out of scope for the local plan. For example, large infrastructure projects – such as major road/rail, major renewable energy and airports – are considered 'nationally significant'. Such projects require national rather than local consent. The local plan's influence on existing buildings and other existing land uses is also limited, as the local plan cannot force changes to existing buildings where none have been proposed, and there are many typical changes to existing buildings or land use that do not require planning permission. However some changes to existing buildings can occur through permitted development in some cases, without the need for planning permission.

About the local plan

- **Has a duty to deliver 'sustainable development'** that meets environmental, social, and economic needs – especially housing delivery targets
- **Separate from Building Regulations** (which set minimum technical standards for buildings nationwide)
- **Has powers to require new development to do better than some of the standards set by Building Regulations** – including for energy efficiency and carbon emissions
- **Must be based on proportionate evidence** showing that the plan policies are justified, effective, deliverable, and consistent with national policy
- **Must pass an examination by the national Planning Inspectorate** – who will check it is in accordance with the National Planning Policy Framework, including that it proactively enables 'sustainable' development.

About Building Regulations Part L

- **Sets basic targets for new builds' energy and carbon:**
  - Fabric Energy Efficiency in kWh/m^2/year – this is a measure of the building's need for space heating
  - Carbon emissions in $kgCO^2/m^2$/year
  - Primary Energy Demand in kWh/m^2/year
- **Building must use specific calculation methods to fulfil these targets:** SAP for homes; SBEM for other buildings. However, these do not accurately reflect actual performance.
- **New requirement for 'energy forecasting' in non-residential buildings** – which can use CIBSE TM54 method

Why must the South Staffordshire Local Plan take action towards net zero carbon?

The Planning & Compulsory Purchase Act 2004 imposes a legal duty for every local development plan to have "policies designed to secure that the development and use of land in the local planning authority's area contribute to the mitigation of … climate change".

Mitigation of climate change means reduction in the impact of human activity on the climate[iv] by reducing greenhouse gas in the atmosphere[v,vi]. It therefore cannot just mean 'minimising the additional emissions from *new* development' – rather it requires an overall reduction in the net amount of emissions from all activities in South Staffordshire. This has two parts: reduction of emissions, and increase of sequestration (removal and storage of carbon by trees, other natural features, or future technology).

The National Planning Policy Framework clarifies the extent of mitigation, i.e. the local plan should:

- Take a proactive approach in line with the Climate Change Act 2008
- Shape places in ways that contribute to radical reductions in greenhouse gas emissions
- Support the transition to a low carbon future
- Provide a positive strategy to increase the use and supply of renewable and low-carbon energy.

The Climate Change Act 2008 contains the following legislated carbon reduction targets for the whole UK, therefore in order to be in line with the Act the local plan would need to be designed to take the necessary local action to achieve these:

- Net zero carbon by 2050 (based on a 1990 baseline)
- Steeply reducing 'carbon budgets' for each five-year period up to 2050 (see to right)

The budgets place a limit on the amount of carbon that can be emitted before the net zero goal. This is a vital action towards the UK's commitment to the international Paris Agreement 2015, in which 174 countries worldwide agreed to limit climate change to no more than a 2C rise on pre-industrial temperatures – above which the global impacts would be catastrophic due to 'tipping points'. For context, the world has already passed a 1C rise and is on track for a 3-4C by the end of the century.

These carbon budgets are devised by the Committee on Climate Change, before being legislated every few years by Parliament as per its duties in the Climate Change Act. The Committee also identifies the necessary sectoral changes to deliver those carbon budgets, of which most relevant to the local plan are:

- All new homes from 2025 to have low carbon heat (not gas), and very low space heat demand
- Rapid and large-scale roll-out of heat pumps to existing homes, and expansion of heat networks
- No installation of new fossil fuel boilers from 2033
- Fully decarbonise the electricity grid by 2035 (to be 80% renewable and 20% nuclear by 2050)
- Reduce travel mileage by car, and ensure all new cars/vans are electric from 2032
- Increase woodland cover to 18%, up from today's 13%, and restore peatlands
- All sectors net zero carbon by ~2045 except aviation, waste, & agriculture (most or all of the UK's capacity for carbon removals will be needed to balance these sectors' remaining emissions).

Committee on Climate Change analysis[vii] shows that national government plans are insufficient to deliver all these necessary changes. In 2022 the government's Net Zero Strategy was found unlawful[viii] as it fails to deliver on the Climate Change Act obligation to produce sufficiently detailed policies that show how the carbon budgets will be met. Therefore, in order to mitigate climate change in line with the Climate Change Act, the local plan will need to act ahead of national government action, using the powers available to local planning authorities.

The legal and policy mandate

- **Planning & Compulsory Purchase Act 2008** establishes that the local plan has a legal duty to mitigate climate change (reduce carbon)
- **National Planning Policy Framework (2021)** states the mitigation should be in line with the Climate Change Act 2008
- **Climate Change Act 2008** sets the 2050 net zero carbon goal, and also interim 'carbon budgets' that reduce every 5 years
- **Committee on Climate Change analysis and a High Court Ruling (2022)** shows that national government's current policies & plans will not deliver the Climate Change Act goals – so the local plan would need to take further action to fulfil its duty to mitigate climate change in line with that Act.

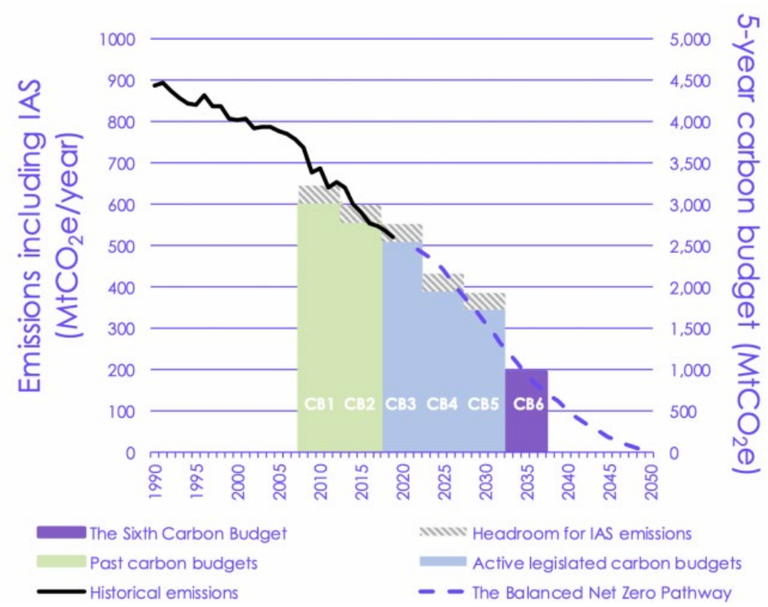


Figure 2: UK legislated carbon budgets under the Climate Change Act. From Committee on Climate Change (2020), The Sixth Carbon Budget: The UK's Path to Net Zero. "IAS" = international aviation & shipping.

How can the South Staffordshire Local Plan take action towards net zero carbon?

The main sources of emissions (and removals) that a local plan can affect are:

- New buildings – energy efficiency, energy supply / on-site generation, and embodied carbon
- Transport – enabling the right type and location of new development to reduce new and existing communities' car dependence, and bringing forward sustainable transport infrastructure
- Existing buildings – encouraging carbon-reducing renovations where permission is needed
- Renewable energy – encouraging new large-scale renewable energy generation and distribution
- Natural environment – protecting and expanding landscape features that capture or store carbon
- Using the planning permission process to raise funds for the measures above where lacking.

In this report, we focus on planning powers towards net zero carbon in the *buildings* and *energy* sectors.

The Planning and Energy Act 2008 gives the local plan the power to set 'reasonable requirements' for:

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

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 in Part L of Building Regulations (SAP or SBEM), despite their aforementioned shortcomings. However, the new non-residential Part L 2021 endorses the more accurate TM54 method for the purpose of energy forecasting (a new requirement to give the building owner a prediction of total metered energy use). Thus, it appears the local plan could require energy efficiency standards based on TM54, which accounts for *total* energy use, not just regulated (glossary).

The Act does not define 'reasonable requirement', nor does it define the term '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 (glossary). In that case a method would need to be chosen to account for that unregulated energy, ideally in a way that works alongside the calculation for regulated energy. Several methods could be used: TM54 (as above), BREDEM, and SAP Appendix L. PHPP could also be used but may not be compatible with SAP/SBEM.

The Town & Country Planning Act 1990 gives two key powers often used for carbon reductions:

- Section 106[ix] enables the local plan to require payments from new development. These must be reasonable, proportional to the development, and necessary to make the development acceptable. This has sometimes been used as a mechanism to offset new developments' carbon.
- Section 61[x] enables creation of Local Development Orders. This is a tool used to achieve specific objectives by granting certain types of development fast-track planning permission (or at least certainty of permission). These have been used to promote renewable and low-carbon energy.

The National Planning Policy Framework reaffirms ways the local plan can mitigate climate change:

- **Paragraph 154b**: "New development should be planned for in ways that … help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards".
- **Paragraph 155a-b**: "Plans should … provide a positive strategy for energy from [renewable and low carbon] sources … [and] consider identifying suitable areas for [these], and supporting infrastructure".
- **Paragraph 190**: "Plans should 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".

Local plan powers for net zero carbon development

- **Energy & Planning Act 2008:** The local plan can require new builds to provide / use renewable energy and improved energy efficiency.
- **National Planning Policy Framework (2021)**
  - Policies should 'reflect national technical standards' – this may influence the performance metrics or calculation methods that can be used in local policy around energy efficiency & renewables (*albeit some local plans have successfully adopted alternative metrics, justified by their effectiveness in delivering on national carbon reduction targets – see precedents*)
  - It is appropriate to seek carbon reductions through new development's location, orientation and design, and to plan for renewable energy
- **Building Regulations (Part L 2021) exceed the supposed previous limit on how far the local plan carbon and energy requirements could go** (the limit was expressed in Planning Practice Guidance and a 2015 Ministerial Statement),
  - Therefore it can be assumed that the limit is obsolete and that local plans can go as far as necessary to fulfil their duty to mitigate climate change
  - … so long as the requirement is shown to be 'reasonable' and does not stop the plan passing the four tests of soundness (justified, effective, consistent with national policy, and positively prepared to deliver development that meets needs)
- **Town & Country Planning Act 1990** allows the local plan to:
  - Seek payments from development (sometimes used to offset new developments' carbon emissions)
  - Make 'local development orders' to fast-track desirable development e.g. renewable energy

How have local plans used their powers towards carbon reductions?

Most adopted local plan example policies on net zero carbon buildings take the following approach:

- A minimum reduction in carbon emissions compared to the standard sent by Building Regulations Part L (the Target Emission rate), and
- The remainder of the Building Regulations 'regulated carbon' (Building Emission Rate) to be offset by a payment per tonne of regulated carbon emissions.

However, newer pioneering examples are taking a potentially more effective route of energy use limits and/or 100% renewable energy. Examples are given below, outlining their differences:

Table 1: Examples of precedent local plans' requirements for either carbon reduction or energy targets, and approach to offsetting excess carbon or energy where targets are not met.

Residential new-build requirement	London Plan (2021)	Milton Keynes (2019)	Central Lincolnshire (2023)	B&NES and Cornwall (2023)
Scope of emissions that must be 'net zero'	Regulated carbon as per Part L (some boroughs also include unregulated)	Regulated carbon as per Part L	Total operational carbon emissions from all energy use (regulated and unregulated)	
Minimum reduction in on-site carbon emissions (vs Building Regulations Part L 2013)	35%	39% (19%, plus a further 20% by renewable energy)	n/a	n/a
Energy use limits	n/a	n/a	35-60 kWh/m^2/year (EUI) 15 kWh/m^2/year (space heating demand)	40 kWh/m^2/year (EUI) 30 kWh/m^2/year (space heating demand)
On-site net zero (i.e. 100% on-site renewable energy supply)	No	No	Yes, through 100% renewable energy, but with exceptions for feasibility	Yes, through 100% renewable energy
Offset price	Recommend £60-£95/tCO$_2$, but decision by borough (e.g. Lewisham, £104/tCO$_2$)	£200/tCO$_2$	£5-15k/dwelling, or direct provision of offsite renewable energy equivalent to dwelling usage	£373/tCO$_2$ (BANES) 10p/kWh (Cornwall)
Years' worth of emissions to be offset	30	1	n/a	30

Some examples require energy efficiency to deliver a certain amount of the carbon savings, as this is the first step of the 'energy hierarchy' (list of measures in order of most to least preferred):

- London Plan 2021: Energy efficiency measures should deliver the following minimum improvements in the carbon emissions rate (within the overall minimum 35% on-site):
  - Residential: 10%
  - Non-residential: 15%.

  These levels were set to reflect the technically feasible energy efficiency improvements identified by analysing the Building Regulations Part L figures of recent development.

Some examples require a minimum contribution of renewable energy, either as a percentage of the building's energy use, or as a percentage reduction on the carbon emissions rate. For example:

- Milton Keynes (2019): Renewable energy to contribute a further 20% reduction in the carbon emissions rate, *after* an initial 19% reduction has been made by other measures.
- Solihull (Emerging): Provide at least 15% of energy from renewable or low carbon sources.
- West Berkshire (2012): Renewable/low carbon energy to achieve net zero total carbon emissions (regulated and unregulated) from 2016 for homes, or 2019 for other buildings, unless demonstrated unviable/ unfeasible. We note that this requirement was upheld by the planning inspector at appeal in 2022, although other parts of the same policy that were based on the now-withdrawn Code for Sustainable Homes were deemed inapplicable.

Where carbon offsetting is one of the mechanisms within the net zero carbon policy approach, the cost per tonne of carbon is set by various rationales. London's £95/tCO$_2$ rate matched a previous national carbon value, set annually by BEIS (as of 2023 this national value has risen to £378/tCO$_2$). By contrast, some other plans have used a per-home payment (see Central Lincolnshire in this table) with lower and upper bounds reflecting the amounts of funding that would be needed to install renewable energy sufficient to offset the typical new building's emissions.

Some key new examples have now been achieved that require absolute energy use limits and on-site renewable energy generation capacity to reach net zero carbon. These policies are inspired by LETI and UKGBC net zero carbon buildings definitions (previously explained) and are considered a more effective and reliable approach to energy and carbon reduction as opposed to policy approaches that rely on an improvement relative to the Part L regulated baseline. Key examples include:

- Bath & North East Somerset (B&NES) Council and Cornwall Council (2023):
  - 40 kWh/m^2/year (EUI) and 30 kWh/m^2/year (space heating demand) limits.
  - On-site renewable energy generation requirement to match total energy use.
- Central Lincolnshire Council (2023):
  - Residential: 35 kWh/m^2/year (EUI) and 15-20 kWh/m^2/year (space heating demand) limits.
  - Non-residential: 70 kWh/m^2/year (EUI) and 15-20 kWh/m^2/year (space heating demand).
  - Residential and non-residential development: on-site renewable energy generation to at least match total energy demand.

There are also several other local authorities that aim to follow this net zero carbon development approach by not relying on the Building Regulations Part L carbon emissions rate as the basis for the improvements that must be made. Examples include:

- Greater Cambridge Emerging Local Plan
- Bristol City Council Emerging Local Plan
- London Borough of Merton Emerging Local Plan
- Leeds City Council Emerging Local Plan
- Winchester Emerging Local Plan

Common features of these emerging pioneering plans include performance targets identified by the Committee on Climate Change to be necessary in new builds to help deliver the UK's legislated carbon budgets:

- Limiting space heat demand to 15-20kWh/m^2/year (sometimes up to 30kWh where this is found to be more cost-effective).
- Limiting total energy use intensity in kWh/m^2/year – the target varies by building type but is always set to a level that rules out gas boilers and requires a heat pump or other efficient low carbon heat (as heat pumps use about one-third of the energy of gas boiler or direct electric).
- Use of an accurate energy prediction calculation to demonstrate the building's compliance with these metrics, such as PHPP or TM54 (glossary), not the methods used in Building Regulations.

The policies also require on-site renewable energy generation equal to the building's energy use. The aim is that although the building may use grid energy at times when its own renewable generation is not sufficient, there will be other times when it generates more than it is currently using and exports the excess to the electricity grid, resulting in a net 'zero energy balance' over the year.

These emerging policies are all supported by evidence bases showing feasibility and viability in new building types typical to the local area, using highly accurate specialist energy modelling and analyses of build cost uplift compared to the existing building regulations.

'Energy offsetting' (rather than 'carbon offsetting') is permitted in the case of technical non-feasibility, in these emerging policies. Developers would have to pay an amount per kWh of energy use not matched with on-site renewables. Funds would be used to install renewable energy elsewhere in the local plan area, and priced accordingly per kWh. The aim is to simplify the offsetting process by avoiding the need for complicated calculations about the changing amount of carbon related to use of different fuels and electricity over time linked to grid carbon reductions.

It must be noted that not all plans following the energy-based net zero approach are receiving positive reactions from the Inspectorate at examination. While Cornwall, B&NES and Central Lincolnshire have now adopted such policies, West Oxfordshire (Salt Cross Area Action Plan) and Lancaster City Council have been forced to remove similar policy requirements. In the case of the West Oxfordshire Salt Cross AAP, the Inspector removed the absolute energy requirements to instead suggest them 'as guidelines only' – however, that Inspector's decision is presently subject to challenge by judicial review on the basis that it rested on an incorrect interpretation of an obsolete ministerial statement.

Defining net zero carbon buildings

‘Net zero carbon building’ definition in national building regulations and planning

Building Regulations Part L is the legal tool that controls buildings’ energy and carbon emissions. Most definitions of ‘net zero carbon buildings’ in local and government policy are based on Part L and the associated calculation methods.

Building Regulations Part L looks only at *operational* energy and carbon (and does not even address the entirety of this, as explained below). There is currently no regulatory method to consider *embodied* carbon, nor to hold new development responsible for carbon emitted by new occupants’ transport.

Part L only controls the ‘fixed’ energy uses of a building: space heating/ cooling, hot water, fixed lighting, ventilation, fans, pumps. It ignores plugin appliances, lifts, escalators, and so on (‘unregulated energy’). This means a ‘zero carbon’ building using Part L is not truly zero carbon.

To legally comply with Part L, a proposed development must use an energy and carbon calculation named the Standard Assessment Procedure (SAP, for homes) or the Simplified Buildings Energy Model (SBEM, for non-residential buildings). These calculations are submitted to building control.

SAP and SBEM set limits on the amount of energy a building uses per square metre per year, and the amount of carbon emissions that associated with the building’s energy use. These are the Target Emission Rate (TER) and Target Fabric Energy Efficiency (TFEE). The TFEE relates only to energy used for heating and cooling. The TER is the carbon emissions associated with all ‘regulated’ energy uses.

These limits are set by modelling a ‘notional building’ of the same size and shape as the proposed building, with a range of basic energy saving measures applied (insulation, glazing, air tightness, lighting efficiency, heating system efficiency and so on). Part L defines what these measures are. The proposed building must be designed so that it uses no more energy nor emits more carbon than the ‘notional building’ would. This means the targets vary between buildings, as heat losses are affected not only by the fabric but also the size and shape (more external surface and joins = more heat loss).

Part L is updated periodically, but not often: the previous version was in place from 2013 to 2022. A new version “Part L 2021” was implemented from June 2022, and a further version is expected to arrive in 2025 (the Future Homes Standard). These uplifts come with changes to the ‘notional building’[xi]. For Part L 2021, this has some small improvements to fabric (insulation/glazing) and solar panels applied to the roof, but it still has a gas boiler. Together these make the target emission rate about 31% lower than it was in Part L 2013. In Part L 2025 the notional building has a heat pump and much better fabric, but no solar panels. Together these measures will make the target emission rate about 75% lower in 2025 than in 2013 (or about 64% lower than it is with Part L 2022).

SAP and SBEM methods are also periodically updated to reflect changes in the carbon emissions of grid electricity, and the efficiency of various appliances or fittings such as boilers and hot water taps. Nevertheless, it is widely acknowledged that these methods are poor at predicting actual energy use (discussed overleaf) and their periodic updates tend to lag far behind the real-world changes to electricity grid carbon or changes to the efficiency of different heating technologies.

The Government’s consultation on the Future Homes Standard noted that their intent is that the Part L 2025 target emission rate will be low enough that new homes would not use a gas boiler. The 75% reduction on Part L 2013 would be essentially impossible to achieve in a home that has a gas boiler, which is likely to prompt the use of heat pumps in most homes, although some may be able to reach that emissions target using direct electric heating combined with extensive solar panels.

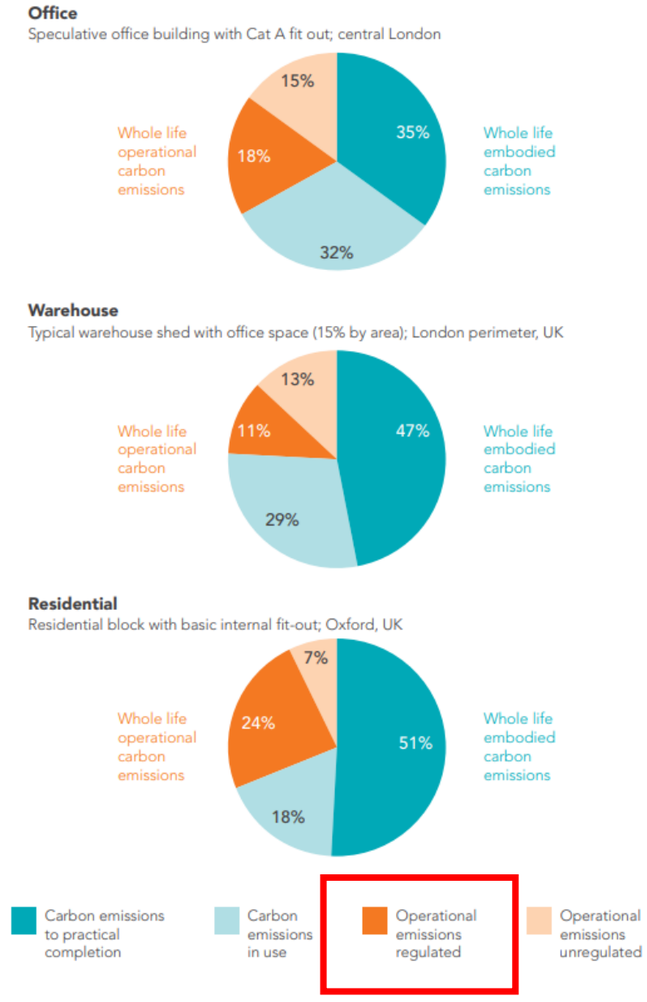


Figure 3: Diagram showing a breakdown of whole-life carbon emissions for three building types. Building Regulations Part L only looks at the orange segments - and even then quite inaccurately. Source: UKGBC.

‘Net zero carbon building’ – alternative definitions in the construction sector

Green construction experts have recently been developing new approaches to remedy the shortcomings of the national building regulations, SAP and SBEM in defining and delivering net zero carbon buildings. The main weaknesses in Building Regulations identified by the sector are:

- Failure to account for ‘unregulated energy’ – plugin appliances, lifts, escalators, and any other uses not covered by building regulations – which can be 50% of total operational energy use[xii]
- Poor accuracy at predicting buildings’ actual energy use using SAP and SBEM methods (the ‘energy performance gap’), often incorrect by a factor of 200-300%
- Frequently outdated carbon emissions factors for energy, especially electricity
- Failure to sufficiently incentivise energy-efficient building design, due to relatively weak standards for airtightness and not setting absolute targets in kWh/m^2 that all buildings of a certain type must achieve.
- Failure to address embodied carbon (the carbon that was emitted to produce building materials, transport them to site, and assemble them into a finished building).

For all of the reasons above, a ‘net zero carbon building’ calculated by Part L SAP or SBEM will in fact be very far from being carbon-free in operation[xiii], before even considering its embodied carbon impacts.

The industry has therefore begun to collaboratively develop new definitions that address not only the end result of net zero carbon, but also inform the design and energy procurement measures that should sensibly be used to achieve it, such as energy efficiency targets and embodied carbon targets.

UK Green Building Council (UKGBC) Framework Definition of Net Zero Carbon, 2019

The UKGBC definition[xiv] of net zero carbon buildings includes twin tracks: operational and embodied. These twin tracks for net zero carbon buildings can be treated separately. However, buildings seeking ‘net zero carbon construction’ should also aim to fulfil the operational track too.

- Net zero carbon in construction [embodied carbon] is: “When the amount of carbon emission associated with a building’s product and construction stages up to practical completion is zero or negative, through the use of offsets or the net export of on-site renewable energy.”
- Net zero carbon in operation is: “When the amount of carbon emissions associated with the building’s operational energy on an annual basis is zero or negative. A net zero carbon building is highly energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset.”

UKGBC does not require the building to hit any specific targets for space heating, operational energy use, or embodied carbon , although it encourages reductions to be prioritised before offsetting.

UKGBC’s separate energy procurement guidance[xv] confirms that off-site renewable energy supply does not have to be via a long-term power purchase agreement[2], but can be a green tariff so long as that it meets certain criteria on ‘additionality’ (so the purchase of the energy brings forward additional renewable energy generation capacity, not just buying up existing renewables present in the grid).The guidance notes that at the time of writing (2021) only three such tariffs existed in the UK. It also notes:

- Fossil fuel must not be the primary energy source for heating, hot water and cooking
- All new build energy systems should be compatible with being renewably powered.

[2] A fixed contract between a renewable energy generator and a customer at a pre-negotiated price. This long-term certainty can unlock finance allowing the generator to install dedicated new capacity for generation.

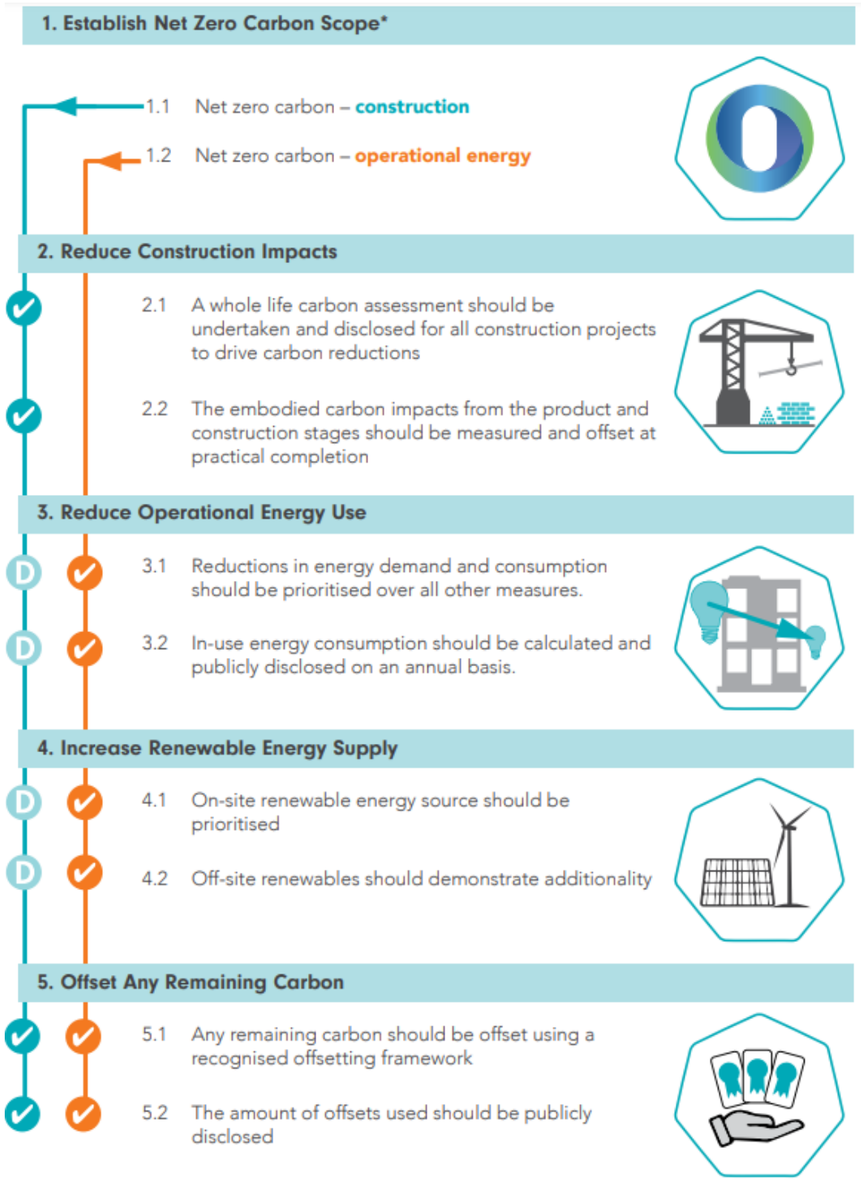


Figure 4: UKGBC Net Zero Carbon Buildings Framework Definition - twin track diagram.

Low Energy Transformation Initiative (LETI) Net Zero Operational Carbon

LETI is a coalition of industry-leading green building experts, architects and surveyors.

Its definition[xvi] is that the building achieves a zero carbon 'balance' in its energy use across each year. That means that for each unit of energy that the building consumes from the grid, it exports at least one unit of zero-carbon energy produced by the building itself (generally assumed to be through solar panels). Alternatively, the building's energy demands can be entirely met by additional renewable energy supply from off-site.

LETI's definition also requires that the building fulfil the following targets:

- Space heat demand: 15kWh/m_2/year for all building types.
- Total energy use intensity, including unregulated as well as regulated: 35kWh/m_2/year in homes, 65kWh/m_2/year in schools, or 70kWh/m2/year in commercial offices
    - These targets are designed to ensure the use of heat pumps, as these have a ~300% efficiency which translates a 15kWh space heat demand to a 5kWh energy use.
- All space heat and energy demand targets must be fulfilled at the design stage using an accurate predictive energy modelling methodology (not the building regulations methods SAP or SBEM[xvii]), such as Passivhaus Planning Package (PHPP)[3]
- Heating and hot water not to be generated using fossil fuels
- Onsite renewable energy should be maximised.

These targets – specifically the space heat demand target and fossil-free heating – are in line with the similar targets that apply to the industry certification 'Passivhaus' (although Passivhaus basic certification does not require any level of renewable energy provision or full 'net zero carbon' status). This means the LETI targets are well-aligned to the recommended SCATTER 'high ambition scenario' interventions for the new build sector for South Staffordshire.

Other sustainable construction frameworks such as the RIBA Climate Challenge[xviii] have adopted similar targets for energy use intensity at similar levels, although not for space heating.

LETI also recommends annual reporting of energy use and renewable energy generation on site for 5 years to verify the net zero carbon status, and that embodied carbon should be separately assessed and reported. It offers separate targets[xix] for embodied carbon, but does not expect the embodied carbon to be offset – rather, reduced at source as far as possible.

We note that although UKGBC has not updated its 'framework definition' (discussed in the previous section), it has now endorsed the LETI definition of net zero carbon[xx].

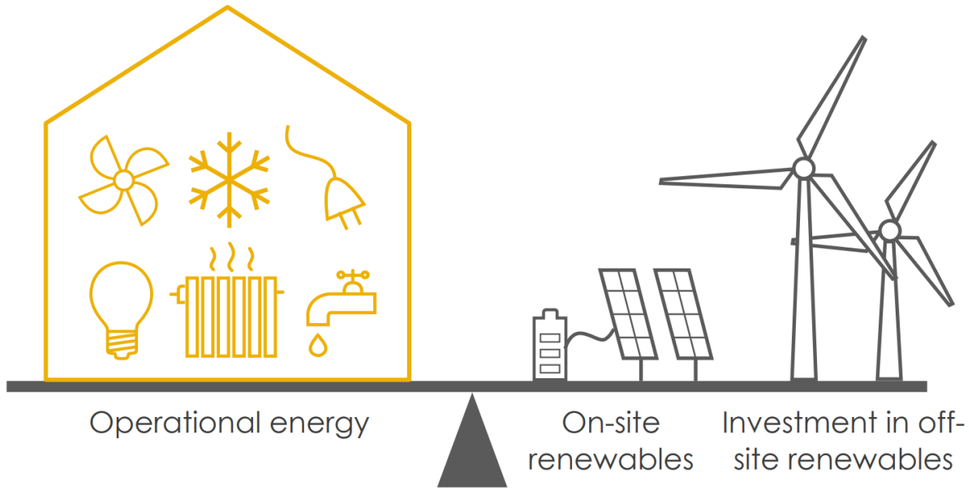


Figure 5: Diagram of LETI net zero operational balance. From LETI Climate Emergency Design Guide.

[3] Please note the Passivhaus Planning Package (PHPP) is a method to model and predict building's energy use. Although it was developed for use in the Passivhaus certification process, there is no obligation to undergo Passivhaus certification – the PHPP tool can be used in any project without pursuing certification.

Why must the South Staffordshire Local Plan take action towards net zero carbon?

National and international commitments to address climate crisis

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. This would require very fast and drastic cuts to global carbon emissions, as there is a limited 'carbon budget'[xxi] to be emitted before the 1.5C and 2C limits will be reached – and a rise of 1 ˚C has already happened. If the 1.5˚C or 2˚C limits are breached, climate change impacts will be devastating worldwide, and the world is currently on track to breach 3˚C by the end of the century[xxii].

The Paris Agreement also commits that the extent of each country's carbon reductions is related to wealth and technological ability. As a rich and technologically advanced country, the UK is responsible for faster and deeper cuts. Given the speed and scale of carbon cuts needed in existing buildings, transport and other energy use, we cannot afford for new buildings to add to the burden.

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, rather than the original goal of an 80% reduction on the carbon emissions of 1990. The Act also comes with interim 5-yearly carbon budgets that are devised by the independent Committee on Climate Change (CCC) and then passed into law by Parliament.

The latest five-yearly carbon budgets[xxiii] mean that compared to the 1990 baseline, the UK must achieve a 78% reduction 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[4]).

The carbon budgets also show 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 (see *Figure 7*), not relying on offsetting.

The Committee on Climate Change explains that "a little more or a little less may be achieved in any area, or alternative low carbon options could be used, but the overall level of ambition and delivery must match" the proposed carbon budgets.

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 (for example, even highly ambitious levels of tree planting would barely be enough to offset unavoidable emissions from agriculture – see *Figure 8* - therefore the buildings and energy sectors should not rely on tree planting to make up for insufficient reductions in their own energy use and emissions).

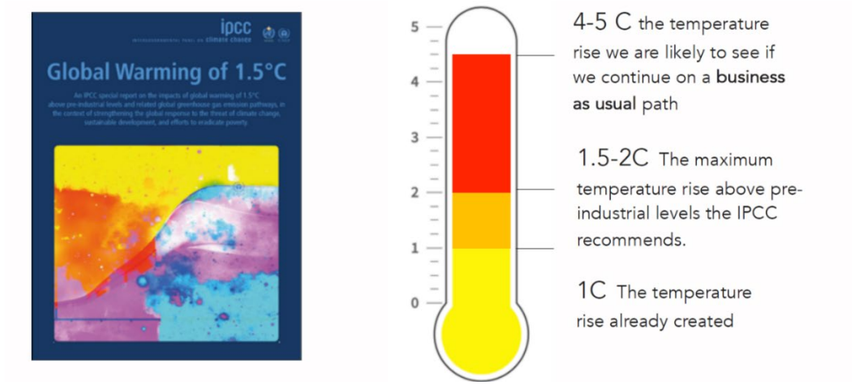


Figure 6: Special Report on 1.5C by IPCC, and diagram of the potential range of climate change to 2100 (Diagram credit: Etude, 2021).

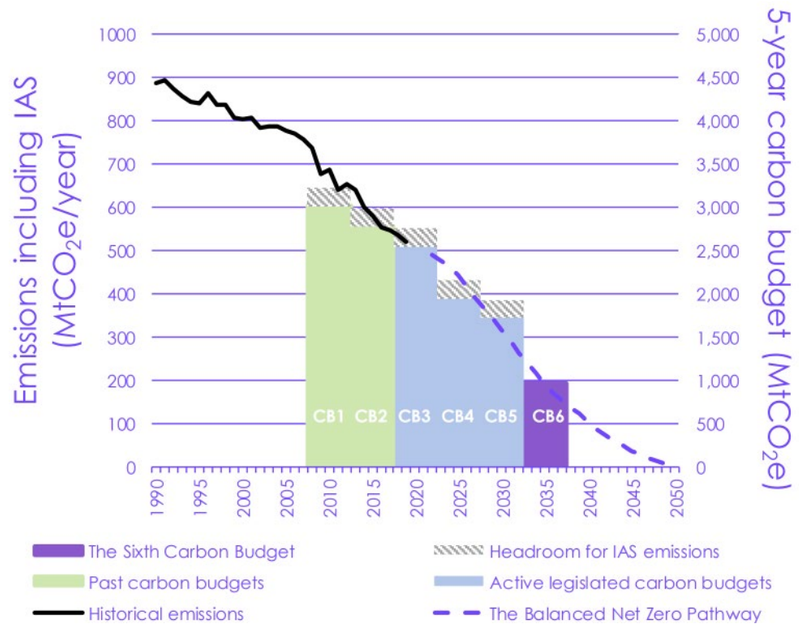


Figure 7: UK legislated carbon budgets under the Climate Change Act. From Committee on Climate Change (2020), The Sixth Carbon Budget: The UK's Path to Net Zero. "IAS" = international aviation & shipping.

[4] For context, the UK's carbon emissions fell by 9.5% in 2020 due to the COVID pandemic but have since rebounded by about half that figure in 2021, while global carbon emissions fell by about 5% in 2020 but have now rebounded to even higher levels than before COVID.

The UK's five-yearly carbon budgets also come with **progress reports** detailing a **combination of actions necessary to stay within the budgets**[5]. These include wide-reaching and ambitious changes to buildings (new and existing), the energy system and transport, as well as agriculture/forestry, industry and waste. Most relevant to local planning are:

- **No new homes connected to the gas grid from 2025** at the latest[xxiv] (and ideally be zero carbon[xxv]), 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 current building regulations[xxvi])
- **Accelerate and scale-up rollout of low carbon heat to existing buildings**, with 3.3. million heat pumps installed in existing homes by 2030, expansion of low carbon heat networks in the 2020s, and a limited role for hydrogen in the existing gas grid in some locations after 2030
- **End the installation of any fossil fuel boilers by 2033 for all existing buildings** including homes, commercial and public buildings, unless in hydrogen gas grid areas
- **Rapid rollout of insulation and other energy efficiency measures to existing buildings**, so that all existing homes for sale from 2028 have EPC rating of C or better, and 15 million homes to receive insulation to their walls, floors or roofs by 2050, to include by 2025:
    - Loft insulations to reach 700,000 per year (from current level of just 27,000/year)
    - Cavity wall insulations to reach 200,000/year (current level: 41,000/year)
    - Solid wall insulations to reach 250,000/year (current level: 11,000/year)
- **Construction materials to be used more efficiently and switching to low carbon materials** (e.g. timber and low-carbon cement) – although this has only a very small role overall
- **Fully decarbonise the electricity grid by 2035**, by:
    - **Scaling-up renewable electricity** to represent 80% of generation by 2050 – primarily wind power but also solar, with much of the wind power being offshore – in step with greater electricity demand as buildings and transport switch away from fossil fuel
    - **Add energy storage to the system**, including batteries, hydropower, and hydrogen
    - **Maintain or restore the existing nuclear power capacity** by building new capacity in the 2030s to replace existing plants that are being retired in the 2020s
- **Reduction in travel mileage by car**, and phase out of new fossil fuel cars and vans from 2032 in favour of fully electric vehicles – and relatedly, decisions on investment in roads should be contingent on analysis justifying how they will contribute to the UK's pathway to net zero and not increase emissions[xxvii]
- **Increase woodland cover to 18% of UK land**, up from 13% today, and restore peatlands.

Committee on Climate Change analysis found that the **government's policy plans are insufficient to deliver the full suite of necessary actions for the carbon budgets**[xxviii]. 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[xxix] nor make buildings net zero carbon from first operation, nor include any regulation around low-carbon materials or material efficiency.

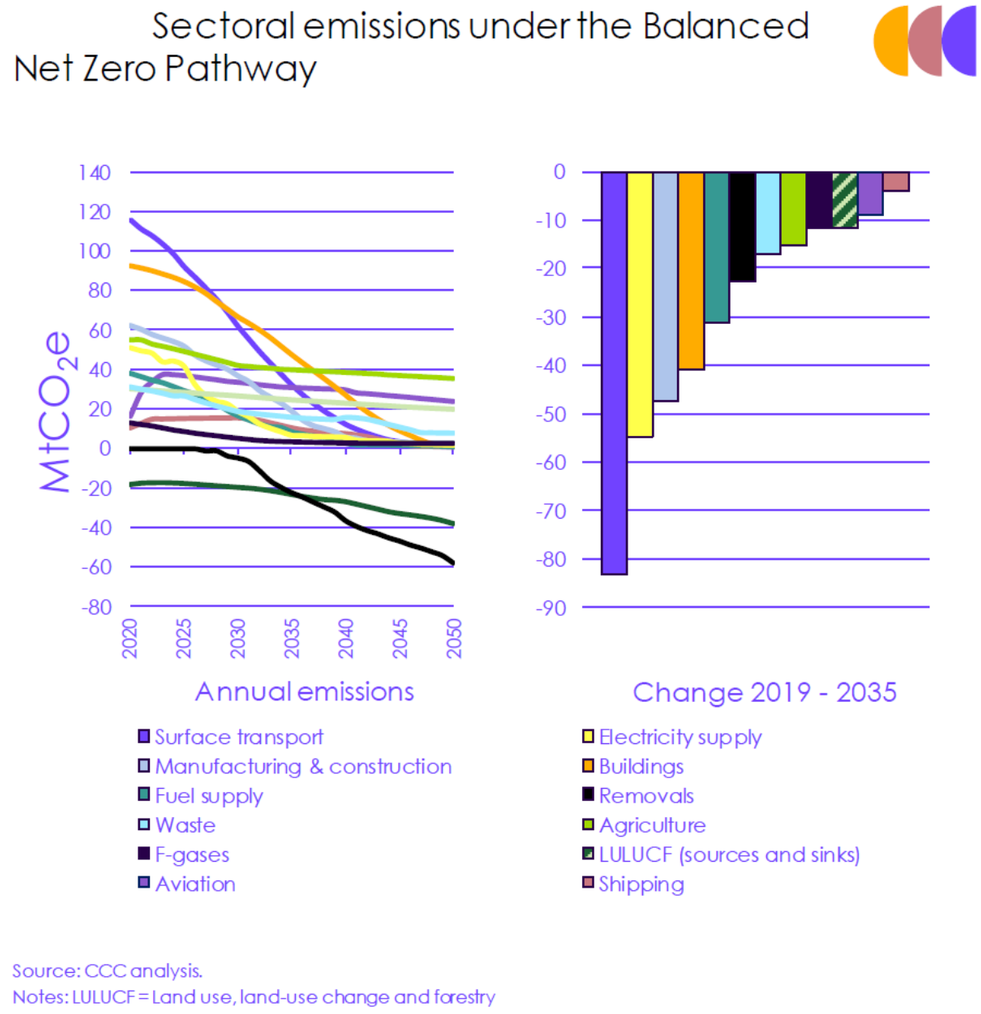


Figure 8: Committee on Climate Change Diagram showing how the carbon emissions of each sector must fall to achieve the 'balanced' pathway towards net zero carbon in 2050 and meet carbon budgets. From Committee on Climate Change (2020), *The Sixth Carbon Budget: The UK's path to net zero.*

[5] It is important to note that the CCC carbon budgets, while challenging, are really the minimum we must do to play our fair role in preventing catastrophic climate change. Other expert analysis of the UK's true 'fair share' of the global carbon budget has found[5] that the carbon budgets should be about half the size of the budgets that the CCC permits. These experts (at the Tyndall Centre) argue that if the UK does not stick to that fair share, it would be failing in its commitment to the Paris Agreement. These experts (at the Tyndall Centre). Beyond the 'fair share' question, the CCC budgets also include future carbon removals through technologies that do not yet exist, and also 'carbon allowances' through emissions trading schemes. Tyndall Centre experts find it wiser to exclude both of these in case the technologies fail to emerge and because the emissions trading schemes are based in economy, not the science of global carbon budgets.

The role of and commitments of South Staffordshire

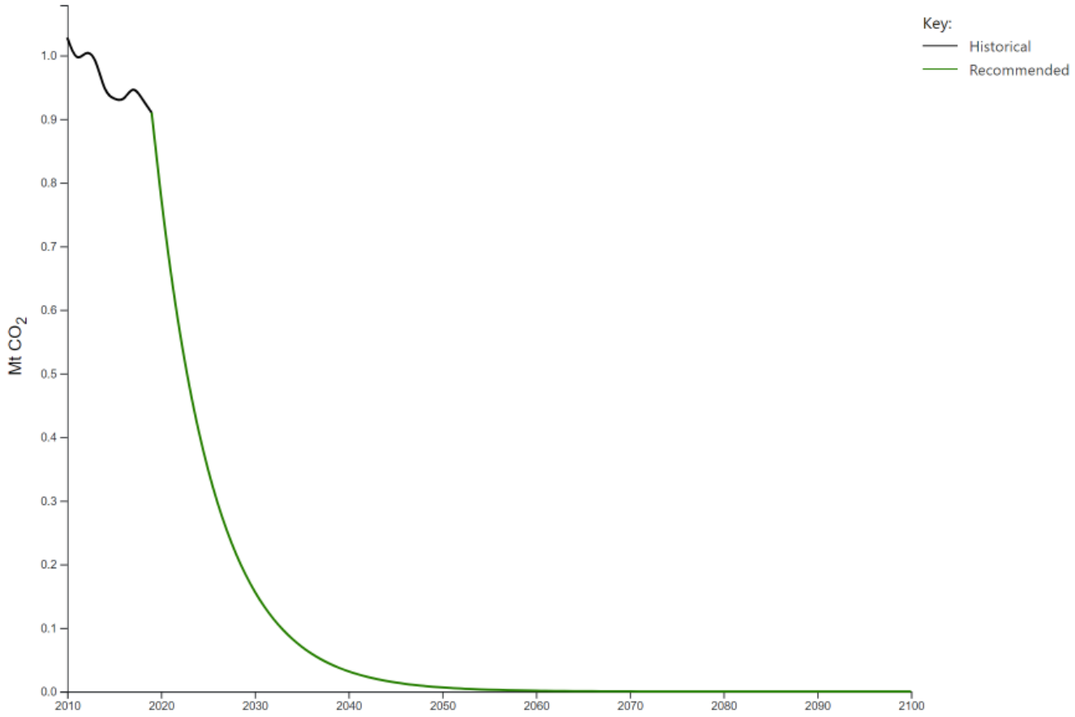


Figure 9: Emissions reduction pathway for energy-only CO_2 emissions to fulfil carbon budgets for South Staffordshire from 2018 to 2100 compatible with the Paris Agreement. Tyndall Centre (2023).

As the UK's carbon budget should logically represent a share of the global carbon budget, expert analysis by the Tyndall Centre has made an alternative estimation of a fair carbon budget for each UK local authority area to pull their weight towards fulfilling the international Paris Agreement to limit climate change to 2°C. 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, and they are devised with a more explicit focus on the 'Paris Agreement's equity principle – that is essentially that richer countries make more drastic carbon cuts due to their greater ability and responsibility for the historic emissions already changing the climate. The Tyndall budgets are CO_2-only (no other gases) and energy-only (i.e. no emissions or removals that are not fuel-related e.g. land use). They show only reductions at source, not 'net zero' where emissions are compensated for by removals.

The Tyndall Centre's recommended pathways to net zero within the South Staffordshire carbon budgets are represented in *Figure 9, respectively*. To avoid exceeding the Tyndall carbon budget, South Staffordshire emissions would need to fall as *Figure 9*, starting from the 2018 baseline. This pathway amounts to a required annual 14.8% reduction to energy-related CO_2.

Recognising the global and national urgency of the climate crisis – and in particular the need[xxx] to cut global emissions by 2030 – South Staffordshire has declared a climate emergency but has not set a target date to achieve net zero as a district. (We note that Tyndall budgets do not reflect local climate declarations –because they are based on what Tyndall Centre finds to be scientifically and ethically justifiable minimum carbon reductions for each area in order to fulfil the UK's international commitment to the Paris Agreement; they are not based on local political commitments).

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 South Staffordshire's ambitions, especially in transport, buildings and energy.

A local plan that achieves dramatic carbon reductions will help to avoid contributing to the risk of South Staffordshire's residents being impacted by financial and health-related harms that would come with climate change. The Committee on Climate Change[xxxi, xxxii] has found (and UK central government has recognised[xxxiii]) that the changing climate brings risks of harm to the UK population's health, wellbeing and economy in coming decades, all of which could affect South Staffordshire's citizens. These include:

- Overheating – deaths, health-related productivity losses, additional energy cost for cooling
- Flood – danger to life, health and cost of damage to property and infrastructure
- Drought – perhaps risking the need for expensive solutions to maintain public water supplies
- Future contagious epidemics via disease vectors – ticks are becoming more abundant, and malarial mosquitoes may begin survive in the UK due to warmer winters
- Crop losses or soil damage via droughts, floods, heat and wildfires – impacting jobs in our fragile farming sector, and potentially the availability and affordability of healthy food.

All of the above are in addition to the impact on ecology/wildlife of the UK whereby freshwater ecosystems are already being harmed by over-abstraction of water[xxxiv], and whereby native UK wildlife may struggle to compete with invasive species that move in as our climate becomes milder.

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.

National Policy expectations and legal duties of the local plan to address carbon reductions in the local area and the UK as a whole

The local plan's role to facilitate dramatic carbon reductions and a net zero carbon future is not only a political choice and a scientific need, but also a legal duty.

This section will explain the key pieces of legislation and national government policy, as well as setting out where in national planning policy and guidance these legal duties are reaffirmed, that impose this duty, providing context for the level of ambitious carbon reduction that the policies should pursue.

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[xxxv], primarily by reducing the level of greenhouse gas in the atmosphere[xxxvi, xxxvii]. This has two parts: reduction of carbon emissions, and action to increase the sequestration of carbon (removal and storage of carbon by trees, grassland, other green infrastructure, or future technologies).

As outlined previously, if a 2°C global limit is breached, we will hit 'tipping points' where various natural systems will be damaged to the point where they begin to release even more greenhouse gases and result in runaway climate change that may be unmitigable after that point.

Therefore to truly "contribute to the mitigation of climate change", the local plan's policies should facilitate the required carbon budget that would be compatible with staying below a 2°C future. As previously noted, this essentially means there is no room for new development to add to the overall carbon emissions of the UK (given the existing vast challenge of reducing existing emissions). The RTPI and TCPA assert also that "This means that Annual Monitoring Reports should contain assessments of carbon performance against the carbon budget regime set out in the Climate Change Act".

National Planning Policy Framework (NPPF) 2021

This document[xxxviii] is the framework by which the whole planning system is guided, and by which the soundness of local plans (and planning appeals) is judged by the planning inspectorate. Its following paragraphs reaffirm the duty of local plans (and whole planning system) to mitigate climate change:

- **152:** "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 and associated infrastructure".
- **153:** "Plans should **take a proactive approach to mitigating** and adapting to climate change … In line with the objectives and provisions of the Climate Change Act 2008".
- **154:** "New development should be planned for in ways that … help to reduce greenhouse gas emissions, such as through its location, orientation and design".
- **155:** "To help **increase the use and supply of renewable and low carbon energy** and heat, plans should … **provide a positive strategy for energy from these sources** … consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development".

To comply with the above imperative for carbon reductions 'in line with the Climate Change Act' would have to mean taking action to achieve the intermediate 5-yearly carbon budgets that the Committee on Climate Change devises and parliament legislates, as well as the eventual net zero goal in 2050.

Planning Practice Guidance (PPG)

The National Planning Practice Guidance is an online resource that adds further context and interpretation to the NPPF. It is separated into a series of topics, including climate change, renewable energy, planning obligations and viability. It makes several points about the duty and expectation for local plans to address carbon reductions.

Its climate change section[xxxix] confirms that:

> "Addressing **climate change is one of the core land use planning principles** which the National Planning Policy Framework expects to **underpin both plan-making and decision-taking**. To be found sound, Local Plans will need to reflect this principle and enable the delivery of sustainable development in accordance with the policies in the National Planning Policy Framework. These include the **requirements for local authorities to adopt proactive strategies to mitigate and adapt to climate change in line with the … Climate Change Act**".

This section reiterates local plans' climate mitigation duty per the Planning & Compulsory Purchase Act 2004, and that plan makers should be aware of the Climate Change Act goal and carbon budgets. The section on renewable and low carbon energy[xl] confirms that:

- All communities have a responsibility to help increase the use and supply of green energy, albeit not overriding other environmental protections
- Local planning authorities hold decisions over renewable energy development of 50 megawatts or less, and may soon hold decisions over onshore wind over 50MW[xli]. (*Note: As of 2020, energy storage of over 50MW is now the domain of the local planning authority, except pumped hydro[xlii]).

Potential tension with other duties

These carbon reduction duties are often in tension with the local plan's other duties – e.g. to enable economic growth and delivery of government-mandated housing targets. It is often assumed or argued that these other objectives could be inhibited if the carbon reduction provisions are so onerous as to present technical challenges or put at risk the developers' anticipated minimum profit margin of 15-20%. Nevertheless, the NPPF explicitly states that the goal of the planning system is '*sustainable* development' which it defines as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (as per the United Nations definition).

Given that the continued existence of life across much of the Earth is at risk if the planet exceeds 2°C of climate change (as previously discussed) – or at least a good quality of life – there is a strong argument to make that carbon emissions should be treated as the fundamental bottom line for what we can define as 'sustainable' development.

How can the South Staffordshire Local Plan take action towards achieving net zero carbon?

As previously explained[6], this report's primary focus is to support policy on the carbon emissions of buildings, which are responsible for a large share of local area carbon emissions. Specifically, new builds are the subject of most planning applications and thus the area that local plan policy wording (as opposed to spatial strategy) can most strongly influence. Therefore, this section focuses on the planning powers available to reduce the carbon of buildings, including via their grid energy supply.

The previous section highlighted the key pieces of legislation and national policy that set out the duties local plans hold to address climate change. This section explores many of the same pieces of legislation and policy, but this time sets out how these documents define the powers available to local plans to meet the duty of addressing climate change, as well as the powers available to meet net zero.

The powers afforded to the local plan to set policy requirements towards net zero carbon new buildings flow principally from the Planning and Energy Act 2008. Further direction how these powers can and should be used is given in the National Planning Policy Framework (NPPF) and National Planning Practice Guidance (PPG). Additionally, formal ministerial statements and other official government policies can also affect interpretation of how those powers should be wielded.

Planning and Energy Act 2008

The Planning and Energy Act 2008 grants local plan the power to set "reasonable requirements" for:

- "energy efficiency standards that exceed the energy requirements of building regulations"
- and "a proportion of energy used in development in their area" to be from renewable or low-carbon sources "in the locality of 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 requirements" as standards that are 'set out or referred to in regulations made by the [Secretary of State]' or 'set out or endorsed in national policies or guidance issued by the [Secretary of State']. This is also repeated in National Planning Policy Framework paragraph 154. The only 'energy efficiency standards' currently clearly set out or endorsed in this way are the energy and carbon calculation methodology used for Part L of the building regulations. Until recently, this was only SAP and SBEM, but the new Part L 2021 for residential also mentions CIBSE TM54 as a suitable method to fulfil the new requirement for energy forecasting. This may be interpreted to mean that energy efficiency requirements must use SAP/SBEM or TM54 calculations. If SAP/SBEM, their scope will be limited to regulated energy only (heating, hot water, fixed lighting, ventilation). If TM54, total energy efficiency could be specified (including unregulated). However, several examples have recently successfully been adopted that use PHPP as well as TM54.

The act does not define 'energy used in their area'. Therefore, it is probable that requirements for renewable energy could cover a proportion of the new building's *entire* energy use, not just the share that is 'regulated' by Part L and calculated using SAP/SBEM.

Most definitions and requirements for 'net zero carbon buildings' in local plans are based on Part L and the associated calculation methods (although some make a separate requirement for renewable energy). This means they are subject to the weaknesses that befall Part L in terms of inaccurate calculations of energy and carbon, and a lack of incentive to create an inherently thermally efficient building shape (see previous section on national and alternative definitions of zero carbon).

Town and Country Planning Act 1990

The key parts of this Act relevant to carbon reductions are:

- Section 106[xliii], planning obligations – this enables the local plan to require payments for the purpose of making an otherwise unacceptable development into an acceptable one. Section 106 obligations are expected to be reasonable, proportional to the development, necessary to make the development acceptable. This has been used in several example local plans to require carbon offsetting payments from new development.

- Section 61[xliv] enables the creation of a Local Development Order. This is a legal tool used by local government to achieve specific local plan objectives by permitting certain types of proposal that would otherwise need to go through the planning permission process. These are sometimes used to bring forward renewable energy, or low-carbon heat to existing buildings.

Infrastructure Act 2015

Section 37 of this Act[xlv] included provision for the Building Regulations to be amended to require provision for off-site carbon abatement measures. This was in relation to the erstwhile anticipation of the national net zero carbon building standard which was scrapped before coming into force. Nevertheless, this is where the concept of 'allowable solutions' to carbon emissions originated, in terms of allowing buildings to be legally accepted as 'net zero carbon' by delivering measures off-site to reduce carbon emissions or increase carbon sequestration, which could include paying others to perform those measures or purchasing carbon offset certificates through a national scheme.

Although the national net zero carbon buildings plan was scrapped and the government has not yet proceeded to enact the national 'allowable solutions' scheme envisioned by the Act, this is still the concept taken echoed in many subsequent local plans in the form of requirements for carbon offsetting either by payments or by direct delivery of projects that will reduce carbon emissions.

National Planning Policy Framework (2021 update)

This national policy document, updated in 2021[xlvi], is the framework by which the preparation of local plans is expected to be guided, and by which their soundness is judged by the planning inspectorate. It expresses four key tests of soundness (all of which appear relevant to carbon):

- Plan should be positively prepared (responding to needs; delivering sustainable development)
- Plan should be justified (having considered alternatives and be based on evidence)

[6] Please note that this document focuses mostly on the carbon impact of **buildings**. Beyond this, new development will often also have carbon impacts from the transport induced in the lifestyles of its residents, workers or visitors. This transport carbon would be part of South Staffordshire's overall carbon emissions – and would therefore need to be reduced to zero in order to hit the national goal of net zero carbon by 2050 (or 2030 for the local target). Nevertheless the transport carbon is not considered part of the carbon that belongs to the building itself, thus it is not part of the definition of 'net zero carbon buildings' for which we now explore the planning powers to regulate. Transport and standalone renewable energy are briefly considered in the section entitled "beyond the building".

- Plan should be effective and deliverable over the plan period
- Plan should be consistent with national policy (again delivering sustainable development and being in accordance with other statements of national planning policy, where relevant).

It also reaffirms the ways in which the local plan (and whole planning system) can mitigate climate change. Beyond the NPPF paragraphs 154-155 in the previous section, the following paragraphs also become relevant to the question of which interventions are considered appropriate by the NPPF:

- **Paragraph 158**: "When determining planning applications for renewable and low carbon development, local planning authorities should not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions".
- **Paragraph 190**: "Plans should set out a positive strategy for the conservation and enjoyment of the historic environment, including heritage assets most at risk through neglect, decay or other threats … taking into account the desirability of sustaining [them] … and putting them to viable uses consistent with their conservation" – This may support a sensitive but permissive approach towards energy retrofit, where this keeps a heritage building fit for long term use.

The NPPF also includes points which could be taken to constrain the extent to which a local plan can require carbon and energy improvements in development, including:

- **Paragraph 154b**: "Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards."
- **Paragraph 157a** allows that new development should comply with local requirements for decentralised energy supply unless it is demonstrated to be not feasible or viable.

At present, the relevant 'national technical standards' would largely mean the building regulations Part L uplifts in 2021 and 2025, and perhaps also the electric vehicle charging requirements that are being introduced through the new Part S of building regulations.

National Planning Policy Framework Update Consultation (2022-2023)

The National Planning Policy Framework (NPPF) consultation[xlvii] ran from 22 December 2022 to 2 March 2023, in the context of the Levelling Up and Regeneration Bill, to primarily seek views on proposed changes to the NPPF and the approach to preparing 'National Development Management Policies' (a completely new element in the planning system, which forms one of the proposals laid out in the Levelling Up & Regeneration Bill - see summary later in this document). The key points from the 2022-23 NPPF consultation relate to:

1. Onshore wind development

A positive amendment to text relating to the repowering of onshore wind states that LPAs should approve applications for the repowering and life-extension of existing renewables sites. This is however arguably the only helpful change on this topic, primarily because footnote 63 continues to take a negative stance to onshore wind development by treating it differently to other types of energy development. As per the current NPPF, this draft NPPF continues the uniquely negative treatment of onshore wind in that its acceptability depends on demonstrating through consultation that it has 'community support', and prior identification of suitable areas in the local plan or in an SPD. A lack of clarity remains over what constitutes sufficient 'community support'. For the purpose of enabling local plans to fulfil their legal duty to mitigate climate change, it could be argued that footnote 63 should be removed to relax barriers experienced by onshore wind development and so that the technology has equal opportunities for growth. Alongside the climate imperative there is also a socioeconomic argument for this especially in context of the recent energy price volatility, given that onshore wind is one of the cheapest forms of energy generation[xlviii].

Other changes to footnotes 62 and 63 propose that onshore wind applications could be granted permission through Local Development Orders, Neighbourhood Development Order and Community Right to Build Orders. Additionally, it is suggested that supplementary planning documents could be used as a resource to identify suitable sites for onshore wind, instead of through a development plan.

2. Replacement of Supplementary Planning Documents

The proposed reforms to the planning system would replace supplementary planning documents (SPDs) with Supplementary Plans; existing SPDs would expire after a new-style plan has been adopted. The replacement of SPDs is a concern for local authorities as they provide valuable supplementary information on parent policies and guidance on how to achieve them. SPDs enable a deeper explanation and description of policy wording within Local Plans, which can strengthen an overall policy approach towards improved delivery. The expiration of existing SPDs will increase plan-making complexity and place resourcing constraints on local authorities, particularly as proposed Supplementary Plans will be subject to an additional process of examination.

3. Increased weight given to energy efficiency improvements in existing buildings

The insertion of paragraph 161 is a positive move, since it emphasises the importance of that retrofitting existing buildings, which is a key necessary step towards staying within the bounds of the 6th carbon budget. Conservation areas and listed buildings will still be treated more cautiously however, due to the sensitive relationship between heritage and carbon-reducing alterations.

4. The removal of the need for justification to be demonstrated in plan making

A fundamental amendment to the NPPF, the potential removal of the need for policy justification, has created concern among those working in planning. The current requirement that plans must be justified is currently one of key four tests that must be demonstrated for a plan to be found sound.

The removal of the test could adversely impact the quality of housing delivery, particularly in sustainable places, because allocations will not necessarily need to be justified. If plans no longer must be justified, it has been recommended by the Town and County Planning Association that the test should, as a minimum, be replaced with a requirement for a robust evidence base and demonstrate that various policy options have been considered. However, the recent Levelling Up & Regeneration Bill consultation indicates that this requirement for evidence will not be entirely removed. Further information on this is expected in coming months but a lack of clarity on this decision remains.

5. Insufficient reference to the 2008 Climate Act

In the context of climate change, a significant gap remains in the changes to the NPPF text, which is that there is insufficient reference to the legally-binding 2008 Climate Act and subsequent carbon budgets and the exact role that local plans can and must play towards achievement of those legally binding reductions. Without a clear direction set by the Act, policy informed by the NPPF will not necessarily be measurable against the UK 2050 net zero target.

Nevertheless, the draft NPPF update still retains the existing paragraph that confirms that plans' climate mitigation and adaptation should be "in line with the objectives and provisions of the Climate

Change Act 2008", therefore the carbon budgets passed under the aegis of that Act should still form a good logical basis for development of local plan policy that brings forward the actions necessary to fulfil them. However, this argument may be weakened in concert with the proposed removal of 'justification' as a test of soundness – given that such policies are argued to be justified by evidence showing that they are necessary to fulfil the carbon budgets.

National Planning Policy Framework Partial Update (2023)

A partially updated NPPF was published in September 2023, primarily to reflect desired changes to onshore wind development. Other elements outlined above relating to the NPPF consultation have not yet been updated or clarified.

The changes amend paragraphs 155 – 158, with the most notable change being that the impacts of onshore wind development must now be 'appropriately' addressed, replacing previous wording that required impacts to be 'fully' addressed. Another change is that SPDs can be used as a resource to identify suitable sites for wind development, although it is currently unclear whether the wider role of SPDs will be sustained in future NPPF iterations. These minimal changes offer a slight relaxation for onshore wind development, but are insufficient to allow onshore wind development to come forward with equal ease as other energy technologies.

Planning Practice Guidance (PPG)

The PPG section on Climate Change[xlix] reiterates several powers relevant to carbon, and also constraints on how those should be exercised. It highlights several opportunities including:

- Reducing the need for travel and providing sustainable transport
- Providing opportunities for renewable and low carbon energy and decentralised energy
- Promoting low-carbon design approaches to reduce energy consumption in new buildings.

It confirms that appropriate mitigation measures in plan-making can be identified by:

- Using available information on the local area's carbon emissions [such as BEIS subnational carbon inventories referenced elsewhere in this appendix]
- Evaluating future emissions from different emissions sources, taking into account probable trends set in national legislation, and a range of development scenarios
- Testing the carbon impact of different spatial options, as emissions will be affected by the distribution and design of new development and each site's potential to be serviced by sustainable transport
- Noting that different sectors have different opportunities for carbon reductions, noting that "In more energy intensive sectors, energy efficiency and generation of renewable energy can make a significant contribution to emissions reduction".

For existing buildings, the PPG notes that many carbon-reducing measures may not require planning permission, but for those that do, "local planning authorities should ensure any advice to developers is co-ordinated to ensure consistency between energy, design and heritage matters."

It reiterates the Planning & Energy Act powers that the local plan can require developments' energy/carbon performance to be higher than those of national building regulations to an extent:

- For homes: up to the equivalent of Level 4 of the Code for Sustainable Homes
    - [We note that this limit should no longer apply, as it has been exceeded by several adopted example local plans and national building regulations Part L 2021, whereas that part of the PPG citing the Code was last updated in March 2019.]
- For non-residential buildings, the plan is not restricted or limited in setting energy performance standards above the building regulations.
- Requirements for new buildings' sustainability are expected to be set in a way consistent with the government's zero carbon buildings policy … adopt nationally described standards … and be … based on robust and credible evidence and pay careful attention to viability".

The PPG section on renewable and low carbon energy confirms that:

- Local planning authorities hold decisions on renewable energy development of ≤50MW [From 2016, onshore wind over 50MW is also now a local planning decision[l]]
- Neighbourhood Development Orders and Community Right to Build Orders can be used to grant planning permission for renewable energy development.
- There are no concrete rules about how to identify suitable areas for renewable energy, but should consider the requirements of the technology and cumulative environmental impacts, and could use tools such as landscape character assessment to inform this.
- Identifying suitable areas gives greater certainty to where renewable energy will be permitted – and wind turbine development should only be approved in such identified suitable areas.

The PPG section on viability confirms that:

- Plans should set out the contributions expected from a new development, including for infrastructure, informed by evidence of need and viability-tested alongside other policies.
- The role of viability assessment is mainly at plan-making stage, and should not compromise sustainable development but should ensure that policies are realistic and deliverable.
- Once the plan is made, the price paid for land is not considered a valid reason for failing to comply with the relevant policies of that adopted plan.

The PPG section on planning obligations[li] (such as Section 106 payments) notes that:

- The previous restriction on pooling more than 5 planning obligations towards a single piece of infrastructure has been removed – so LPAs can now pool as many S106 or CIL as they wish, subject to meeting the other tests (necessity, scale and direct relation to development).
- The Community Infrastructure Levy "is the most appropriate mechanism for capturing developer contributions from small developments".
- Planning obligations should not be sought for development that consists only of residential extensions/annexes.

Other government outputs that relate to how local plans can wield powers

Written Ministerial Statement (2015)

In 2015, national government announced that it would update building regulations to deliver the same reduction in on-site carbon emissions that the withdrawn Code for Sustainable Homes Level 4 would have delivered (a 19% reduction on the emissions rate set by Part L 2013). It stated that when those changes were made, it would also remove local plans' Energy and Planning Act powers to require higher energy standards. It stated that in the meantime, local plans should not require more than that 19% reduction, nor any other higher standards in construction, layouts or performance. It should however be noted that this was framed as *expectation* and not a *requirement* – and the wording appears to apply only to existing policies and did not include emerging policies.

This, along with the tension between the duties for carbon and viability/housing delivery, has caused many local plans to adopt 'zero/low-carbon' policies that stop far short of requiring new development to achieve a truly neutral climate impact to the extent that would have been technically feasible.

However, these changes to building regulations and the Energy and Planning Act were in fact never implemented. As a result, the 2015 statement appears to carry limited weight with the planning inspectorate, given that there has been successful adoption of several local plans that go well beyond the supposed limit of a 19% reduction on Part L 2013 (London 35%; Reading 35%; Milton Keynes 39%). Also contrary to the 2015 WMS, The London Plan (among others) also requires other standards for 'construction, internal layout or performance' such as the Home Quality Mark or BREEAM. Developers in these locations have for many years proven able to consistently comply with these higher standards. Bath & North East Somerset Council, Cornwall Council and Central Lincolnshire Council received positive Inspector's reports and have recently adopted ground-breaking new housing policies requiring an on-site net zero energy balance and fixed absolute targets for energy efficiency. The Inspector's reports for these plans explicitly addressed the status of the 2015 WMS and found it to be no longer relevant. Additionally, a 2022 UK Government letter received by B&NES reaffirmed the ability of local authorities to exceed Building Regulations standards. These policies were supported by evidence bases showing how these improvements were technically feasible and financially viable.

The **legal advice[lii] within the 'net zero evidence' suite produced for Essex Design Guide** similarly concludes that "Despite the 2015 WMS remaining extant and despite the failure to update the Planning Practice Guidance, it is clear that the Government does not consider that they constrain [local planning authorities] and that the [Planning & Energy Act 2008] empowers [them] to set energy efficiency standards … which go beyond national Building Regulations … This is the correct approach in law. In my view, the right approach is that adopted in the Report on the Examination of the Cornwall [DPD]: The 2015 WMS should not be accorded any weight".

We note that the 'interim uplift' to Part L of building regulations in force since June 2022 makes the 2015 Ministerial Statement obsolete, because the new Part L already delivers a carbon saving greater than the supposed 19% limit. Relatedly, a judicial review is currently challenging a planning Inspector's decision to reject similar policies due to the WMS2015. Another recent Inspectorate appeal decision expressed the view that the 2015 Ministerial Statement is no longer the most relevant expression of national policy, as the Future Homes Standard and Climate Change Act net zero carbon goal are now clearly more relevant – echoing the Inspectors' reports for recent successful plans noted above.

'Planning For the Future' White Paper (2020)

In 2020 the government publicly consulted on a white paper proposing changes to the planning system. This contained various intents relevant to energy and carbon policy for buildings, including:

- **Easier planning permission for energy efficiency and renewable energy measures in existing buildings:** The government commits to update the planning framework for listed buildings and conservation areas to better enable "sympathetic changes to support their continued use and address climate change" because "We particularly want to see more historical buildings have the right energy efficiency measures to support our zero carbon objectives"
- **Different role for local planning authorities in carbon reductions, when the Future Homes Standard is in force**: The government intends that the FHS from 2025 will a 75-80% reduction in homes' (regulated) carbon emissions compared to the Part L 2013 rate, and will deliver homes that reach zero carbon when the electricity grid decarbonises, without further retrofit. Also from 2025, local planning authorities may be expected to "focus more fully on [monitoring and] enforcement" of the national standard, rather than setting different local standards.

Future Homes Standard Consultation Response (2021)

This document is the government's response to public consultation on the new Future Homes Standard, which will update building regulations in 2025 with tighter standards in energy and carbon. The document also lays out an 'interim uplift' titled Part L 2021, which is now in force as of June 2022.

The government had asked whether it should now enact the changes to Planning and Energy Act that would remove local planning authorities' power to require higher standards of energy efficiency and renewable energy, as per the 2015 Written Ministerial Statement. 86% of responses said no. The government's response confirms that "in the immediate term" it will not enact those changes and that local plans thus retain their existing powers. It notes the previous "expectation" set by the 2015 Ministerial Statement (that local plans enforce no more than 19% carbon reduction on Part L 2013), but does not say that this limit still applies, and recognises that many local plans exceed this limit.

The response document also lays out an indicative specification for the 'notional building' for the 2021 & 2025 Part L. This is the imaginary building which includes a range of energy efficiency and renewable energy measures, whose carbon emissions rate the proposed building must not exceed. It includes several new measures that were not in the 2013 notional building (see table below). It was later confirmed that the document forms a piece of official government policy.

Table 2: Changes over time in the specification of the 'notional home' in Building Regulations.

Part L Interim uplift 2021 (changes vs 2013)	Part L Future Homes Standard 2025
Minor improvements to roof, windows, doors	Major improvements to walls, roof, floors, windows, doors
Solar PV panel m^2 equal to 40% of ground floor	Low carbon heat pump
Wastewater heat recovery system	Solar panels and wastewater heat recovery are not part of notional building spec
Still has gas boiler as basic assumption	
Result: 31% reduced target emissions rate compared to 2013	**Result: 75% reduced target emissions rate compared to 2013 (low enough to rule out gas boilers)**

Levelling Up & Regeneration Act (2023)

This Act received Royal Assent in late October 2023. It will affect the planning system in a variety of ways, the most relevant of which for carbon are:

- **Section 106 & Community Infrastructure Levy may be largely replaced** by an 'Infrastructure Levy' set in relation to development value, not floor space. However, specifically Section 106 appears to not be entirely scrapped although its role is scaled back to limited applications[liii]. This may alter the ability to use Section 106 powers to collect carbon offset payments from developers. The charging schedule for the new Levy would still be set by the local authority. An infrastructure delivery strategy must outline how it will be spent. The new Levy may become applicable to permitted development as well as full plans[liv].
    - The Act as passed in 2023 does not appear to directly end the use of Section 106 or the Community Infrastructure Levy. However, Schedule 12 (Part 1) grants powers to the Secretary of State to "make regulations providing for … a charge to be known as Infrastructure Levy (IL)" and that these IL regulations "may include provision about how the following powers are to be used":
        - a. Community Infrastructure Levy
        - b. "section 70 of TCPA 1990 (planning permission),"
        - c. "section 106 of TCPA 1990 (planning obligations)"
        - d. "section 278 of the Highways Act 1980 (execution of works)."
    - Therefore it appears that until the Secretary of State creates the new Infrastructure Levy Regulations which may change how S106 is permitted to be used, we will not know whether S106 will still be usable for the purpose of raising carbon offsetting funds, or for any other purposes related to reducing the carbon emissions impact of development.
- **New 'national development management policies' (NDMP)** with which local plan policies must not be inconsistent. The Act 2023 does not confirm the content of the DM policies. It only states that (Chapter 2, point 94):
    - "A "national development management policy" is a policy (however expressed) of the Secretary of State in relation to the development or use of land in England, or any part of England, which the Secretary of State by direction designates as a national development management policy"
    - Before making, modifying or revoking an NDMP, the Secretary of State must:
        - Consult with relevant parties on this unless it is a) an immaterial change to the NDM policy or b) it is 'necessary, or expedient …to act urgently'.
        - "Have regard to the need to mitigate, and adapt to, climate change".
- A previous consultation suggested that an NDMP for carbon measurement and reduction could be set. Carbon is not mentioned at all in the Act text as passed, so we cannot determine yet whether this could affect the ability of LPAs to set their own standards on carbon reduction and energy efficiency in new buildings.
- **A new 'Environmental Outcomes Report'** to replace the existing system of Sustainability Appraisals, Strategic Environment Assessments and EU Environmental Impact Assessment. The outcome topics are yet to be clarified but may conceivably include carbon.
    - The Act as passed in 2023 (Part 6) establishes that "Regulations made by an appropriate authority … may specify outcomes relating to environmental protection in the United Kingdom or a relevant offshore area that are to be 'specified environmental outcomes'".
        - 'Appropriate authority' is defined as the Secretary of State and/or a devolved authority.
        - "'Environmental protection' means … protection of the natural environment … from the effects of human activity" – and this definition, along with the definition of 'natural environment, mentions chalk streams specifically.
        - The definition of 'natural environment' names 'living organisms … their habitats … [unbuilt] land, air and water … and the natural systems, cycles and processes through which they interact". This could logically be implied to include the climate – as this is a natural cycle or process.
        - However: Neither climate nor carbon is specifically mentioned anywhere in Part 6. Therefore it is unlikely that the Act's 'Environmental Outcomes' will affect the way the local plan can choose to pursue climate mitigation.

How have existing and emerging local plans used those powers?

Local existing policy context

South Staffordshire Council adopted its Core Strategy in 2012. The existing local plan contains policy that directly seeks to reduce carbon emissions (Chapter 7 – Environmental Quality):

- EQ5: Sustainable Resources and Energy Efficiency

Policy EQ5 requires that residential development is to meet the following targets set out in the table below. The standards are based upon Building Regulations and use benchmarks inferred from the Code for Sustainable Homes.

However, upon liaison with South Staffordshire Council, we understand that the reductions set out from 2013 onwards were not implemented in practice because the stepped targets were based on the Code for Sustainable Homes, which was scrapped in 2014. Therefore, residential development has since had to meet the 2010-2013 standards set out under EQ5.

Period	Regulated (vs Part L 2006)	Minimum Proportion of Low and Zero Carbon energy generation* (regulated carbon)
2010-13		
Minimum**	25%	10%
Maximum[χ]	44%	20%
2013-16		
Minimum**	44%	20%
Maximum[χ]	Zero carbon	Zero Carbon
2016-19	100% (min. 70% Carbon compliance / 30% AS)	
Minimum**		Obsolete at this carbon standard
Maximum[χ]		
Post 2019		

Non-residential development over 1000m^2 is required to be built to BREEAM Excellent or above. Specific carbon reduction measures are also required:

- 10% for developments completed between 2010 and 2013
- 20% for developments completed from 2013 onwards,
- or a scoring of two credits within the Building Research Establishment's Environmental Assessment Method (BREEAM) Energy section, if this method of assessment is used

Policy EQ5 is now viewed as outdated and should be updated to reflect updates to Building Regulations and better align actions that address national commitments to net zero, such as the Climate Change Act.

Policy NB6 has been proposed in the South Staffordshire Local Plan Review and sets the following key requirements:

1. **Residential development carbon reduction**
   a. Achieve net zero regulated carbon emissions
      i. Minimum 63% reduction in carbon emissions through on-site measures against Part L 2021
      ii. Demonstrate at least a 10% improvement on Part L 2021 Target for Fabric Energy Efficiency
      iii. No fossil fuel-based heating systems
   b. On-site renewable energy generation or connections made to on or near site renewable/low-carbon community energy generation and storage networks must be sufficient to achieve at least zero regulated carbon
   c. Offset any remaining residual regulated carbon emissions

2. **Non-residential major development carbon reduction standards**
   a. Demonstrates compliance with the latest BREEAM 'Excellent' standard as a minimum, targeting compliance with BREEAM 'Outstanding' wherever possible;
   b. Whilst achieving compliance with the standards in (a), priority must be given to maximising credits achieved under BREEAM criteria Ene01 in all cases;
   c. Demonstrates the fullest viable use of onsite renewable energy generation measures to meet operational energy demand from the scheme

3. **Embodied carbon and closing the performance gap**
   a. Major development to demonstrate how embodied carbon has been considered and reduced
   b. Large-scale development to complete a nationally recognised Whole Life Carbon Assessment and demonstrate actions to reduce life-cycle carbon emissions
   c. Major development to implement a recognised quality regime that ensures the as-built performances matches calculated design performance
   d. Developers must ensure that a recognised monitoring regime is put in place to allow assessment of energy use, indoor air quality and overheating risk for 10% of the proposed dwellings for the first five years of their occupancy

4. **Retrofit**
   a. Proposals which would result in considerable improvements to the energy efficiency, carbon emissions and/or general suitability, condition and longevity of existing buildings will be supported, with significant weight attributed to those benefits.

Existing and emerging South Staffordshire policies represent the starting point for policy improvements to be made and pursue best practice approaches that other local authorities have achieved. We explore a range of examples throughout the rest of this section and provide recommendations for Policy NB6 later in the report.

Reductions on the building regulations baseline carbon emissions

Using powers granted by the Planning and Energy Act, most local plans lay out their 'low carbon' or 'net zero carbon' policy requirements in terms of a percentage reduction on the Target Emission Rate set by the previous version of Part L of Building Regulations (Part L 2013) as Part L 2021 is recent and not used as the baseline in most existing local plans.

This percentage reduction in on-site carbon emissions usually ranges from 19% to 40%. Some local plans also require the remaining Part L carbon emissions to be offset at a fixed cost per tonne, payable by the developer through a Section 106 payment, to be spent on local projects for carbon reductions.

Older example plans have sought a 19% reduction, because this reflected the national Code for Sustainable Homes which was previously seen as best practice – and because of a 2015 Written Ministerial Statement previously mentioned, which was taken to mean that 19% was the limit.

Later, requirements for higher percentage improvements in Part L carbon emissions were pioneered by the London Plan, justified by evidence assembled by the GLA and its consultants to show that new developments in preceding years had already been typically achieving 30 to 40% reductions[lv]. Several other adopted local plans have similarly adopted similar requirements (see examples box).

As of 2022, the building regulations Part L has been updated, resulting in a ~31% reduction in the carbon emissions rate compared to Part L 2013. And from 2025, it will be updated again to a 75% reduction. It is important to note that these reduction values exceed the 19% reduction limit referred to in the 2015 WMS, which clarifies the invalidity of the statement.

Requirement to demonstrate implementation of the energy hierarchy

Some local plans divide their carbon and energy requirements into several steps prioritising the most effective and long-lasting carbon reduction measures first. This follows the **energy hierarchy**, generally accepted best practice across the building design sector.

The logic is that if energy demand is minimised first, this reduces not only the burden that the new building places on our limited energy resources in operation, but also the amount of new equipment needed to generate and distribute energy to meet that demand. This reduces the materials, carbon and cost involved in producing and installing that equipment (and lowers energy bills).

The energy hierarchy is as follows:

1. Reduce energy demand (also known as 'be lean')
2. Supply energy efficiently (also known as 'be clean')
3. Supply renewable energy (also known as 'be green').

A policy requiring minimum improvements in each stage of the energy hierarchy makes the developer demonstrate that they have applied the hierarchy before resorting to offsets to reach zero carbon. Local plans usually express this as a requirement for the developer to show that they have made a minimum % improvement in the building's carbon emissions rate by measures taken at each stage. Policy compliance is demonstrated in an energy statement submitted with the planning application.

Example local plans requiring percentage reduction on regulated carbon emissions compared to Part L 2013

London Plan 2016, Policy 5.2: 35% reduction on site via the use of the energy hierarchy (expressed at the time as 40% reduction on previous Part L 2010) in both homes and non-residential. To rise to zero carbon for homes from 2016 and other buildings from 2019.

Reading Local Plan 2019, Policy H5: 35% reduction on site and offset the rest to zero (major developments). All other new build housing to achieve 19% reduction on site.

New London Plan 2021: 35% on-site emissions reduction, followed by carbon offset payment for the remainder of Part L regulated emissions.

Bath & North East Somerset Local Plan Partial Update 2023: 100% reduction to be met following a fabric-first energy hierarchy (major non-residential). Any residual on-site emissions to be offset.

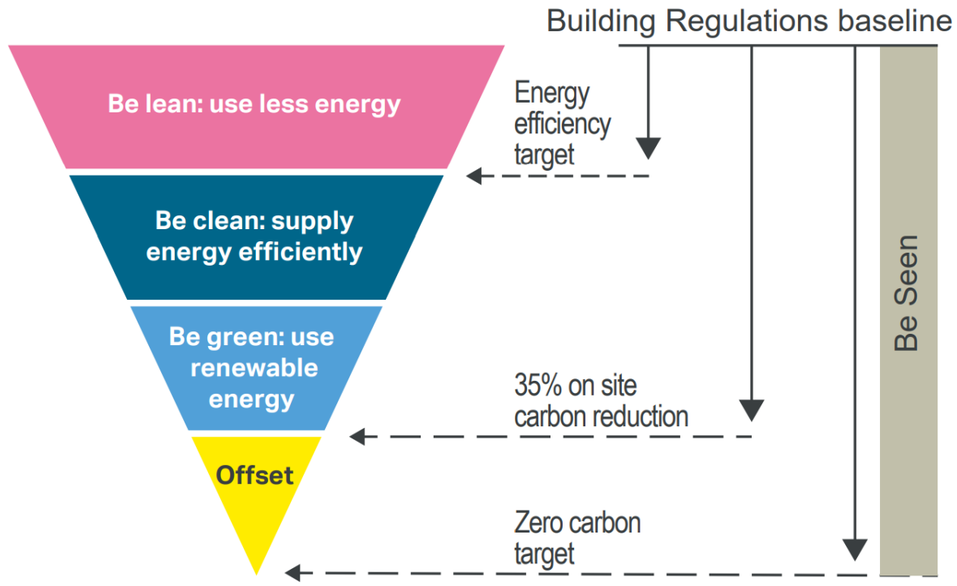


Figure 10: New London Plan (2021) Diagram of the energy hierarchy to reach 35% on-site reduction compared to baseline carbon emissions rate set by Building Regulations Part L 2013.

The following sections explore example local plan policies in each of these steps and how they were justified. Three more sections then look at offsetting, existing buildings, embodied carbon and new innovative approaches based on Energy Use Intensity.

The emerging policy position of NB6 is aligned to the Part L percentage-based approach outlined above. Although this approach is no longer best practice, it is understood that local constraints, among other local plan policy considerations, may limit the applicability of the energy-based best practice policy approach explored in a later section.

Reducing energy demand

To achieve the legislated target of net zero carbon by 2050, we must reduce our total energy consumption as well as scaling up the supply of renewable energy. In the country's transition to net zero carbon, **increased demand will be placed on the electricity grid** as vehicles and existing buildings' heating switch from fossil fuels to electricity. Upgrading the electricity grid and expanding renewable generation is already a huge but necessary challenge, involving a great deal of shared **cost and embodied carbon to produce that infrastructure**. It is thus vital to minimise the extra burden that new buildings place on our energy infrastructure, to ensure that it does not become technically or financially unfeasible to deploy the required amount of renewable energy to meet our demands.

Improving the energy efficiency of new homes (minimising their energy demand) is a very cost-effective **way to minimise the new infrastructure that will be required to support them** in a future zero-carbon energy system. New homes should therefore target reductions in energy demand to reduce the amount of total energy that must be supplied, both from the electricity grid and from other renewable energy sources. Put simply, optimising the efficiency of the building fabric is the starting point for the whole net zero journey.

It is critical to set higher **fabric energy efficiency standards to ensure buildings do not need to be retrofitted expensively at a later date,** as the cost of retrofitting to tight energy standards is typically three to five times the cost of achieving the same performance in a new build[lvi]. This argument will be further underscored if the Government proceeds with the recent Committee on Climate Change proposal that no home should be able to be sold unless it reaches EPC Band C by 2028. However, EPCs have recently been deemed 'not fit for purpose' by Lord Deben, the Chair of the Committee on Climate, since the grading system is primarily based on the *cost* of energy and not the actual *amount* of energy used. This statement is supported by research that shows the actual operational energy use of existing buildings differs significantly from values predicted through EPCs.

(However: Please note that this point on the cost of energy performance in new builds vs retrofit is not an argument to allow demolition of existing buildings so that they can be replaced with new buildings – as this would result in greater embodied carbon from new building materials. Reuse of existing buildings is also desirable in that it reduces the need to build on greenfield, and tends to occur in urban areas where there is typically less need for car use. Therefore, planning policy should encourage and enable reuse, especially wherever a proposal includes retrofit that would significantly improve an existing building's energy efficiency. But where new buildings *are* proposed the policy should be designed to avoid a need for *future* retrofit by building to excellent standards in the first place).

Fabric efficiency (insulation and airtightness) is particularly pertinent for housing schemes that use **heat pumps and MVHR, as these will require highly insulated and draught-proofed buildings** to operate efficiently. The previously referenced costs report also found that if very high thermal efficiency is reached, the whole construction can become more cost-effective because the developer can then **save money on smaller-sized heating systems** (pipes, radiators, heat pumps, etc.).

A further final justification for including a minimum improvement on energy efficiency is that it helps with the **social needs of affordable living, fuel poverty and healthy homes**. An energy-efficient home saves energy bill costs for the home occupiers and also often helps make the home interior more comfortable and conducive to good health (warmer, less draughty, and with less condensation on cold spots on walls or windows thus reducing the chance of respiratory harm from mould growth).

How can local plans set requirements for improvement at the *energy efficiency* stage?

The Planning and Energy Act 2008 grants Local Planning Authorities the power to require "energy efficiency standards that exceed the energy requirements of building regulations". It defines "energy efficiency requirements" as standards that are endorsed by national regulations, national policies, or guidance issued by the secretary of state. It defines 'energy requirements' as regulated energy only (the energy affected by Part L of building regulations – this does not include plug-in appliances).

Example adopted plans generally require a **set % reduction value to be achieved through energy efficiency measures** ranging from circa 5-15% against the emissions rate set by Building Regulations Part L 2013. In the examples we have examined, this contributes part of the total required % improvement on the Part L baseline, and were set to ensure that energy efficiency (not just energy supply) played a role within that total target. These percentages were set according to best practices already being achieved in local proposals at the time, which may now be considered outdated).

An **alternative** could be a percentage improvement on the **'Target fabric energy efficiency' (TFEE)** set by Part L and SAP. The TFEE is the legal limit on how much heat a home needs per m^2, based on the *fabric* not the efficiency of the heating *system*. Part L sets the TFEE to reflect a home of the same size and shape to the proposed home, with a certain minimum standard of insulation, glazing and airtightness. The TFEE therefore varies by the size and shape of the proposed building. By law, new homes must not exceed the TFEE. An improvement on the TFEE would demonstrate effort at this stage of energy hierarchy. The requirement could be a % improvement on the Part L 2021 TFEE, or could be set as an absolute kWh/m2/year figure that the proposed home must achieve. The target may need to be updated when Part L 2025 (Future Homes Standard) enters force.

Table 3: Potential targets for fabric energy efficiency	Justification
Homes: 10% improvement on the Target Fabric Energy Efficiency Rate set by Part L 2021 using SAP10.2 Non-residential: Energy efficiency measures (fabric and supply) to deliver 19% reduction in carbon emissions compared to Part L 2013 or equivalent vs Part L 2021.	As of June 2022, the new national baseline is Part L 2021. In 2025 it will be replaced again by the Future Homes Standard, which has upgrades to the building fabric. This 10% figure represents the approximate difference in fabric (average of all building element U-Values and airtightness) between Part L 2021 and Future Homes Standard 2025. Unfortunately, the Future Buildings Standard specification 2025 for *non-residential* buildings has not yet been released so no equivalent percentage can be calculated at present. Meanwhile, a 19% improvement on Part L 2013 has been demonstrated feasible and viable in Milton Keynes (see case study).
Homes and schools: 15-20kWh/m^2/year Fabric Energy Efficiency using Part L SAP10.2. Additional energy reporting with PHPP or TM54.	Homes: kWh limit shown to be necessary for the UK's carbon budgets between now and 2050, and the net zero end goal. Schools & homes: kWh limit shown to be feasible in emerging example evidence bases (Greater Cambridge & Central Lincolnshire – albeit using different energy modelling methods, PHPP or TM54, because SAP/SBEM are inaccurate at predicting energy usage.)

Example: New London Plan (adopted 2021)

As part of its requirement for an overall 35% reduction in carbon emissions against the building regulations baseline, London requires that part of this carbon reduction is achieved through energy efficiency measures, as follows:

- *New homes: 10%*
- *Other new buildings: 15%.*

A topic paper on energy efficiency (within the New London Plan evidence base) explains the evidence that justified how this was set:

London's requirement for a total 35% reduction in Part L carbon emissions in major developments had been in place since 2013, but not much of this was being delivered through energy demand reduction. Instead, developers were showing the reduction through energy supply, expedited by grid carbon reductions. The GLA commissioned a study of the carbon savings achieved through energy efficiency across major developments' energy statements submitted to the GLA in 2013-2017 to understand what was already possible with best practice:

- The average carbon saving achieved from energy efficiency alone was only 3.5% (in homes), 11.6% (non-residential) or 6.3% (mixed-use)
- But much higher performance was achieved in many cases (37% of new home projects achieved at least a 5% reduction, and 13% achieved a 10% reduction)
- New homes could technically achieve a 5 – 10% reduction, and other buildings could technically achieve a 15% reduction in many cases.

The GLA the commissioned a further detailed study of the implications of achieving an energy efficiency target of this sort for a set of typical development types. It found that homes could typically achieve a 10% improvement just through the then-current best practice. It also found that offices could achieve a 15% improvement and schools could get close to this. These percentage improvements were tested and found to be viable for most development types. They were therefore adopted, with flexibility for certain non-domestic development types such as hotels which would struggle to meet the target due to high hot water demand.

The London Plan 2021 also requires action on *unregulated* energy use:

- Policy SI 2 (E): "calculate and minimise carbon emissions … that are not covered by Building Regulations, i.e. unregulated emissions".
- Supplementary guidance instructs that unregulated energy calculations should use "BREDEM 2012 methodology".

Example: Milton Keynes Local Plan 2019

Milton Keynes Local Plan 2019 Policy SC1 includes a requirement for a reduction of 19% on the building regulations carbon emission rate, followed by a *further* reduction of 20% through the use of renewable energy and low/zero carbon technologies.

The latter 20% would fall under step 3 of the energy hierarchy ('be green'), implying that the first 19% must be achieved through the first two steps of the hierarchy (reducing energy demand, and supplying energy efficiently)[7]. Milton Keynes draft Sustainable Construction Supplementary Planning Document 2020 explains why the overall requirement is considered to be feasible:

> "We do not anticipate that the requirement to exceed the TER[8] by 19% will be unduly onerous for developers, as our analysis of BRUKL[9] data for consented schemes in Milton Keynes indicates that on average an improvement of 41% over the TER is already being achieved at the design stage."

[7] This is within reason. Bioregional recently worked on a mixed-use planning application in Milton Keynes whose homes achieved a carbon emissions reduction of approximately 26% using energy efficiency measures only. For the non-residential parts of the scheme this figure was 25%. The scheme then adds renewable/low carbon measures to achieve a further 20% site-wide carbon emissions reduction. The site-wide total carbon emissions reduction is 51.39%. Homes were flatted blocks. Non-residential spaces were office, retail and gym.

[8] Building regulations Target Emission Rate for carbon dioxide

[9] BRUKL is Building Regulations UK Part L: the energy data that must always be submitted in order to pass building control.

Efficient energy supply

This stage of the energy hierarchy is also referred to as 'be clean'.

This step generally refers to measures to use heat networks[10] to distribute heat efficiently and cleanly and with minimal losses.

Heat networks usually serve several buildings or sites from a common energy source, and can be expanded over time to serve more sites. Networks have variously included:

- Heat networks fed by local waste heat sources such as from waste incineration or data centres which generate a lot of heat as a by-product of their normal activity
- Heat networks fed by large-scale heat pumps (taking energy from air, ground or water sources) at a standalone energy centre that does not 'belong' to any individual new building
- Heat networks fed by CHP plant (combined heat and power), essentially a small-scale power station which burns fuel to generate electricity and heat at the same time. This was previously seen as 'efficient' because the CHP plant would be close enough to homes and businesses that the heat could be reused. This is generally no longer seen as a sustainable option because they almost always run on fossil gas which needs to be fully phased-out to meet net zero carbon goal and carbon budgets, unless carbon capture technologies emerge in future. The electrical grid now provides electricity at a lower carbon intensity than a CHP plant, and heat pumps are a more efficient and cleaner heat source which is ready to reach zero carbon as the electrical grid decarbonises, and avoids the negative air quality impacts that come with fuel combustion in CHP.

Because local waste energy sources are extremely geographically site-specific and because heat networks in general are dependent on a relatively high density of heat demand, it is not appropriate to seek a universal carbon percentage reduction that should be achieved at this stage of the energy hierarchy.

Because heat networks are often powered by waste incineration or fossil gas – neither of which currently has a path to zero carbon – there is a risk that a building connected to a heat network may not necessarily save carbon compared to a building with an individual heat pump other electrical heating combined with renewable electricity supply. One grey area is waste incineration, where the incineration may occur whether or not the heat is reused. A case-by-case treatment may be the most logical approach (considering the counterfactuals and embodied carbon of the new network).

Thus, it may be beneficial to design a policy so that heat network connection is only sought where the heat source is low- or zero-carbon and/or a lower carbon solution to individual electrical heating solutions per building. If the local plan also has a policy requiring on-site renewable electricity generation (see section), then it is likely that individual heat pumps run on this renewable electricity would be a lower-carbon solution than a heat network – unless in major mixed use development, in which case a communal heat sharing network driven by heat pumps could be the optimal solution as these can (if correctly designed) enable recycling of heat rejected from cooling systems at commercial uses at the scheme.

Local plan examples (see overleaf) are therefore instead expressed as:

- A requirement to connect to an existing or planned heat network, if present
- A requirement to have an energy strategy that is compatible to connect to a future heat network, if the proposed development is within suitable area identified in a heat mapping exercise
- An acknowledgement that lower-carbon energy options may be available, in which case the heat network connection will not be required, and
- An acknowledgement that the requirement may be waived if there are unsolvable feasibility or viability obstacles which make heat networks unsuitable for the specific scheme.

[10] Heat networks (also known as district heating) are networks that supply heat across an area through underground piping systems flowing from a central heat source.

Example: New London Plan 2021

Policy SI3: Energy Infrastructure

This policy requires that major development proposals within identified 'Heat Network Priority Areas' should have a communal low-temperature heating system, whose heat source should be selected according the following hierarchy:

a. Connect to local existing or planned heat networks
b. Use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)
c. Use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network)
d. Use ultra-low NOX gas boilers (which must meet requirements of a separate air quality policy).

Where a heat network is planned but not yet in existence the development should be designed to allow for the cost-effective connection at a later date.

Example: Milton Keynes Local Plan 2019

Policy SC2: Community energy networks and large scale renewable energy schemes

This policy requires that:

- Major development proposals should consider the integration of community energy networks in the development. This consideration should form part of development proposals and take into account the site's characteristics and the existing cooling, heat and power demands on adjacent sites
- All new developments in proximity of an existing or proposed combined heat and power (CHP), combined cooling, heat and power (CCHP) station or local energy network will be expected to connect to the network unless it can be demonstrated that:
    1. A better alternative for reducing carbon emissions from the development can be achieved; or
    2. Heating and/or cooling loads of the scheme do not justify a CHP connection; or
    3. The cost of achieving this would make the proposed development unviable.

Table 4: Summary of options for Part L-based energy efficiency policy requirements (energy demand reduction and energy efficient supply)

Percentage reduction on Part L 2013 through energy efficiency (demand reduction and efficient supply)	Justification
10% in homes 15% in nondomestic buildings (except hotels and schools, to be considered case-by-case)	Shown to be feasible and viable across London in 2013–2017 via analysis of consented schemes; adopted as minimum policy across London. Although viability in London is different to South Staffordshire, this performance was achieved several years ago and should have disseminated to other regions via ongoing industry advances. Not ideal as Part L 2013 baseline became obsolete in June 2022 (therefore further analysis needed to update percentages).
19% in major residential proposals	Shown to be feasible in Milton Keynes via analysis of recent consented schemes' energy statements; evidently acceptable in planning terms via example of the adopted MK local plan. As above, 2013 baseline now obsolete.
Custom % reflecting typical best practice in South Staffordshire	Analysis of recent successful applications in South Staffordshire (from building control) to ascertain and demonstrate that the target is feasible locally. Not recommended as it will not deliver much improvement on existing practice and would require additional analysis.

Overall, although **Part L-based policy requirements** have previously been viewed as best practice where large % reduction targets have been set, **this approach is now far from best practice and should not be prioritised as an ambitious approach**. The examples outlined in this sector show that the emerging standards set out under Policy NB6 have been adopted and implemented for a number of years now. Therefore, it is clear the policy standards are deliverable and achievable. A **vanguard of local authorities has moved on from Part L-based policy approaches** and now focus upon best practice energy-based metrics. There should be **no doubt that Policy NB6 as drafted is deliverable**, particularly as there are numerous examples of adopted policies that exceed NB6 standards – these are explored in a later section.

As set out in the policy recommendations section, we have recommended that Policy NB6 is amended from a Part L-based approach to align with an energy-based policy approach for residential new build development.

Renewable and low carbon energy at new buildings

The third step of the energy hierarchy is to decarbonise energy supply (see *Figure 10*): both electricity and heat. The Committee on Climate Change 2019 report ('UK housing: Fit for the future') identified that grid decarbonisation is a vital component in the trajectory towards net zero. Onsite renewable generation at new buildings supports this in two ways. First, it drives investment in additional renewable electricity, and second, it can simultaneously reduce peak and annual demand on the grid.

Requirements for renewable or low-carbon energy supply can be expressed as:

- A further percentage reduction in carbon emissions against the building regulations baseline, in addition to the percentage achieved through fabric (*see example from Milton Keynes*), **or**
- A 'Merton Rule'[11]; where the proposal must include renewable energy generation equipment on-site or near-site, sufficient to meet a certain proportion of the building's own energy demand (see example below from Solihull). This can be total energy, or regulated energy only. This uses the Energy and Planning Act power to require a 'reasonable' proportion of the development's energy use to be from renewable sources in the locality.

The value of onsite generation has long been recognised in local planning policy, but has not been without its critics. It has sometimes been argued that the prescriptive nature of such policies may not be applicable for all sites and can occasionally lead to the installation of inefficient onsite renewables[lvii]. Some sites may not be able to meet a very high requirement for renewables, such as if they are overshadowed (meaning solar PV panels would not work well), or if it is a tall building where there is a larger amount of internal floor space demanding energy but a relatively smaller roof space for PV.

We would therefore recommend including enough flexibility to accommodate unique site constraints, whilst still seeking an ambitious amount of appropriate onsite LZC technologies in all proposals. There is a growing number of adopted example policies that set specific targets for onsite renewable generation towards net zero carbon target. In practice, these policies are often applied flexibly if the developer can show how and why it was not possible to meet the required metric and that they have pursued renewable energy measures to the greatest reasonable extent.

Defining 'low and zero carbon technologies'

If setting a plan policy requirement under this stage of the energy hierarchy, it will be necessary to define the types of measures that will count as 'renewable / low and zero carbon technologies'. Some technologies, such as solar PV panels, solar thermal and turbines, always count. Other technologies – such as heat pumps – may need clarification on where to account for these in an energy statement.

Heat pumps are not automatically zero carbon – they still use mains electricity to run. But they can be a low carbon heating system provided they run at high efficiency (they can deliver about three times as much heat energy as they consume in electrical energy, because take ambient heat from outdoor air – thus there is a renewable element to the heat they deliver). To achieve this level of efficiency, they need to provide heat at a relatively low temperature. This becomes feasible if the heat pump is used in combination with improved thermal efficiency and reduced air permeability[12].

The developer could make the heat pump zero carbon by supplying its electricity from a renewable source such as rooftop solar panels, so long as they are generating the renewable electricity at the same time the heat pump is running or if the building can store the solar electricity in a battery for later use. You will need less energy from your solar panels to run your 300% efficient heat pump, compared to using your solar panels to run direct electric heating which can only ever be 100% efficient – therefore you don't need as many solar panels, resulting in savings in embodied carbon.

Carbon savings from heat pumps are usually treated in planning guidance under the same step of the energy hierarchy as renewables – that is Step 3/'Be Green'. For example, London Plan draft energy guidance[lviii] asks that heat pumps be accounted for as a Step 3 measure, unless they are powering a heat network, in which case all heat from the heat network would be a Step 2 ('be clean') measure.

Counting heat pumps as a Step 3 / 'be green' measure' gives more flexibility in options for buildings to achieve carbon reductions at this stage even if the building is not suitable for solar panels due to shadow or orientation.

Example: Sutton Local Plan (adopted 2018) Policy 31

In Policy 31, All proposed development must apply the Mayor's energy hierarchy in the following order:

1. Being built to 'the highest standards of energy efficient design and layout',
2. Supplying energy efficiently (low or zero-carbon heat networks and cooling networks),
3. Using on-site renewable energy to achieve a reduction in total CO^2 emissions (regulated and unregulated) of 20% in major developments or 10% in minor developments.

Example: Milton Keynes Local Plan 2019 (adopted)

Policy SC1 (Sustainable Construction) includes that:

All proposals of 11+ dwellings or non-residential space over 1,000m^2 must apply the energy hierarchy to achieve:

1. A ≥19% reduction on Building Regulations 2013 carbon emissions,
2. A further ≥20% reduction through renewables (onsite or a local network),
3. The developer must then pay to offset remaining carbon emissions (see 'carbon offsets' section further on in this brief).

[11] The original Merton Rule (introduced in 2003) required only 10%, but more recently adopted and emerging local plans aim higher.

[12] Air permeability is the opposite of airtightness. As defined in Part F of Building Regulations, airtightness is "a general descriptive term for the resistance of the building envelope to infiltration with ventilators closed. The greater the airtightness at a given pressure difference across the envelope, the lower the infiltration".

Emerging example: Solihull Local Plan: Draft Submission Plan 2020

Policy P9, point 3, requires that:

At a site level, development must apply the 'energy hierarchy' to reduce energy demand for heating, lighting and cooling and minimise carbon dioxide emissions as follows:

- All new dwellings to achieve 30% reduction in energy demand/carbon reduction improvement over and above the requirements of Building Regulations Part L (2013) at the time of commencement up to March 2025.
- From April 2025 for all new dwellings to be net zero carbon.
- Minor non-residential development will conform to at least BREEAM Very Good and major non-residential development will conform to at least BREEAM Excellent.
- Provide at least 15% of energy from renewable and/or low carbon sources for all major housing developments and non-residential developments of 1000sqm or more

Setting absolute targets for energy use intensity, space heating and on-site renewable energy generation

There is a growing number of local authorities pursuing the industry-recommended approach to achieving genuine net zero new build development. The approach does not use baselines and % reductions based on previous iterations of Part L, as previously explored, and instead sets threshold limits on energy use. A policy that follows this approach sets three key requirements:

1. Energy use intensity (EUI) – the predicted total amount of regulated and unregulated energy used.
2. Space heating demand – the amount of energy required to heat the building.
3. On-site renewable energy generation – must match total energy to be a net zero building.

Table 5: Comparison of targets for residential development

Space heating demand (kWh/m²/year)	Energy use intensity (kWh/m²/year)	Target referenced
30	40	Cornwall Climate Emergency DPD
		Bath & North East Somerset Local Plan Partial Update
15-20	35	Central Lincolnshire Local Plan
		Greater Cambridgeshire Draft Local Plan
	n/a	Committee on Climate Change
15	35	London Energy Transformation Initiative
		CIBSE
		Good Homes Alliance

The EUI target includes all energy used by the building, importantly accounting for unregulated energy, which Part L does not. EUI does however exclude contributions from renewable energy generation and does not consider electric vehicle charging in the calculation. Reducing the energy used by the building is the primary aim of the EUI approach, which can then be supplemented to net zero by the renewable energy generation requirement that supplies the energy demand of the building.

Following an energy metric approach ensures more control over the fabric and systems installed in buildings. For example, high performance U-values are essential to achieve space heating demand targets set out above. Part L of Building Regulations does not however guarantee such high-performance since absolute energy targets are not set for certain building typologies. An additional benefit of this assessment is that EUI can be easily monitored and verified in practice from meter readings.

Additionally, the EUI target essentially bans the use of on-site fossil fuels, and more specifically, gas boilers for heating. Although explicitly stating the ban of gas boilers in policy wording may cause concern, the EUI target does this implicitly since gas boiler efficiency (c. 90%) will likely result in too large a contribution of overall energy use to result in a compliant EUI value. Contrarily, the superior efficiency of heat pumps makes achieving the EUI target significantly easier, as the technology can produce over 3 units of heat per 1 unit of electricity used.

Particularly for more stringent EUI and space heating demand targets, as proposed by Central Lincolnshire and Greater Cambridgeshire, more than just the installation of a heat pump and high fabric efficiency will be required to achieve such targets. To meet the more stringent targets, decisions must be made at an early stage of the development process to make appropriate decisions on form factor, glazing ratios and building orientation, which encompasses a fabric first approach. These decisions will contribute towards the maximisation of energy demand reductions and the ability of the renewable energy generation system to create an on-site net zero energy balance.

This remedies a key weakness in Building Regulations, which fail to incentivise applicants to design a building with an inherently thermally efficient form or orientation because all of the Part L targets are not fixed targets but are set in relation to a building of the same size and shape as the proposed building.

To further strengthen a policy informed by this approach, a robustly accurate energy modelling methodology will need to be used. SAP 10.2, used for Part L compliance, is currently unable to accurately assess unregulated energy since the relevant equation is based on 1998 appliances, which clearly does not reflect modern efficiencies. It is therefore more difficult to comply with an EUI target using SAP because the proportion of unregulated energy, which can be up to 50%, is severely overestimated. SAP also frequently underestimates space heat demand by up to 270%, and SBEM has also been shown to generally underestimate overall energy use.

To mitigate such inaccuracies, an alternative energy modelling methodology is required to ensure design-stage performance values correspond to the as-built performance of the building. The industry-recommended energy modelling method to minimise such a performance gap is Passive House Planning Package (PHPP), which is used for the leading Passivhaus standard. Contrary to common misconceptions, PHPP can be used without needing to pursue the stringent Passivhaus certification process. An alternative accurate energy modelling calculation method, if used correctly, is CIBSE TM54. TM54 works by starting with the SBEM calculation and making adjustments to the inputs to reflect how the building will be used based on reasonable adjustments about occupancy and so on.

On-site renewable energy generation must match the EUI (multiplied by the floor space) to reach an on-site net zero energy balance. In the majority of cases, this has been shown to be technically feasible for EUI targets up to 40 kWh/m²/year. The taller the building, the less likely it is that there will be sufficient roof space to match EUI. However, even for such taller, more shaded buildings, façade-mounted panels and other ground-mounted renewable energy technology should be considered.

Several examples are explored overleaf, which, although they take a similar approach, have received very different reactions from their respective Inspectors during examination.

Example: Cornwall Climate Emergency DPD 2023 (adopted)

The Cornwall Climate Emergency Development Plan Document (DPD) was adopted in February 2023 and retained all key elements of its net zero carbon policies.

Policy SEC1 (Sustainable Energy and Construction) includes that (paraphrased):

1. Major non-residential development (over 1,000m^2) to achieve BREEAM Excellent (or "equivalent or better methodology")
2. New residential development to achieve all of the following:
    i. Space heating demand of <30kWh/m2/year
    ii. Total energy consumption of <40kWh/m2/year
    iii. On-site renewable generation to match the total energy consumption, with a preference for roof-mounted solar PV. Where it is not feasible or viable to include enough renewable energy generation to match total energy consumption, the development should pursue the following:
        - Renewable energy generation to be maximised as far as possible
        - Connection to an existing or proposed district energy network
        - Offset the residual energy demand by a contribution to Cornwall Council's Offset Fund.

This is supported by evidence in the form of energy modelling analysis[1] by expert green building engineers. This analysis used accurate energy modelling method (PHPP) to identify a range of energy performance targets that are feasible in Cornwall and can reach the net zero carbon target in a variety of ways (different combinations of fabric / energy efficiency and renewable energy measures). This evidence piece also compared the proposed 'net zero carbon' building performance options against how a building would perform if it simply met the Future Homes Standard.

The analysis included cost information for each modelled building that was then used in the viability assessment for the DPD. That viability assessment found that most residential development scenarios remained viable with the policies applied, and that the majority of the cost uplifts over the 2013 building regulations will be incurred by developers anyway in order to meet the new 2021 building regulations, even without the local plan carbon policy.

Contrarily to the Salt Cross AAP, the Inspector's report positively stated that the 2015 WMS has clearly been overtaken by more recent events.

A difference between standards set between residential and non-residential development may be noted in these examples. This an important aspect of the energy-based policy approach. The typical usage of residential buildings is less variable therefore relatively easy to predict and understand, whereas non-residential buildings can vary significantly in terms of energy use. For example, an office with computers at each desk (and potentially a computer server bank) will have a far higher energy consumption than a retail unit that primarily consumes energy only through lighting and heating.

Therefore, non-residential buildings need to be treated in isolation of the archetype assessed because the whole scope of non-residential buildings involves a very wide range of energy consumption levels associated with the unique activities of the occupier. Setting specific energy use limits per archetype is one approach that has been used, whilst setting a level of BREEAM certification acts as another. The latter approach may not be as stringent on energy use (as BREEAM does not set absolute targets for energy use or renewable energy and does not guarantee net zero carbon schemes), but ensures a wider range of sustainability issues are considered and addressed (for example, materials, management, water, biodiversity and other issues beyond energy use).

Example: Bath & North East Somerset Local Plan Partial Update (adopted)

The Local Plan Partial Update (LPPU) was adopted in January 2023 and became the first local plan in the UK to set net zero energy standards for new housing.

Policy SCR6 sets identical standards to Cornwall for residential development and was informed by the same technical evidence base. As set out in the Sustainable Construction Checklist Supplementary Planning Document, PHPP is required for major development, whilst an option to use SAP with the Energy Summary Tool is available for minor residential development. The Energy Summary Tool adjusts outputs from SAP to reflect in practice performance. These options reflect the same approach as Cornwall. It is however important to note that the calculation approaches were not tested at examination as the requirements are set out in supplementary guidance.

A specific technical study for the Bath & North East Somerset (B&NES) area was not seen as necessary because Cornwall and B&NES share the same prominent housing typologies and climate patterns that influence the efficiency of solar PV to provide an on-site net zero energy balance.

A key piece of evidence that assisted B&NES to successful adoption was a letter received from DLUHC, which reiterated the fact that local authorities are able to set standards that exceed Building Regulations i.e. that exceed the standards set out in the 2015 WMS. The 2015 WMS was not explicitly stated in this correspondence from government, yet the clarification on exceeding Building Regulations all but confirms that the 2015 WMS is no longer relevant.

This view was directly stated in the Inspector's report:

"*The **WMS 2015 has clearly been overtaken by events** and does not reflect Part L of the Building Regulations, the Future Homes Standard, or the legally binding commitment to bring all greenhouse gas emissions to net zero by 2050.*

*I therefore consider that the **relevance of the WMS 2015 to assessing the soundness of the Policy has been reduced significantly,** along with the relevant parts of the PPG on Climate Change, given national policy on climate change. The NPPF is clear that mitigating and adapting to climate change, including moving to a low carbon economy, is one of the key elements of sustainable development, and that the planning system should support the transition to a low carbon future in a changing climate. Whilst NPPF154b sets out that any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards, for the reasons set out, that whilst I give the WMS 2015 some weight, any inconsistency with it, given that it has been overtaken by events**, does not lead me to conclude that Policy SCR6 is unsound, nor inconsistent with relevant national policies**.*"

The logical view provided by the B&NES Inspector appropriately summarises the context of local authority powers to set their own energy efficiency standards. In contrast, the West Oxfordshire Inspectors' views represent inconsistency in decision making on net zero policies at PINS. As more local authorities propose ambitious policies that will need to be weighted against consistency with national policy, increased consistency should become apparent.

Example: Central Lincolnshire Local Plan (adopted)

The Central Lincolnshire Local Plan was adopted in April 2023[1]. The adoption of this plan is significant as the energy requirements for Policy S7 and S8 are aligned with recommendations from LETI and the Committee on Climate Change.

Proposed Policy S7 (Reducing Energy Consumption - residential) includes that:

> "Unless covered by an exceptional basis … all new residential development proposals must include an Energy Statement which confirms in addition to the requirements of Policy S6 that all such residential units:
>
> 1. Can generate at least the same amount of renewable electricity on-site (and preferably on-plot) as the electricity they demand over the course of a year, such demand including all energy use (regulated and unregulated), calculated using a methodology proven to accurately predict a building's actual energy performance; and
> 2. To help achieve point 1 above, target achieving a space heating demand of around 15-20kWh/m^2/yr and a total energy demand of 35 kWh/m^2/yr … No unit to have a total energy demand in excess of 60 kWh/m^2/yr [which means] the amount of energy used as measured by the metering of that home, with no deduction for renewable energy."

The policy also includes a clause to address the energy performance gap:

> "The Energy Statement must include details of assured performance arrangements. As a minimum, this will require:
>
> a) The submission of 'pre-built' estimates of energy performance; and
> b) Prior to each dwelling being occupied, the submission of updated, accurate and verified 'as built' calculations of energy performance. [This] should also be provided to the first occupier … Weight will be given to proposals which demonstrate a deliverable commitment to on-going monitoring of energy consumption … which has the effect … of notifying the occupier [if] their energy use appears to significantly exceed the expected performance of the building, and explaining to the occupier steps they could take to identify the potential causes."

Proposed Policy S8 (Reducing energy consumption – non-residential) replicates the clauses except with a higher permitted total energy demand of 70-90kWh/m^2/year. The assured performance clause is also mirrored.

If a non-residential proposal can demonstrate why the metrics are not achievable, it can instead source renewable energy from off-site, pay the local authority to deliver equivalent renewable energy or other offsite infrastructure to deliver the appropriate carbon saving, or connect to a decentralised energy scheme.

Alternatively, a non-residential proposal may demonstrate achievement of BREEAM Excellent or Outstanding, instead of complying with the energy metrics.

Emerging example: Merton New Local Plan (draft 2022)

In April 2023, the inspectors expressed concerns in the Post-Hearings Letter[lix] around the viability of policies set out below, particularly for smaller development, that may negatively impact delivery. This relates to potential issues for small housebuilders in that required expertise in energy efficient construction may not be widespread.

The currently proposed draft with main modifications after the inspectors' first comments[lx,lxi] sets Policy CC2.3, which includes the following maximum **Energy Use Intensity** targets from Jan 2025 – this is likely to change now following the Post-Hearings Letter:

- Residential and multi-residential – 35 kWh/m^2/year
- Offices, retail, GP surgery, hotels and higher education – 55 kWh/m^2/yr
- Schools – 65 kWh/m^2/yr
- Leisure – 100 kWh/m^2/yr
- Light industrial uses – 110 kWh/m^2/yr

Supporting text paragraph 2.3.18 explains that major developments should calculate these with (CIBSE) TM54, (PHPP) methodology or equivalent. Minor residential schemes are permitted to instead calculate these with Part L SAP. 5-year post occupancy monitoring is also required for major development.

The targets match those developed by the London Energy Transformation Initiative to be consistent with achieving national net-zero carbon targets (paragraph 2.3.21) and proven feasible by energy modelling for another emerging local plan. In contrast, paragraph 2.1.14 notes that typical current Part L EUI is 140/kWh/m^2/yr.

The policy also includes the following **space heat demand** targets, with SAP:

Development type	Until 31/12/2022	01/01/2023 – 31/12/2024	From 01/01/2025
Block of flats & mid-terrace house	<43 kWh/m^2/year	39 kWh/m^2/year	15 kWh/m^2/year
Semi-detached, end-terrace & detached house	52 kWh/m^2/year	46 kWh/m^2/year	20 kWh/m^2/year
Non-residential (target flexible)	-	-	15 kWh/m^2/year

Supporting text paragraphs 2.3.9 – 2.3.13 explain that the gradual uplift allows time for developers to adapt, and that the 2022-24 targets reflect the Zero Carbon Hub 'interim fabric energy efficiency standard' and 'full fabric energy efficiency standard' which have been demonstrated to be feasible, viable, and achieved in several schemes in Merton.

In Policy CC2.4, proposals must use low carbon heat. Proposals must demonstrate "how the proposal has made the best potential use of roof space" to maximise renewable energy generation, which should meet "100% of energy demand … where possible".

Emerging example: Winchester Draft Local Plan (draft 2022)

This proposed submission underwent Regulation 19 consultation in March-May 2022[lxii].

Proposed Policy CN3 (Energy efficiency standards to reduce carbon emissions) requires that all residential development must demonstrate the following:

- **No on-site fossil fuels** for space heating, hot water or cooking.
- Space heating demand of **15 kWh/m^2/year.**
- Energy consumption (EUI) of the building(s) to less than **35 kWh/m^2/year.**
- **Passive House Planning Package or CIBSE TM54** to be used for predicted energy modelling.
- On-site renewable energy generation to provide 100% of the energy consumption required by residential buildings.

It appears in the Draft Plan that there is no option to offset shortfalls to the renewable energy generation and/or EUI target. No other authority has proposed the EUI approach without a last resort option to offset, although most evidence studies prove that the absolute energy requirements are technically feasible for the majority of housing typologies and therefore offsetting may not be required.

High-rise flat block is the primary typology that may struggle to meet on-site renewable energy requirements since there is limited roof space relative to the internal floor area. Given the housing mix in Winchester is unlikely to include this typology, this could explain why offsetting is not currently included in the Plan – this could be an approach South Staffordshire also explore for the same reasons.

Emerging example: Greater Cambridge Local Plan (First Proposals 2021[lxiii])

Policy CC/NZ *will require and guide net zero carbon new builds.* This will include:

- Space heat demand of 15-20 kWh/m^2/year in all new developments
- No new developments to be connected to the gas grid; all heating low-carbon
- Total energy use intensity targets to be achieved as follows:
    - Dwellings including multi-residential: 35 kWh/m^2/year
    - Office, retail, higher education, hotel, GP surgery: 55 kWh/m^2/year
    - School: 65 kWh/m^2/year
    - Leisure: 100 kWh/m^2/year
    - Light industrial: 110 kWh/m^2/year
- Proposals should generate at least the same amount of renewable energy (preferably on-plot) as they demand over the course of a year [including] all energy use (regulated and unregulated), calculated using a methodology proven to accurately predict a building's actual energy performance.

The need and deliverability of this policy is evidenced by a suite of net zero carbon evidence reports including:

- Local area carbon reduction targets that would represent a fair local contribution to the national net zero carbon transition and Paris Agreement
- Expert analysis by the Committee on Climate Change and various building industry experts about what must happen in the buildings sector to deliver the national net zero goal and interim carbon budgets – including proposed targets for heat demand, total energy use, and on-site renewable energy generation – and explaining how/why this is not delivered by building regulations (current or incoming)
- Technical feasibility studies which modelled whether it was possible to reach the proposed zero carbon energy balance in the typical types of development expected to come forward in the plan period (based on applying a range of energy improvement measures to real recent development proposals that received permission) – this showed that the targets were feasible
- Cost modelling to show the cost uplifts to meet the modelled energy improvement measures, as above, for inclusion in the viability assessment.

The supporting text notes that the alternative – having no policy and relying instead on incoming uplifts to building regulations – would fail to fulfil the plan's statutory duty to help fulfil the Climate Change Act and would fail to play Greater Cambridge's role in helping the UK fulfil its commitment to the Paris Agreement to limit climate change to 1.5C or 2C.

The plan is still in its relatively early stages as of May 2022. It completed its First Proposals/Preferred Options consultation in December 2021, from which issues are being explored. A draft of the local plan itself is expected be released in 2023.

Emerging example: Leeds City Council Draft Local Plan (2023)[lxiv]

Policy EN1 Part B *requires new development to be operationally net zero.*

All development must demonstrate a space heating demand of 15 kWh/m^2/year.

Energy use intensity required targets vary significantly between typologies, as set out below:

- All residential development – 35 kWh/m^2/year
- Offices, retail, GP surgery, hotels and university facilities – 55 kWh/m^2/year
- Schools – 65 kWh/m^2/year
- Leisure – 100 kWh/m^2/year
- Light industrial uses – 110 kWh/m^2/year
- Research facility – 150 kWh/m^2/year

On-site renewable energy generation is to deliver an annual net zero carbon balance (including regulated and unregulated emissions).

Additional secondary requirements:

- Calculations must be carried out using an approved building modelling software such as IES-VE, SBEM and PHPP.
- Gas boilers and direct electric resistive heating will not be supported.
- Expected official UK government electricity grid carbon intensity values to be used instead of static SAP10.2 factors.
- Offsetting at a cost of £248/tCO_2 – rising to £280 by 2030 to reflect further predicted grid intensity reductions.

Policy EN1 Part B goes further than similar recently adopted policies, since it prescribes EUI targets for non-residential typologies alongside residential. The policy is also explicitly refers to the use of gas boilers, whereas other policies rely on the energy targets themselves to rule out gas boilers and direct electric heating.

Emerging example: Bristol City Council Draft Local Plan (2022)[lxv]

Policy NZC2 requires new development to be operationally net zero based on absolute energy limits.

All development will be expected to:

- Achieve a maximum 15 kWh/m^2/year space heating demand
- Achieve a maximum 35 kWh/m^2/year energy use intensity – new homes and other forms of accommodation to achieve
- Comply with operational energy/carbon requirements of BREEAM 'Excellent' – major non-residential
- Provide on-site renewable electricity generation with an output equivalent to at least the annual energy consumption of the development
- Development should provide onsite renewable energy of 105 kWh/m^{2}fp/year

In the case of Policy NZC2, offsetting is a last resort option for energy use intensity instead of on-site renewable energy generation – price set at £90/MWh or 9p/kWh. See *previous section* for further information.

The key policy element here that is unique to similar emerging examples is the expectation of a certain amount of renewable energy based on the footprint of the building. Best practice for this metric is currently 120 kWh/m^{2}fp/year. Setting a target for this ensures that it is easy for planning officers to assess whether a development has truly maximised all available roof space. In most cases, if on-site roof top solar PV generation is predicted to be lower than the target set out, it can be assumed that all opportunities for generation have not been maximised from the earliest stage of the scheme.

Now that confirmed examples and emerging policies have been explored thoroughly, it is clear what the Local Plan can achieve. The successfully adopted examples above show that the equivalent South Staffordshire policies could include standards on:

- Energy Use Intensity
- Space heating demand
- On-site renewable energy generation
- Potentially an additional technical certification for non-residential buildings such as BREEAM

To ensure it is clear that on-site renewable energy generation has been truly maximised, a target using a kWh/m$^2_{\text{building footprint}}$/year could be set.

South Staffordshire definitely has the power and the mandate to set policy on energy efficiency and on-site renewable energy requirements for new buildings that exceed Building Regulations standards. The ideal (most ambitious and effective) recent successfully adopted policies have taken the approach described in the precedents above (EUI and space heat targets, and renewables to match total energy use). Therefore, it is **recommended that South Staffordshire explore whether such ambitious policies can be supported by the viability study** using secondary cost uplift evidence (see separate section 'Viability of required improvements to the building'.
However, if this proves impossible then it is **recommended to pursue an alternative policy approach of requiring improvements on Building Regulations and offsetting residual emissions**, as currently per draft Policy NB6.

Links between energy-based policy approaches and overheating risk

In addition to the key energy metrics for these policies, the local plan would ideally seek to incorporate measures on climate adaptation, most notably overheating risk, which is linked to energy efficiency. An overview of overheating risk and how it could be integrated into policy is explored below.

Overheating risk becomes a greater concern as buildings (necessarily) become more thermally insulated. Overheating risk can decrease comfort or even safety of residents. Integrating overheating assessment requirements into policy alongside operational energy/carbon requirements works towards a well-rounded policy approach, that can address mitigation and adaptation holistically.

Building Regulations Part O now requires, in new homes, either a simplified method or a dynamic modelling method to assess overheating. The more effective 'dynamic method', which is based on the industry best practice 'TM59' method by CIBSE, provides more detailed information on specific risks and their locations within a building, but is only required by Part O when the development is considered to have an elevated risk (such as in certain urban locations) and therefore most developments are likely to follow the simplified route. Alternatively, a full CIBSE TM52 (non-residential) or TM59 (residential) overheating risk assessment methodologies provide a robust approach for accurately assessing and mitigating such risks, which could be implemented as local plan policy alongside operational energy/carbon measures. A policy requirement that new development appropriately integrates the cooling hierarchy into design decision-making could also help ensure that overheating risks are considered throughout the entire decision process, allowing for more effective measures to be selected. The cooling hierarchy prioritises passive measures to reduce overheating risk, instead of allowing active cooling measures to be installed, such as air conditioning units that will unnecessarily increase energy demand and impact Energy Use Intensity levels.

Although a 2021 Written Ministerial Statement claims that now Building Regulations Part O (Overheating) has been introduced "there will be no need for policies in development plans to duplicate this", we note that Part O does not make mandatory the more effective full dynamic overheating modelling approach exemplified by CIBSE TM52 and TM59 as above. Additionally, Part O has no requirement for any such assessment in non-residential development. Therefore, a policy approach requiring CIBSE overheating methods could be justified, subject to development management capacity to determine policy compliance on this issue.

Overheating and operational energy/carbon would ideally be treated together, for example to ensure that the development does not increase overheating risk by excessively pursuing solar gain to reduce heating demand, and that the design does not require energy use for active cooling now or in future climate conditions. Therefore, it is important that passive cooling measures are prioritised and active cooling measures are only used as a last resort because their use will increase energy consumption and subsequent associated carbon emissions. Design elements such as building form, orientation, shading and passive ventilation should be decided at the earliest possible stage to ensure passive measures are maximised and overheating is sufficiently addressed.

Carbon and energy offset payments

Carbon offsetting

Carbon offset payments are sometimes set as a Section 106 requirement in order to make a development's unavoidable carbon emissions acceptable through off-site actions to mitigate them.

Carbon offset payments from developers were pioneered by Milton Keynes in 2008 and later adopted by Ashford and Islington, then across London, and now also Reading. These funds are meant to deliver actions that will prevent or remove the same amount of carbon that the development is calculated to emit over a certain number of years. Several key differences arise in how this kind of policy is applied:

- Calculation and scope
- Pricing
- Collection and spending.

Calculation and scope

Key differences here are:

- Whether to offset only regulated carbon emissions as calculated by SAP or SBEM (national calculation methods), or also unregulated emissions (and how to calculate these if so)
- Number of years of carbon emissions that the developer should pay for
- When the calculation should be performed – i.e. at the time of planning application, or on completion or post-occupation to ensure the offset amount reflects reality.

In the London Plan 2021, only regulated emissions must be offset (as calculated by SAP/SBEM). Some local authorities in London and elsewhere also seek offsets for unregulated emissions.

Where local plans require *carbon* offsetting to 'net zero' we have not found any examples that use a non-SAP / non-SBEM method to calculate the *regulated* portion of the carbon emissions that must be offset (although some seek offsetting of the *unregulated* portion using a different method). However, some energy-based policies that offset energy and not carbon use tools such as PHPP when calculating the amount of offsetting required for policy compliance.

Pricing

- Either tied to a nationally recognised 'carbon price' such as the BEIS carbon valuation,
- Or the cost of delivering local projects that would remove or prevent the same amount of carbon.

The recommended London offset price is based on a 2017 study by AECOM. This explored a range of costs to enact carbon-saving projects, minus the amount of 'copayment' that can be secured (e.g. if homeowners pay part of the cost towards insulating their home, and the fund pays the rest). These projects mostly consisted of retrofitting existing buildings with insulation or renewables. It concluded:

> "Given the wide variability in the costs and carbon savings for potential carbon offsetting projects combined with the uncertainty in the percentage copayments that could be secured, it would be difficult to assemble sufficient evidence … to analytically derive a robust [London-wide] carbon price based on the cost of offsetting projects. As such, the approach adopted in this study is to … base [offset] prices … on a nationally recognised carbon pricing mechanism".

The AECOM study notes that offsetting [within the London Plan policy approach] must be considered in viability studies, and could be varied by the location in the same way that CIL zones differ. The London Plan 2021 lets boroughs set their own price, noting that "a nationally recognised non-traded price of £95/tonne has been tested as part of the viability assessment for the London Plan". The equivalent cost of offsetting based on the original £95/tCO_2 is now set at £378/tCO_2 (2023 price) to reflect a decrease in carbon intensity of the grid. 2018 Mayoral guidance notes some LPAs have based their price on the average cost of local projects to save carbon, e.g. Lewisham (£104/tonne), which is re-tested in a local viability assessment. We note that it is important that viability assessments must not 'double count' the cost impact of net zero carbon policy: that is, the viability assessment should firstly consider the cost of meeting policy requirements for carbon reductions on-site through improvements to the building, and then only apply the cost of offsetting where there is any *remaining* carbon.

In the context of the South Staffordshire recommended offset approach for new residential development, offsetting does not need to be considered in viability assessments because the price set is equal to the cost of on-site measures and therefore does not represent an additional cost to the developer.

Collection and spending of offset payments

London mayoral guidance (2018) notes that offset payments should be collected via Section 106 agreements in the usual way and by the same team, and that:

> "LPAs generally choose to take **payment on commencement of construction** on site. Some choose to **split the payment**, with 50 per cent paid post-construction and 50 per cent prior to occupation. This is up to the LPA to determine. However, taking payment later than commencement of works can mean a high degree of uncertainty as to when funding will be received and is unlikely to enable carbon savings from the offset fund to be delivered before the development is occupied, creating a delay in offsetting a development's carbon impact. LPAs should also note the time limits that apply to discharging Section 106 agreements and ensure funds are collected and spent in this time period."

One potential pitfall is that carbon offset payments received via S106 agreements have sometimes had to be returned after not being spent in the allotted timescale. National Planning Practice Guidance notes that:

> "[S106] agreements should normally include clauses stating when and how the funds will be used by and allow for their return, after an agreed period of time, where they are not."

This can be avoided. London's 2019 annual survey of the use of offset funds notes that in that financial year, "No LPAs reported returning offset payments to developers" and also that "The GLA would not expect offset payments to be returned in any instance and expects LPAs to be collecting offset payments for all applicable developments and identifying suitable projects for spending funds."

The Centre for Sustainable Energy notes that developers can ask for a refund of carbon offset payments that are unspent within 5 years. To avoid this, it recommends setting up:

> "defined structures and processes to stimulate new markets and opportunities for carbon saving measures ... [Creating] an open application process to stimulate and attract carbon saving projects from council departments, the market and community that would be unviable without subsidy, for example community energy projects or insulation schemes. Applications should be proportionate to the scale of the funding provided, the emissions to be saved and the risk profile of projects."
>
> "Programmes of standardised measures, low unit cost, low risk and lower variability of carbon savings (such as the many domestic insulation programmes, run by council housing departments) should be required to apply to the fund just once as a whole programme, with detailed implementation targets, specifications, predicted carbon savings and reporting processes and timetables. Once approved, it should be as simple as possible for residents, communities or businesses to access funding through these programmes."

The 2018 London mayoral guidance encourages LPAs to pool Section 106 carbon offset payments rather than committing to spend them on specific projects. When the guidance was written, local planning authorities were only permitted to pool up to five S106 payments towards the same project, but this restriction was removed in 2019 and this can now be pooled with CIL payments too. Councils using either CIL or S106 must publish an infrastructure funding statement annually. When setting the carbon price, the LPA should factor in a cost to administer the fund and set up a pipeline of projects to be funded.

Example: Milton Keynes

A 2016 review of offsetting practices noted that both Ashford and Milton Keynes originally established their local carbon price in 2008 using an estimate of typical costs of making carbon savings elsewhere in their respective districts. This was set at £200/tonne in 2008, plus inflation.

The MK Adopted Local Plan 2019 Policy SC1 retains this requirement: Offsets must be paid for carbon emissions that remain subsequent to complying with the first two requirements for a 19% reduction in Part L 2013 carbon emissions, plus a further 20% emissions reduction through renewable energy.

Milton Keynes adopted Sustainable Construction SPD 2021 notes that Policy SC1 does not require offsetting of *unregulated* emissions. This is notable because the draft version of that SPD (2020) had sought offsets for both regulated emissions (calculated by SAP in homes or SBEM in non-domestic buildings) and unregulated emissions (calculated by BREDEM for homes; in nondomestic buildings this can be calculated using CIBSE Guide F, CIBSE TM54, or metered evidence from previous work). This requirement appears to have been removed after one public consultee pointed out that the SPD could not require this because the plan policy SC1 itself did not specify that it included unregulated energy.

This SPD confirms that the price remains at £200/tonne plus 'indexation fluctuations' which will be decided at the time of calculation. The developer must only offset 1 year of emissions, but the SPD notes that they may apply an annual multiplier in future iterations of the local plan.

Example: New London Plan 2021

Policy SI2 allows offset payments to partially meet the net zero carbon requirement. It applies to:

- Major development only
- Any regulated residual emissions over a period of 30 years, after enough upgrades have been designed-in to result in at least a 35% on-site reduction in the regulated emissions (using SAP/SBEM calculation).

There is no London-wide requirement to offset unregulated emissions, but major developments must still "calculate and minimise" these.

At least one London Borough (Islington) does additionally require an offset for unregulated emissions (as of a 2016 National Energy Foundation review[lxvi] of practices across London).

The same NEF review found that most London local planning authorities (LPAs) require that the carbon is calculated at the time of the planning application. However, several of these LPAs then update the calculation later:

- Recalculation at detailed design stage or discharge of planning conditions (Croydon, Hackney, Islington, Hillingdon, Kingston)
- Recalculation at 'as built' stage, on completion (Brent, Enfield, City).

The London Plan Policy SI2 requires that each borough must maintain its own fund to hold and use these offset payments. This must be:

- Ring-fenced for carbon reducing actions, and
- Its activities monitored and reported on annually.

Mayoral guidance (2018) expects the local carbon offset price per tonne to be based on:

- either a nationally recognised carbon pricing mechanism (starting at £60/tonne as the nationally recognised non-traded price, although the Plan 2021 raises this to £95/tonne),
- or the cost of offsetting carbon emissions across the local planning authority area.

Example: Islington Local Plan Core Strategy 2011

Policy CS10: "All major development should achieve an on-site reduction in total (regulated and unregulated) CO_2 emissions of at least 40% in comparison with ... Building Regulations 2006" and the rest offset via a contribution at £920/tonne for one year's emissions, or a flat fee for minor developments.

Neither the policy nor SPD say how unregulated emissions should be calculated, nor do they differentiate between regulated and unregulated emissions for offsetting. This implies that unregulated emissions are included in the offsetting.

Energy offsetting

Due to the rising number of local authorities setting standards based on the approach set out in the previous section (with fixed energy targets and 100% renewable supply), energy offsetting is becoming more prominent. In this context, it is preferred over *carbon* offsetting because the cost of offsetting is based directly on residual kWh (£/kWh), instead of tCO_2 (£/tCO_2). Carbon intensity factors (see glossary) of the grid or other energy sources are not required for calculations when energy is offset (instead of a carbon offset), which leads to a **more direct reflection of exactly what is being offset**. Carbon factors for offsetting are often quickly outdated, and are somewhat crude in their estimation since they are annually averaged and do not reflect seasonal grid intensity variations. Planning decisions on carbon offsetting could also face a stumbling block around uncertainty about what the grid carbon factor will be by the time the development is completed; energy offsetting avoids this problem.

Energy offsetting **simplifies the process for project selection** due to the absence of carbon factors, since it becomes easier to assess how many kWh a new rooftop solar PV installation will produce, for example. This better ensures that the residual kWh that were not mitigated on-site **can be directly measured and mitigated** off-site through a funded project through an energy offset fund.

With *carbon* offset funds, several types of project including energy efficiency, retrofitting, and renewable energy could be appropriate for the delivery of those offsets, because the residual amount of CO_2 is not directly assigned to a particular measure. In some cases even tree planting is proposed despite uncertainty about its longevity, or transport measures despite uncertainty that this will deliver the required CO_2 savings in reality. This uncertainty can result in political disagreement about how to spend the fund on competing priorities, and administrative complexity in assembling a portfolio of projects, thus the required amount of carbon mitigation may not be swiftly (if at all) achieved.

When *energy* needs to be offset, it is usually due to a technical inability to deliver the required on-site renewable energy generation. This **makes it a simple decision to spend the fund** on off-site solar PV installations, preferably on existing buildings, which should aim to at least generate the residual on-site kWh. Through this simplified system, energy offsetting can become a reliable mechanism to ensure that any residual on-site renewable energy generation is wholly mitigated elsewhere.

It should however be explicitly noted that offsetting in this context, as well as a carbon offset context, **should strictly be a last resort only acceptable in exceptional circumstances**. The risk of offsetting is that it may increase the burden on existing district-wide decarbonisation plans and use up low hanging fruit resources. **Additionality must therefore be the primary consideration** of both offset approaches to ensure that the offset funding delivers something that would not have otherwise been created.

To best guarantee offset mechanism effectiveness, a locally-specific net zero offset price should ideally be set, which should be based on the cost of existing delivered renewable energy schemes of varying size. Subsequently, an appropriate price should be set to sufficiently deliver the residual kWh not mitigated on-site. In recent examples, prices to achieve this have been set at 9-12p/kWh.

Assuming the current electricity emissions factor in SAP10.2 (136 gCO_2/kWh), an estimated net zero local offset price - £652/tCO_2 for Bath & North East Somerset Council – can be close to double the price of the 2023 BEIS Green Book valuation of £378/tCO_2. This represents the importance of a correctly set price, which otherwise risks insufficient funds to deliver the residual on-site energy elsewhere.

A recent study by the Centre for Sustainable Energy (CSE) for West of England (WoE) authorities determined the cost of energy offsetting based on 131 domestic rooftop PV installations that were delivered through the Local Authority Delivery Scheme (LADS), which was managed by Bristol City Council's energy service. The installation costs of solar PV projects through the LADS scheme well represents the costs of energy offset fund projects that are likely to occur in the WoE in the future, particularly due to the average installation capacity of 3.37kWp. The subsequent median installation cost under the LADS scheme was £2,180/kWp, in contrast to the BEIS installed cost statistics for 4-10kWp solar PV installations (2020-2021) value of £1,586/kWp. This again reiterates the importance of establishing a *locally-specific* offset price as nationally-averaged costs can produce a price 25% lower than the local cost, as demonstrated above. Using the £2180/kWp median installation cost value, an offset price (including 15% administration costs for the fund) of 9p/kWh was estimated by CSE, which can be considered a local net zero energy offset price for the West of England authorities.

Example: Cornwall Climate Emergency DPD (2023)

Policy SEC1 (Part 2b) "*allows offsetting where it is not feasible to meet all the renewable energy requirements for new-build residential and there is no connection to a low carbon district energy network*".

Cornwall will run a pilot offsetting spending scheme, which will install solar PV on existing Cornwall Council housing.

A study by the South West Net Zero Hub set the cost for energy offsetting, which is set at **10p/kWh** to reflect overall costs to deliver residual on-site renewable energy generation elsewhere. Over the assumed 30-year lifetime, the price accounts for:

- Administrative costs
- Annual maintenance
- Solar PV panel degradation
- Inverter replacement for a typical 3kW solar PV array for each home

Example: Bath & North East Somerset Council Local Plan Partial Update (adopted 2023)

Policy SCR6 provides a last-resort option for major development in exceptional circumstances.

The funds will be spent on solar PV installations on existing social housing and low-income households, which will be delivered in partnership with a community energy group and local housing provider.

A *study* by the South West Net Zero Hub established an initial local net zero cost for energy offsetting, set at £652tCO_2 (converted from kWh). B&NES however selected the 2023 BEIS Green Book value of **£373/tCO_2**. 10% administrative costs are then added onto the final calculation for the lifetime financial contribution.

The lower yet nationally-recognised valuation was primarily selected due to time constraints with the Examination in Public, which did not allow the production of an in-depth study to establish a more robust local net zero offset price (an initial study only assessed one solar PV installation so was not deemed a robust basis for a price).

Emerging example: Bristol City Council Draft Local Plan (2022)

Bristol City Council have proposed two offsetting schemes in their Draft Local Plan: operational energy offsetting and embodied carbon offsetting. The latter is described in a following section, whilst operational energy offsetting is discussed here.

Policy NZC2 takes a different approach to energy offsetting to the two adopted examples set out above. Instead of offsetting a shortfall to on-site renewable energy generation to meeting a net zero energy balance, it is residual kWh to energy use intensity that is to be offset as a last resort.

The offset cost is set at **9p/kWh** that is required over the typically assumed 30-year building lifetime. This is stated to be equivalent to providing additional renewable energy generation elsewhere in the city and is therefore a locally-specific net zero offset price. Cornwall (above) set a similar cost of 10p/kWh, which is the same as the estimated price for West of England authorities by the Centre for Sustainable Energy.

Taking into account the range of offsetting approaches within both carbon and energy contexts, the recommendation for the Local Plan is to offset residual on-site renewable energy generation, which is based on a £/kWh price. This is the approach recommended under the new residential development policy recommendations. No offsetting is recommended for non-residential new development as the draft wording and recommendation for NB6 is to achieve BREEAM Excellent. Additionally, no embodied carbon offsetting is recommended because the emissions limit recommended should not require offsetting to be achieved.

Energy performance gap

The energy performance gap is the difference between the predictions for a designed building's energy use, and the amount of energy it actually uses in operation. This is due to three factors:

1. Poor methods used to predict the energy use of a building (including poor calculations, incorrect assumptions, and exclusion of 'unregulated' energy loads)
2. Errors in construction which lead to worse airtightness or thermal envelope
3. Errors in system operation, and user behaviour different to assumptions (for example, turning up space heating while opening windows to dry laundry, not using heat system as intended, spending more time in the building than anticipated, or bright lighting left on overnight).

Unfortunately, the calculation methods used in Building Regulations Part L (SAP and SBEM) are very poor predictors[lxvii] of the actual energy use of a building. SAP and SBEM are compliance tools[lxviii], not really tools to predict energy and carbon performance (even though they purport to be). This is not only due to out-of-date carbon factors used for different energy sources, but the entire methodology.

For this reason, recalculating SAP on completion[13] will not prove that the building *performs* to the same metrics as in the SAP output (kWh/m^2 and CO_2/m^2), only that it is *built* as designed in terms of installed specification of insulation, heating system and renewable energy generation. The nation-wide lack of post-occupation energy monitoring means that both developers and planning/building control enforcers are often unaware of the scale of difference between SAP outputs and actual performance.

Point (2) above relates to how imperfections in the construction process can lead to worse energy performance than predicted. For example, a building may leak a lot of heat if insulation is incorrectly installed, or if a hatch to a cold loft is put in the wrong place and then moved, leaving holes in the air tightness membrane. Lower-spec products or poor substitutions may be made in the building –for cost-cutting reasons, supply difficulties, or simply because the right person was not on site at the time[lxix].

Methods to address the performance gap

There are energy modelling methods that give much more accurate predictions than SAP/SBEM, such as the **Passivhaus Planning Package (PHPP)** and the **CIBSE TM54** method. However, it is not entirely clear whether local planning authorities are legally empowered to require conformance with standards set using these alternative calculation methods because of definitions in the powers granted by Planning & Energy Act 2008 (discussed). The Local Plan may be able to **require *reporting* of predicted energy use using these methods** (subject to viability linked to the cost of the modelling), but it is uncertain whether the plan could require the building to *achieve* a certain metric using them (although please note the new examples from Bath/North-East Somerset, Cornwall and Central Lincolnshire have all successfully required this, sometimes through supplementary guidance). Of the two, TM54 is likely to be more clearly supported by the 2008 Act as it uses building regulations Part L as a starting point[lxx] and is now recognised in Part L 2021 for non-residential as a valid method to fulfil the new requirement for accurate energy forecasting).

There are also several quality assurance processes that can be applied during construction to avoid the unnecessary errors that can cause the building to perform worse than expected. Examples include:

- BEPIT (Building Energy Performance Improvement Toolkit) – a set of checks during construction that identify and remedy defects in the construction at every stage up to completion
- Passivhaus process – in addition to using accurate energy modelling, a Passivhaus project undergoes a series of stages during design and construction which improve the build quality
- NEF/GHA Assured Performance Process™ – this maps to the five stages of the RIBA Plan of Work (inception to verification) and involves expert impartial review by accredited assessor.
- Soft Landings – recommended by the UKGBC (as above) but discounted by some local planning authorities as an acceptable 'quality assurance' method (see example of Milton Keynes).

There may be other suitable quality assurance processes. These **must** be based on quality of energy performance, not just generic building quality. South Staffordshire would need to decide whether these are acceptable based on their individual merits and evidence that they are effective (verified by track record of previous projects' post-completion testing or post-occupation energy monitoring).

The Local Plan **could require the use of these processes, subject to viability** (again relating to the cost of appointing qualified professionals to undertake these processes). Proposals could submit:

- **Energy modelling:** evidence to be submitted in energy statement with planning application, and recalculation of this if any relevant details are changed at reserved matters / amendments. (This would be necessary in any case to demonstrate compliance with energy intensity targets even at design stage, even without an in-use verification requirement.)
- **Quality assured construction:** evidence to be submitted along with other documentation to gain sign-off on completion from building control and discharge of planning conditions.
- UKGBC Policy Playbook recommends "a recognised performance gap / assured performance tool will be used to minimise the potential performance gap between design aspiration and the completed development. The effectiveness of measures will be reviewed and ratified as part of the post-completion discharge of conditions".
- **Evidence requirements in the case of no 'quality assured construction' scheme relating to energy use:** set a standalone requirement to carry out air tightness tests whilst the air barrier is still accessible as a construction requirement, if the full use of specific third-party quality assurance schemes would make necessary development unviable.

Verifying energy performance post-completion

Post Completion certificates can be issued once Planning Conditions are discharged. Local Authorities can condition to ensure that buildings are performing as anticipated; however, this would require engagement with the main contractor outside of their practical completion contract. Examples have sought this through an Area Action Plan and site-specific allocations.

There is debate about whether it is reasonable to hold developers accountable for carbon impacts of unregulated energy use, which would be untested by Part L SAP and largely out of their influence in

[13] As-built SAP calculations have been used by several local authorities to determine the final amount of offset payments the developer must provide, but it does not verify performance or change the energy performance gap. Relying only on SAP will always mean the developer offsets far less carbon than the building will actually emit – although it does simplify the offset decision-making and data gathering process.

terms of unconfirmed occupant fit-out, operational hours, occupancy, and other third-party factors. These uncertainties are larger in non-residential buildings, where there is a wider range of variation in how the buildings are used compared to residential building use patterns which tend to be more homogenous and predictable. However, even for non-residential, reasonable assumptions can be made about many of these uncertain factors, in order for the developer to include the appropriate amount of renewable energy in the design, even if the metered data in any post-occupation monitoring turns out to vary from the design-stage assumptions.

The following pre-completion testing requirements would help in the assurance of as-built performance against the design standard. Outline costs[14] are provided:

- Air tightness testing ~£1000 per property
- Thermographic testing[15] ~£400 per property
- U Value testing ~£400 for a dwelling (3 weeks per property)[16]
- Post-occupancy evaluation testing: ~£5000[17]. (if applied to scalable developments >c.50 dwellings, the economy of scale would reduce the cost burden through sample testing only).

[14] Communities and Local Government (2008), Performance Testing of Buildings BD 2535
[15] Thermographic surveys can only be completed during the heating season. Where building completion occurs outside that season, the applicant could commit test at the earliest opportunity and perform remedial measures where needed. Homeowners must be fully informed.

[16] Accredited construction details are to be checked through thermographic testing performed according to BS EN 13187: 1999 Thermal performance of buildings. Qualitative detection of thermal irregularities in building envelopes. Infrared method. Identified locations with deviations from expected performance are further investigated through a borescope survey and remedial works performed if practical.
[17] https://www.pollardthomasedwards.co.uk/download/PTEpost-occupancy_evaluation2015_LR.pdf

Example: Milton Keynes Local Plan 2019 (adopted)

Policy SC1 includes that:

- K. 5 All proposals of 11+ dwellings or non-residential space over 1,000m^2 must
    - "implement a recognised quality regime, which assures that 'as built' performance (energy use, carbon emissions, indoor air quality, and overheating) matches the calculated design performance", and
    - "Put in place a recognised monitoring regime to allow the assessment of energy use, indoor air quality, and overheating risk for 10% of the proposed dwellings for the first five years of their occupancy, and ensure that the information recovered is provided to the applicable occupiers and the planning authority..
- The Sustainable Construction SPD explains that a 'recognised quality regime' must include
    - (1) modelling of different scenarios at design stage and issuing performance targets such as kgCO2e/year or energy use (which must use expected usage profiles rather than standard ones, and should ideally include Dynamic Simulation Modelling using the National Calculation Methodology [SAP or SBEM] as a baseline),
    - (2) processes and plans in place to ensure everyone in construction and dwelling management knows how to avoid common reasons for the performance gap,
    - (3) suitable fabric testing and iterative feedback mechanisms,
    - (4) demonstrating that the 'as built' targets set are achieved, and
    - (5) third-party verification that the quality regime has been carried out.
- The SPD also asserts that the quality regime must ensure the post-occupancy data will be available by implementing a suitable metering and monitoring strategy that can deliver performance data to compare with the designed performance targets.
- The SPD also notes that two suitable regimes are the Quality Assurance sections of Home Quality Mark ONE, and BSRIA Soft Landings Framework.
- The above specified requirement for the 'quality regime' means that the developer must also test the 'as-built' performance and submit data to the council. A report is then submitted to both occupiers and to Milton Keynes Council, which states the performance gap metric and identifies any reasons for deviation from predicted energy usage, carbon emissions, indoor air quality and overheating performance, as well as specific actions that have or will be taken to reduce the gap.

Example: Greater London Energy Monitoring Guidance 2020 (adopted)

The 'Be Seen' energy monitoring guidance (April 2020) requests that[lxxi]:

"Analysis guided by CIBSE TM54, which recommends using a tailored Part L model for the estimates of regulated and unregulated loads, should be undertaken and its findings should be reported in the 'be seen' reporting webform. A TM54 analysis gives more accurate predictions of a building's energy use. This approach also aligns with the reporting requirements under the GLA's Whole Life-Cycle Carbon (WLC) Assessment Guidance. The CIBSE TM54 findings should therefore also be used to represent the regulated and unregulated energy requirements for non-residential uses of Module B (operational energy use) of BS EN 15978."

Example: B&NES and Cornwall 2023 (adopted)

Supplementary guidance from Cornwall Council, and the Sustainable Construction Checklist SPD from B&NES respectively set out compliance and reporting frameworks for the councils' recently adopted net zero homes policies.

Both documents recognise the inaccuracy of SAP to accurately assess building energy performance, particularly with policies that assess energy use intensity and space heating demand. To resolve issues with SAP and subsequently minimise a performance gap, the councils take the same approach, which provides two options to developers for new build residential applications:

- **Passive House Planning Package** (PHPP) – suitable for all residential development
- **SAP + Energy Summary Tool** – suitable for minor residential development

PHPP is the preferred option for any size of development, but it is a requirement for major residential development.

The option for SAP to be used alongside the Energy Summary Tool is offered as a benefit to developers, so that the use of familiar Part L software can continue for minor residential development. The use of the Energy Summary Tool ensures that final outputs from SAP for energy use intensity and space heating demand reflect genuine in practice performance.

It is important to note that these requirements, which have the intention to reduce the performance gap, were not subject to deep interrogation during Examination.

Emerging Example: Solihull Draft Local Plan (draft 2021)

Policy P9 requires that all major developments must "implement a recognised quality regime that ensures the 'as built' performance (energy use, carbon emissions, indoor air quality, and overheating risk) matches the calculated design performance of dwellings as specified above [a 30% reduction on Part L 2013 commencing from now, and net zero carbon for all new development commencing from April 2025]"

Emerging Example: Merton New Local Plan (draft 2021)

Merton is currently awaiting a response from the Inspector following the submission of additional requested information and documents post-examination. Its proposed draft with main modifications after inspector's first comments[lxxii] Policy CC2.3 includes a range of space heat and energy use intensity targets whose compliance must be demonstrated using calculations with (CIBSE) TM54, (PHPP) methodology or equivalent.

The supporting text explains that these calculation methodologies help to reduce the performance gap because they generate much more accurate predictions of energy use, compared to the SAP methodology used to fulfil Building Regulations Part L.

Setting effective energy performance targets is crucial, yet it is equally important to ensure that they are effectively implemented in practice. Therefore, policies need to be in place to address and monitor the energy performance gap. As shown in the examples above, policies in this area address accurate energy performance calculations, assured performance processes throughout construction, and post-occupancy monitoring mechanisms – the latter two here are necessarily required by Policy NB6.

Existing buildings

There is less clear direction in legislation, and fewer examples available, to demonstrate the acceptability of seeking energy and carbon improvements in existing buildings compared to new ones.

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. It is difficult or impossible to retrofit them to the same energy performance standard as new builds can achieve, and the workforce has a shortage of skills to do this effectively.

The decarbonisation of existing buildings is actually a more important challenge compared to new buildings, simply due to scale. The Committee on Climate Change has shown[lxxiii] (and Government has recognised[lxxiv]) 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.

The rollout of insulation and low carbon heating to existing buildings ('energy retrofit') have been far slower than predicted and needed[lxxv]. Heat pump rollout in particularly must be vastly accelerated[lxxvi]. Costs for these technologies are decreasing and will continue to do so, particularly with Government grant assistance. It is important to note however that fabric measures should be prioritised initially before heat pump installation to avoid excessive energy use; this is to ensure heat retention as heat pumps operate at lower temperatures than conventional gas boilers. These measures are vital for net zero carbon and will deliver economic and wellbeing-related benefits in the long term if implemented correctly.

Take-up of solar panels to existing homes dropped steeply[lxxvii] since the closure of the Feed-In Tariff scheme in 2019, as new installations no longer generate income from energy sent to the grid. Solar PV installations are however now back on the rise due to householders becoming increasingly concerned about the cost-of-living and energy crises.

Local plans 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: The planning system can (correctly or incorrectly) be perceived by building owners as yet another obstacle to retrofitting, on top of the cost, disruption, and risk of building damage. Owners may (wrongly) assume that all changes need permission, or that permission is likely to be refused. Building owners' willing action and investment is essential to the net zero carbon transition, and therefore it is vital that the planning system becomes a facilitator and not an obstacle to this.

The National Planning Policy Framework confirms that (paragraph 152): "The planning system should support the transition to a low carbon future … [by] encourag[ing] the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure". It also confirms that (paragraph 158) when determining applications for renewable and low carbon development, the local planning authority should not require the applicant to demonstrate the overall need for renewable energy, and should approve the application if its impacts are acceptable or can be made so. This supports a permissive approach towards proposals for the addition of carbon-saving and renewable energy measures to existing buildings.

The scope for a role for local plan policy in reducing existing buildings' carbon therefore has two main strands:

1. Removing the actual or perceived planning barriers to energy retrofit changes to buildings.
2. Allocating or identifying sites suitable for renewable energy generation and distribution in order to decarbonise the energy that existing buildings use.

Point 1 (a permissive, supportive approach) could be pursued through the following tools:

- A local plan policy that explicitly encourages energy efficiency and carbon improvements to existing buildings with significant weight attached to those benefits, and signposts the reader to further guidance about how to make such changes acceptable in heritage-sensitive settings
- Supplementary planning guidance that clearly explains the range of retrofit measures that can be effective in improving energy performance of existing buildings, which kinds of changes are acceptable in different settings, how to make acceptable changes in heritage settings (referencing available expert guidance[lxxviii]), and advising which changes simply do not need permission in most settings
- A Local Development Order giving blanket permission to specific changes in geographic locations that are not considered heritage-sensitive – such as certain acceptable types of upgraded windows, doors, external insulation, or heat pumps visible from the street.

One further option is to seek 'consequential improvements' when changes are being made to a building that require planning permission. This could expand on Building Regulations requirements for the same. We have identified one example for this. However, discussions with energy officers at that local authority reveal that this has not proven very effective because very few relevant proposals pass over their desk, and the improvements can only be applied to the part of the building that is undergoing works, not the whole building – which can render some retrofit measures ineffective (such as airtightness). Nonetheless, the Local Plan can look to encourage low-carbon measures to be integrated into the areas of the building where planning permission is needed, and require that the energy hierarchy is followed for design decisions.

Point 2 (proactive promotion of renewable energy generation and low-carbon energy distribution) could be pursued through the following tools:

- Spatial strategy (allocating or identifying suitable locations for such renewable energy features and potential low carbon heat network locations, in consultation with citizens, local business, conservation bodies and the electrical grid District Network Operator) – this can help to de-risk the prospect for potential investors, site owners and developers of renewable energy
- Infrastructure Delivery Plan – ensuring the electrical grid District Network Operator is ready to make the capacity upgrades necessary to serve a growing proportion of all-electric, gas-free, solar-exporting buildings, electric vehicles, and suitably located large-scale renewable energy
- A Local Development Order that gives blanket permission to add solar panels to buildings in locations not considered heritage-sensitive, expansion of strategic low carbon heat networks.

Example for actively welcoming energy improvements to existing buildings: Milton Keynes Local Plan (adopted 2019) [lxxix]

Policy SC1 (Sustainable Construction) includes that:

> "Proposals which would result in considerable improvements to the energy efficiency, carbon emissions and/or general suitability, condition and longevity of existing buildings will be supported, with significant weight attributed to those benefits."

Supporting text notes that:

- "existing domestic buildings contribute 28% of the Borough's carbon dioxide emissions (1.5 tonnes of CO_2 per capita in 2014). Along with other non-domestic buildings, retrofitting the existing building stock in the Borough presents a significant opportunity to help meet the strategic carbon dioxide reduction target of 57 per cent by 2030".

- Policy SC1 recognises the benefits that retrofitting buildings can bring [such as fit-for-purpose housing as well as carbon reductions], giving significant weight to them … in order to help achieve Strategic Objectives 11 [delivery of housing that meets needs] and 13 [mitigation of climate change]. The Council will encourage retrofit improvements to existing buildings in the Borough, on an individual and area-wide basis. Where appropriate the Council may employ Local Development Orders to support area-wide schemes".

Example using a Listed Building Consent Order to enable easier solar PV installation in listed buildings: Kensington and Chelsea (2022)

The Royal Borough of Kensington & Chelsea is the first council in the UK to issue a Listed Building Consent Order, which gives consent for solar PV on the majority of Grade II and Grade II* listed buildings without a requirement for listed building consent.

Certain conditions must be demonstrated on:

- Positioning
- Materials
- Fixings
- Protecting the appearance of fabric of the listed building

Providing the conditions are demonstrated, a far simpler application compared to a usual listed building consent application is required. This makes solar PV installations a more attractive and less time intensive prospect for householders in Kensington and Chelsea.

Examples (various): using Local Development Orders to expand renewable and low carbon energy systems and promote energy retrofit

Swindon Borough Council has used LDOs to promote the growth of renewable energy generation and use, both on specific sites and in borough-wide terms. Examples include:

- A borough-wide LDO for non-domestic air source heat pumps and district heating
- Hydrogen and electric vehicle charging stations (specific sites) –
- Identifying specific sites for solar photovoltaic arrays including solar farms. The LDO on solar farms has been particularly successful, by de-risking the process. It was created by issuing a 'call for sites' and then assessing these sites against various criteria.

Across several London Boroughs, an LDO was created to make it easier to deliver heating and cooling networks. By removing the need to make a separate application for each new network section, this makes the network more flexible for new connections and reduces the costs of expansion. It also creates a common standard for new heat networks.

Milton Keynes local plan 2019 indicates a willingness to use LDOs to encourage wide scale energy retrofit.

Actively welcoming energy and carbon improvements to existing buildings

The following policies are not intended to be strict requirements, as the local plan cannot do this. Yet they are important examples of how to signal a positive stance by the council towards retrofitting, offering confidence to potential applicants and steering officers to take very seriously the benefits of energy efficiency retrofitting when weighing up its impacts.

Emerging example: Wokingham Draft Local Plan Update 2020

Draft Climate Change Policy SS8 confirms the local plan will "support retrofitting existing buildings with measures to improve their energy efficiency and generate onsite renewable energy".

Supporting text notes that "Proposals to sensitively refurbish or retrospectively improve the performance to reduce their energy use and improve comfort will be supported. Interventions to upgrade historic buildings should be undertaken sensitively in recognition of their heritage value."

This is supported by policy DH7 (Energy) which includes that:

> "Development proposals which would result in considerable improvements to the energy efficiency, carbon emissions and/or general suitability, condition and longevity of existing buildings will be supported, with significant weight attributed to those benefits[*]. The sensitive retrofitting of energy efficiency measures and the appropriate use of micro-renewables in historic buildings, including listed buildings and buildings within conservation areas will be encouraged, providing the special characteristics of the heritage assets are protected."

Example: Cornwall Climate Emergency Development Plan Document (adopted)

This emerging plan has been through Regulation 19 consultation, underwent independent examination in Summer 2022[lxxx], and was adopted in early 2023.

Policy SEC1 (Sustainable Energy and Construction) includes that:

> Significant weight will be given to the benefits of development resulting in considerable improvements to the energy efficiency and reduction in carbon emissions in existing buildings.
> Proposals that help to increase resilience to climate change and secure a sustainable future for historic buildings and other designated and non-designated heritage assets will be supported and encouraged where they:
> 1. conserve (and where appropriate enhance/better reveal) the design, character, appearance and historical significance of the building; or
> 2. facilitate their sensitive re-use where they have fallen into a state of disrepair or dereliction (subject to such a re-use being appropriate to the specific heritage asset).

Emerging example: Greater Cambridge Local Plan (First Proposals 2021[lxxxi])

Policy GP/CC *is titled* 'Adapting heritage assets to climate change'.

The proposed policy direction includes

- "Require retrofit works to be carried out in accordance with the BSI PAS 2035 framework and Historic England guidance for energy improvements to heritage assets
- Require proposals to take a 'whole building' approach to undertaking works to heritage assets to enhance environmental performance"
- Support proposals which seek to undo the damage caused by previous inappropriate interventions (e.g. removal of cement render and replacement with breathable options).
- Give consideration to measures that will reduce carbon emissions and assist with adaptation to our changing climate (for example external shading or property level flood protection).
- The plan will also direct residents to further guidance on how to approach works to older homes."

The supporting text notes that need for this policy is evidenced by the local plan's Net Zero Carbon Study which showed that existing buildings cause one-third of the area's greenhouse gas emissions and therefore "we cannot meet our climate targets without reducing emissions and energy usage in all our homes", given that "the Committee on Climate Change have concluded that at least 90% of existing buildings in the UK should have energy efficient retrofits for the UK to meet its zero carbon targets".

The supporting text emphasises that this is particularly relevant because 20% of homes were built before 1919, and Listed Building Status applies to 1% of homes in Cambridge and 3% of homes in South Cambridgeshire. It also notes that such improvement to existing buildings reduces running costs and also increases the lifespan of the building.

It explains that "Policy is therefore needed to support owners of heritage assets to undertake sensitive works to address the performance of their buildings, in line with best practice guidance for heritage assets".

The South Staffordshire local plan should ideally create policy to support energy and carbon improvements to existing buildings. Although these cannot strictly be set as requirements, it is important for the local plan to take a stance that supports positive measures to existing buildings.

Embodied carbon

Embodied carbon means the carbon that was emitted in the production and transport of building materials, and their assembly on site. It can also include the emissions associated with maintaining and eventually disposing of a building too. If the latter are included, this is termed 'whole-life embodied carbon'.

These emissions rise largely from fossil fuel energy use to extract and process raw materials such as minerals and metals, then transport them. There can also be emissions from chemical processes to produce building elements (such the carbon dioxide that is cooked-off minerals to make cement) or from the breakdown of the material at the end of its lifespan.

Embodied carbon makes up a very large share of the total carbon emissions caused by the creation and use of a building across a typical 'design lifetime' of a building, usually 60 years (see UKGBC pie charts diagram previously referenced). Many commonly used building materials like ordinary cement, steel, aluminium and zinc have inherently high embodied carbon because of how they are produced. Vice versa, plant-based materials like timber can have less than zero embodied carbon because the tree absorbed carbon dioxide from the atmosphere and this is locked up in the material for as long as it is in use.

Unlike operational energy and carbon, there is currently no mechanism to address embodied carbon in national building regulations or other national legislation for planning and building. Still, embodied carbon is relevant for the net zero goals of the UK and South Staffordshire because some of materials or products will have been produced here, and all will have been transported within the country or district, and energy will be used during construction.

In the absence of a national regulatory approach to address embodied carbon and without a specific local planning power granted to address it, some local plans have nevertheless taken steps to ensure embodied carbon is not entirely neglected.

Example plans have taken one or both of the following approaches:

- Requirement to assess the building's embodied carbon, reported within the planning application
- Requirement to provide narrative about what steps are being taken to minimise embodied carbon, such as reusing existing buildings, use of lower-carbon materials, or efficient design to reduce material use.

Our review has only identified one adopted and one emerging plan that require a development to achieve a specific numeric target for embodied carbon, whether a limit or a % improvement on a baseline; see B&NES and Bristol examples below. This may be because of a lack of explicitly granted powers, and the 2015 Written Ministerial Statement that directed local plans not to set 'additional technical standards' for the sustainability of housing. It may also simply be because this is an emerging area where local planners do not yet feel confident to set these requirements, robustly justify them at inspection, or interpret whether developers have sufficiently demonstrated compliance.

There is an industry standard method to calculate a building's embodied carbon: the RICS Whole Life Carbon Assessment for the Built Environment[lxxxii], which builds on the relevant British/European Standard (BS EN 15978). This RICS method splits the building's whole-life embodied carbon into a series of 'modules':

- Modules A1 – A5: 'Cradle to completion stage' (from raw material extraction through to completion of the building)
- Modules B1 – B5: The 'use stage' of the building (such as maintenance, repair, replacement and refurbishment)
- Modules C1-C4: 'End of life stage' (deconstruction, demolition, transport, waste processing, and final disposal).

It must be noted that the RICS / EN15978 approach assumes that any carbon that was sequestered by trees and stored in timber is released during the C1-C4 modules. In reality this may be avoided if the timber is eventually reused. This means that a whole-life carbon assessment may not recognise the full benefit offered by timber buildings, which is that the timber would lock up carbon for most of this century. This is a critical period[lxxxiii] in which we are at risk of reaching tipping points for feedback loops of runaway climate change – such thawing permafrost releasing huge amounts of methane, or large areas of rainforest dying back. It matters not only *how much* carbon is emitted, but *when*.

Therefore it makes sense to set targets that exclude modules C1-C4, to give timber buildings the 'credit' for the carbon they will lock up for many decades. Modules B1 – B5 also include many assumptions about uncertain future actions, therefore may need to be omitted from any planning targets due to a lack of robust justification.

Using the RICS 'modules', other building industry specialist bodies have created benchmarks and 'good practice' targets expressed in kilogrammes of embodied carbon per square metre of floor area:

Table 6: RIBA Climate Challenge embodied carbon targets[lxxxiv]. Includes all RICS modules **A1-C4**.

	Business as usual	2025	2030
Homes	1200 $kgCO_2e/m^2$	<800 $kgCO_2e/m^2$	<625 $kgCO_2e/m^2$
Offices	1400 $kgCO_2e/m^2$	<970 $kgCO_2e/m^2$	<750 $kgCO_2e/m^2$
Schools	1000 $kgCO_2e/m^2$	<675 $kgCO_2e/m^2$	<540 $kgCO_2e/m^2$

Table 7: LETI Embodied Carbon Primer targets[lxxxv]**.** RICS modules **A1-A5 only**.

	Business as usual	2020	2030
Homes	800 kgCO2e/m^2	500$kgCO_2e/m^2$, (400 including sequestration)	300$kgCO_2e/m^2$ (200 including sequestration)
Office or school	1000 $kgCO_2e/m^2$	600$kgCO_2e/m^2$ (500 including sequestration)	350$kgCO_2e/m^2$ (250 including sequestration).

Bath & North East Somerset Council (see example below) has adopted an embodied carbon policy that requires a target to be met. It does not go as far as the LETI standards, but forms a highly important example that it is possible to justify such a target.

LETI/RIBA targets could still inform supplementary planning guidance, to educate developers and allow planning officers a point of comparison to assess the relative merits of schemes' embodied carbon reports submitted by developers.

If a local plan were to seek to require any of the LETI or RIBA embodied carbon targets, there would be challenges from the development sector consultees and potentially also the inspector. One likely objection is the argument that such a requirement may inhibit the delivery of housing targets, unless evidence can be produced or identified to show that this would not be the case.

The LETI and RIBA baselines are derived from a range of existing project data. Their future targets may also be based on case studies that would justify the planning policy, especially on technical feasibility.

RICS may be able to provide estimates of the typical cost of embodied carbon assessments and the number of professionals who are able to conduct such assessments.

Example: New London Plan 2021 (adopted)

Policy SI 2 includes that:

F. Development proposals referable to the Mayor should calculate whole lifecycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.

Example: Bath & North East Somerset Council Local Plan Partial Update (adopted, 2023)

Policy SCR8 of requires that large scale development (>50 dwellings or >5000m^2 of commercial floor space) achieves an embodied carbon target of 900 $kgCO_2/m^2$ for RIBA modules A1 – A5 (upfront embodied carbon). The target only includes the following building elements:

- *Substructure*
- *Superstructure*
- *Finishes*

The policy requirement was selected because it is predicted to be cost neutral, as set out in the evidence study produced by WSP.

There is no last resort option to offset any shortfall of embodied carbon emissions to the required target.

We also note that further evidence is continually emerging on this topic, which could help the planning justification for such targets. For example, in early 2022, the UK Green Building Council[lxxxvi] found that a real-world large low rise residential development in south-west Cambridgeshire achieved a 20% reduction in embodied carbon reduction at masterplan level compared to a typical baseline, with only a negligible impact on capital costs (0.6%). This was achieved through simple changes such as reducing the area of asphalt in favour of low-carbon permeable paving, and using swales to reduce the need for other drainage infrastructure.

Relevant data could begin to be assembled by the local authority if it firstly adopts a local plan requirement for major developers to simply *report* on their embodied carbon using the RICS methodology, and ideally also any costs associated with steps taken to reduce embodied carbon as a percentage of overall costs. From these, local benchmarks for 'business as usual' and 'best practice' could be derived for inclusion in a subsequent local plan policy or supplementary planning document. This is an important next step for South Staffordshire if an embodied carbon policy is successfully adopted.

Emerging example: Bristol Local Plan Review (draft 2022)

Policy NZC3 of this draft plan requires that new development will be expected to achieve the following targets as a minimum:

- Residential (4 storeys or fewer) - <625 $kgCO_2e/m^2$
- Residential (5 storeys or greater) - <800 $kgCO_2e/m^2$
- Major non-residential schemes - <970 $kgCO_2e/m^2$

The requirements are based on the RIBA Climate Change targets for 2025 Homes, 2030 Homes and 2025 Offices.

Any shortfall against the embodied carbon targets will be offset at a cost of £373/tCO_2 – the BEIS Green Book 2023 value. Embodied carbon offsetting and target setting at this level has yet to be tested at Examination. Additionally, the £373 price is based on operational emissions and has not been calculated based on embodied carbon, which could be seen as a flaw in the approach.

To conclude: The Local Plan can and should look to set embodied carbon targets, as solely requiring embodied carbon reporting is insufficient to deliver emissions reductions that align with net zero targets locally and nationally. An ambitious target should be set to limit the 'upfront embodied carbon emissions carbon' (modules A1 – A5). Including modules B and C could pose an additional unnecessary risk to policy adoption because these are reliant on many assumptions during the operational and end-of-life stages of a building. Setting a cost neutral numerical target under Policy NB6 represents a strong starting point for embodied carbon limits for SSC. Additional requirements such as pre-demolition audits should be set to ensure that retrofit of existing buildings is promoted for new development where appropriate, instead of demolition and subsequent embodied carbon emissions.

Justifying the requirements: Necessity, feasibility and viability

Necessity and feasibility

The **necessity** for net zero carbon policies is clearly demonstrated by the previous sections' exploration of the scale and urgency of the climate crisis, the changes necessary to deliver the UK's legislated Net Zero Carbon 2050 goal and legislated carbon budgets (Climate Change Act), the absence of suitably ambitious national regulation or other incentives to deliver those changes, and the Local Plan's legal duty to proactively pursue carbon reductions (Planning & Compulsory Purchase Act) in line with the Climate Change Act 2008 (National Planning Policy Framework).

The Royal Town Planning Institute[lxxxvii] points out that "Where local plan policy which complies with the duty [to mitigate climate change] is challenged by objectors or a planning inspector on the grounds, for example, of viability, they must make clear how the plan would comply with the duty if the policy were to be removed". This is because that duty stems from the Planning and Compulsory Purchase Act and Climate Change Act (supported by powers in the Energy and Planning Act). Formal legislation holds more weight than other government guidance that might seek to limit local plans' requirements.

The **feasibility** of identified measures is demonstrable through case studies and modelling.

Further evidence of feasibility of similar performance requirements is found in supporting documents of several pioneering recent and emerging plans. The evidence bases for local plan documents in Greater Cambridge (emerging)[lxxxviii], Central Lincolnshire (adopted 2023)[lxxxix] and Cornwall (adopted 2023)[xc] all have studies showing that the requirements can be fulfilled in typical new buildings types in these areas. In these studies it was shown how recent local new builds could have complied with the policy without changing the form or orientation of the building – only needing to add reasonably improved fabric, a heat pump, and solar panels that fit within the roof area.

In addition, feasibility in general is evidenced by the fact that all measures have been previously delivered by the building design and construction industry in the UK before today (low heat demand via effective insulation and airtightness; accurate energy modelling; heat pumps or other low carbon heat; well-oriented solar panels; Section 106 offset payments; embodied carbon assessment).

The only potential policy components whose feasibility might be difficult to prove are the enhanced energy reporting and embodied carbon reporting. These skills are present and growing in the sector, but may not be mainstream outside of London projects and so there might be a bottleneck of skilled professionals available to conduct these. The impact of this bottleneck depends on the rate and scale of development that comes forward (in any local plan areas making a competing demand for these skills, as these services can be performed remotely). If development takes the form of fewer but larger applications consisting of broadly similar house types, these can be assessed efficiently via representative sampling. The skills bottleneck may be more impactful if housing comes forward via smaller and more varied applications that each need a separate assessment.

It should be noted that these specialist skills will be a far smaller factor in housing delivery compared to the overarching construction labour shortage[xci] which constrains the whole sector today. As national housing targets are thought to already be too large for the workforce to deliver[xcii], energy/carbon modelling should not be assumed the deciding factor in the feasibility of delivering housing.

Additionally, for the UK to hit its legally binding carbon reduction targets, it will be vital for the specified energy targets to be achieved in reality, which will not be possible unless the industry swiftly develops these skills and deploys them as a standard practice in the vast majority of development.

The policy requirements would stimulate the industry to expand its capacity to fulfil them (similar to commentary noted in the FHS Consultation Response, paragraph 2.40, 2.60, 2.61, 2.62). In the absence of data to show whether there is or is not enough capacity in the industry to deliver these reports, a cautious approach could be to require the enhanced energy & carbon modelling only in major developments. If this choice is made, a required minimum specification could be devised for minor and householder proposals that would be likely (if not guaranteed) to deliver the required targets.

Viability of required improvements to the building

The cost of meeting building energy performance targets should be considered within a whole-plan viability assessment. Despite a range of aforementioned precedent policies on carbon reduction, there is not a consistent approach to transparently assessing the cost of policy compliance. Some viability studies (for policies seeking reductions of 35-50% on Part L 2013) have variously applied cost uplifts of:

- £5/m^2 for 'BCIS Energy + Carbon' although it is not explained how this reflects the policy requirements, and somehow reaching £25,000/dwelling for fully zero carbon homes.
- £15,000 per dwelling for a bundle of sustainability measures including carbon and renewable energy– without clarifying the breakdown, or how this cost of policy compliance was identified.
- 1% uplift to overall costs to allow for professional fees, and BCIS cost data reflecting the construction cost of the Code for Sustainable Homes Level 4.

These precedents were successfully adopted, so their viability assessments must have been deemed sound by the Planning Inspectorate for the purpose of those plans' policies.

Nevertheless, it is more robust to use more transparently evidenced cost uplift data, linked as directly as possible to policy requirements that South Staffordshire proposes. While it is beyond the available resource to produce primary data specifically for this, there is a variety of credible costs data available in the public domain that could be used to assess more ambitious policies. Two key sources are:

- National Government Future Homes Standard Consultation Impact Assessment[xciii]
- Other local plan evidence bases for similar requirements (as cited under 'feasibility'.)

The following table compares cost uplifts in a three-bedroom semi-detached home for various steps that South Staffordshire's current draft policy might require (compared to a building regulations Part L 2013 compliant baseline), based on the national and local government cost sources.

Table 8: Cost uplifts in comparison to basic compliance with Building Regulations Part L 2013

(Note: Uplifts today should be lower, as the baseline has risen since the introduction of Part L 2021).

Policy requirement	FHS Impact Assessment 2019	Currie & Brown 2021 for Cornwall DPD Evidence Base
Future Homes Fabric	+£2160 (£2560 minus £400 for waste-water heat recovery)	+£1977
Heat pump system (to reach Future Homes carbon emission rate, which is 75% lower than Part L 2013 or 63% vs Part L 2021)	Not specified as an individual element	+£1562
Solar PV to meet remaining *regulated-only* energy uses (*Not part of FHS requirements – but shown here to illustrate approximate cost to go from FHS to net zero regulated operational carbon).	+£2700 to +£3100 (Derived from £1,100 fixed cost + £800 per kWp; estimating that the regulated energy demands of a home with FHS fabric and heat pump could be covered by a ~2 – 2.5kWp system.)	+£1328 to meet regulated energy use of 20kWh/m^2/year (Derived from cost of solar panels to meet total energy use in home with efficient fabric and heat pump, minus the share of unregulated energy, rounded up to 6 whole panels.)

It must be noted that the cost uplifts in the FHS Impact Assessment and Cornwall DPD evidence are from a baseline of a building that complies with Part L 2013 which was the national minimum standard when they were written. Today, the new Part L 2021 is in force, which improves the baseline energy performance. Thus the cost uplift compared to today's regulations would be smaller.

To illustrate this, we note that a November 2021 viability study[xciv] for the adopted Cornwall DPD found that most of the cost uplifts to meet the DPD's 'true net zero carbon' policy, compared to a baseline of Part L 2013, would already be incurred in order to meet Part L 2021 even in the absence of the policy.

The viability study[xcv] for the Bath & North East Somerset Local Plan Partial Update, while sharing an evidence base with Cornwall, tested three different % uplift scenarios. 3% was the expected cost uplift for the net zero new build policies, yet 5% and 6% scenarios were also tested to reflect potential future market fluctuations. At the higher uplift scenarios, the policies remained largely viable (except high-rise flats in rural areas, which are highly unlikely in any case). The extra headroom gained by proving viability even in more expensive scenarios gave a stronger defence against viability-based objections.

The strongest way to assess viability impacts would be to commission a similar study of up-to-date cost uplifts specific to South Staffordshire for a range of building types expected to arise during the plan period. This would ideally show the cost uplift compared to the current baseline (Part L 2021).

However, there are several sources of credible evidence on the cost uplifts for a range of building energy performance standards, from which we can derive reasonable estimates of probable cost uplifts that could be incurred due to the current draft and other possible South Staffordshire policies.

For example: In addition to the Government's Future Homes Impact Assessment and the Cornwall cost evidence (both cited previously), there are also published cost evidence bases for recent energy-based local plan policies in Greater Cambridge (emerging), Central Lincolnshire[xcvi, xcvii] (adopted), Essex[xcviii], and a collection of London boroughs[xcix]. These variously assess the cost uplifts of the following performance levels:

- Part L 2021 (from a baseline of Part L 2013) – consisting of improved insulation, larger radiators, wastewater heat recovery (WWHR), and PV equal to 40% of building foundation area.
- Part L 2025 (FHS) as an uplift on Part L 2013 – consisting of further improved insulation and glazing, adding a heat pump, but removing WWHR, PV and gas grid connection.
- Approximate amount of PV that would be needed to reduce an FHS home to zero carbon (whether regulated emissions only, or emissions of total energy use)
- 'True net zero carbon' homes with moderate energy efficiency targets and 100% on-site renewable energy supply, as an uplift on Part l 2013 or
- 'True net zero carbon' homes with exemplary energy efficiency targets and 100% on-site renewable energy supply, as an uplift on Part L 2013 or Part L 2021.

Most of the above cited sources give several different cost uplift figures depending on home type (flats, terraces, detached etc). Most of them also break this down the cost uplift into a cost for fabric, a cost for changes to the heating system, and a cost for solar PV panels (where applicable to the performance standard that they are assessing). These can be reassembled into cost uplifts to reflect a range of potential policies that South Staffordshire could pursue, beyond the policy already put out for consultation (which is to require buildings to have a performance equivalent to the Future Homes

Standard, then to address the remaining *regulated* carbon emissions to zero preferably with onsite renewable energy, or alternatively with carbon offset payments if it cannot be achieved on site).

The source data cited above is not specific to the South Staffordshire market. However, the data can be converted into typical percentage cost uplifts on the average base build costs of the buildings used in the source data (averaging only those with a compatible baseline performance, i.e. Part L 2013 or Part L 2021). This percentage can then be applied to the actual base build cost in South Staffordshire today, to reflect local market conditions.

Where offsetting is concerned, there is nationally published data[c] available on the regulated carbon emissions of new build homes in each local authority area. This is released quarterly. Taking a sample of new builds completed in the most recent few years while Part L 2013 was in force, we can look at their carbon emissions per home, and make an adjustment to this to reflect the improvement in regulated carbon that the Government has stated will be achieved by Part L 2021 (31% reduction) or the Future Homes Standard (between 70 and 80% reduction). This allows us to work out how much a developer might need to pay in carbon offsetting (see section 'cost of offsetting any remaining carbon emissions' below).

We can also use this national new build home data to derive an average floor size per home, which helps us to adjust data from other sources to better reflect the typical South Staffordshire new build. For example, this allows us to scale-up or scale-down the per-home figures given in other cost uplift data sources cited previously, which often have been assessed for a home of a different size than the typical South Staffordshire new build.

By combining all of the above sources of data, we can establish reasonable estimated probable ranges of cost uplifts that would be incurred by the policy put forward at Regulation 18 consultation, and potential more ambitious policy options. Using these, Bioregional has separately provided the Council with a range of estimated % cost uplifts that can be tested in the whole-plan viability appraisal to explore whether increased levels of policy ambition may be viable, including the options in Table 9 to the right.

Following discussion with the Council, it has been decided that Option 5 will be pursued as the selected policy approach to undertake amendments to Policy NB6 within the context of new residential development.

Table 9 **Potential policy requirement**	**Indicative cost uplift over base build costs of Part L 2021 home (three bed semi-detached, adjusted to South Staffs home size)**
OPTION 1 [CURRENT SOUTH STAFFS DRAFT POLICY] Future Homes Standard & offset regulated carbon (with grid decarbonisation)	0.3% increase on base build costs (3.9% over Part L 2013 baseline). (This is almost entirely due to offset costs, as the source data indicate that the increased cost for improved fabric and heat pump are largely cancelled out by the PV cost saving, as Part L 2021 has a significant amount of PV while the Future Homes Standard has none).
OPTION 2 Future Homes Standard & PV on site for zero regulated carbon & Offset the carbon of unregulated energy.	2.6% increase on base build costs (7.2% over Part L 2013 baseline). This breaks down as: • 0.68% uplift for improved fabric (insulation & glazing) • 1.26% uplift for switch from gas to heat pump • 0.35% uplift for PV • 0.29% for offsetting.
OPTION 3 Future Homes Standard & PV on site to reduce ALL remaining operational carbon emission to zero (regulated + unregulated)	3.7% increase on base build costs (8.6% over Part L 2013 baseline). This breaks down as: • 0.68% uplift for improved fabric (insulation & glazing) • 1.26% uplift for switch from gas to heat pump • 1.78% uplift for PV. There is no offsetting cost associated, as this policy option would require all carbon reductions to be achieved on site.
OPTION 4 (LETI-aligned) Ideal energy targets (15kWh/m²/year space heat demand; 35kWh/m²/year energy use intensity) & On-site PV to match 100% of energy use.	3.9% increase on base build costs (10.3% over Part L 2013 baseline). This breaks down as: • 2.36% uplift for improved fabric (insulation & glazing) • 1.56% uplift for switch from gas to heat pump • 0.015% uplift for PV. There is no offsetting cost associated, as per option 3. PV costs are low because energy use is very low.
OPTION 5 Looser energy targets (~30kWh/m²/year space heat demand; ~45kWh/m²/year energy use intensity) & On-site PV to match 100% of energy use.	1.3% increase on base build costs (6% over Part L 2013 baseline). This breaks down as: • 0.51% uplift for improved fabric (insulation & glazing) • 0.66% uplift from gas to heat pump or direct electric • 0.15% uplift for PV. There is zero offsetting cost associated, as per options 3 and 4.

Factors that mitigate against cost uplift impacts on viability

The Cornwall study[ci] (November 2021, cited above) found that the steep rise in house prices from 2019-2021 improved viability in several locations and build types, despite increased build costs.

There has also been some evidence[cii] indicating that homes with better energy and carbon performance may command higher sale prices thus aiding viability. However, these effects were regionally specific at the time. This effect may be magnified by the current and ongoing energy cost crisis. The effect may also further increase if the government follows through on its proposals to financially incentivise improved building carbon performance through the mortgage lending system, as suggested in its recent Net Zero Strategy[ciii] and Heat and Buildings Strategy[civ].

Cost of offsetting any remaining carbon emissions

If following the older precedents (based on Part L reductions)

If South Staffordshire chooses to follow a Part L SAP-based policy approach (instead of a LETI energy-based policy approach), costs of offsetting can be reasonably estimated for viability assessment purposes using publicly available data on recent new homes' carbon emissions in combination with a deduction for the percentage carbon reduction the local plan policy will require on-site compared to a Building Regulations baseline. This would align with the standards included in existing draft Policy NB6.

It is up to the local authority to decide on the cost per tonne of carbon, and the period of time for which the emissions must be offset. Most precedent local plan policies on offsetting require a period of 30 years' worth of emissions to be offset. These precedents usually also assume that the annual emissions do not change over that time, and nor does the price per tonne of carbon. Their total offset cost calculation would therefore be as follows:

((Annual carbon emissions) x (£cost per tonne)) x (**30 years**) = £total offset payment.

We can estimate the likely amount of annual *regulated* carbon emissions that new homes in South Staffordshire are likely to have, using publicly available data of recently completed new homes in the area. The live public record of new dwelling energy performance certificates[cv] includes data on average annual regulated CO_2 emissions per dwelling, as calculated by Part L SAP. This can be filtered by local authority area and date. An average of all new build homes in the last four years gives a reasonably reliable typical new build performance with 'business as usual' in South Staffordshire (that is, in the absence of a local plan policy that requires a specific degree of on-site carbon reductions, meaning that the new homes in this period were, in the vast majority, built to meet the then-current Building Regulations Part L 2013 – as the new Part L 2021 only kicked in for developments whose plans or building notice were submitted after 15th June 2022[18]). In South Staffordshire, this four-year average[19] annual *regulated* carbon figure per home is 1.58 tonnes/home (or 0.016 tonnes per m^2 floor space).

Next, this average figure must be **reduced to reflect the policy's required on-site improvements to regulated carbon.** The current South Staffordshire draft policy is designed to bring forward the Future Homes Standard as the minimum on-site improvement. Thus we deduct 75% from the carbon figure (as the Future Homes Standard is expected to reduce regulated carbon by ~75% compared to the Part L 2013 baseline represented by the sampled EPC data). Therefore, with that policy:

> (Annual 1.58 tonnes – 75% = 0.395 tonnes) x **30 years** = 11.84 tonnes of regulated carbon to offset for a typical South Staffordshire home built to the Future Homes Standard with no further improvements, without taking into account any future grid carbon reduction.

Next the cost per tonne of carbon must be decided. Some precedent local plans used a local study to understand the cost to achieve carbon removals or reductions, but most use a £60-90/tonne figure that reflected a previous year's nationally recognised 'central' value[20] per tonne of non-traded carbon. This approach was adopted by London when the London Plan first began to require carbon offsetting, but the London guideline price has not been regularly updated to reflect the subsequent increases to the nationally recognised value. At the time of conducting this analysis, that national 'central' value is[cvi] £256/tonne for 2024 (alternatively, the 'high' scenario in 2024 sets a price of £384/tonne). South Staffordshire could therefore use that current value for the whole local plan period as follows:

> (11.84 tonnes regulated carbon emitted within the 30-year period) x £256 = £3,031/home total offset payment.

However: In the national valuation figures for energy and carbon, the value rises by 1.5% year-on-year for inflation[21], reaching £378/tonne in 2050. Therefore South Staffordshire could also apply an increase to reflect that the nationally recognised financial value per tonne of carbon increases over time (increases to 2050 are published in advance by BEIS):

> (0.395 tonnes x 2024 value) + (0.395 tonnes x 2025 value) + (0.395 tonnes x 2026 value)+ (etc **for all years over a 30-year period**). The resulting total would be £3,800/home.

On the other hand: If we are going to apply future years' monetary values for carbon, it seems reasonable to also recognise that the carbon emissions will also change in future years due to changes in how grid electricity is generated, as more renewables arrive and gas power stations are phased-out. Publicly available projected data[cvii] for on future years' electricity grid carbon is found in the same data set as the national carbon values. ***Assuming the home is gas-free and all-electric***, we can apply the future grid carbon reduction percentages to the home's total regulated carbon. This would work out as follows:

> (0.395 tonnes x 2024 value) + (0.381 tonnes x 2025 value) + (0.285 tonnes x 2026 value) + (etc **for all years over a 30-year period**). The resulting total is £754/home.

Please note: If the home has gas or other forms of energy supply other than electricity, it is vital that the calculation must *not* apply the future electricity grid decarbonisation to the home's whole carbon figure.

[18] We note that the introduction of Part L 2021 does not appear to have delivered an immediate drop in the CO_2 emissions of new builds, judging by this EPC data. The data show only a 4.8% reduction in the average CO_2 per square metre in the period Q3 2022 onwards (when Part L 2021 became binding), compared to the sampled period before that. Government states that Part L 2021 should deliver a 31% reduction compared to Part L 2013 - but in fact the change in Part L will take time to consistently filter through to the EPCs of completed homes. We highlight this here to show that the sampled data has not been significantly distorted by the introduction of Part L 2021 and therefore still broadly represents a Part L 2013 baseline.

[19] The four-year sample runs from the third quarter of 2019 to the second quarter of 2023, as this was the final quarter available in the most recently published data at the time of producing this analysis.

[20] The carbon valuation dataset also offers a 'low' value and a 'high' value.

[21] Future releases of that national valuation of carbon may turn out to be higher, to reflect higher inflation.

This final total of £754/home can then be used for viability testing alongside the cost of making any required on-site carbon reductions - *assuming* South Staffordshire's policy only covers regulated carbon and requires a minimum on-site improvement equivalent to the Future Homes Standard. This is factored into the cost in 'option 1' in the table previously.

If the policy also requires unregulated carbon emissions to be offset, this must be added to the annual *regulated* carbon amount before multiplying by the years, grid carbon reductions, and carbon value.

An estimation of the typical amount of *unregulated* carbon may benefit from analysis by an energy specialist using BREDEM calculations, or PHPP / CIBSE TM54 calculations if the policy approach chooses to require those as the method for compliance with policy requirements for total energy/carbon.

Alternatively for the purposes of viability assessment, one can make make a broad-brush assumption about the ratio of unregulated to regulated carbon based on existing industry studies. For example:

- The UKGBC Net Zero Carbon Buildings Framework Definition[cviii] includes case studies breaking down buildings' whole-life carbon emissions (regulated, unregulated, and embodied). In the residential example given, the home's *regulated* carbon contributed 24% of its whole life carbon while its unregulated carbon contributed 7%. This would indicate that unregulated energy use adds ~30% on top of the regulated carbon figure in homes.
- Analysis from the Good Homes Alliance[cix] (GHA) gives a helpful breakdown of estimated different types of energy use (heating, hot water, lighting, and unregulated) for a three-bed semi detached home built to various different performance standards, one of which is very similar to the indicative specification for the Future Homes Standard. The ratio of unregulated to regulated carbon in this GHA document is about 30% to 70%, which is not dissimilar to the figure given in the UKGBC document cited above[22]. It gives a figure of 21.9kWh/m^2 annual unregulated energy use.

The GHA data is likely a more robust figure to use in this calculation, as it is more recent and more closely reflective of a home built to the Future Homes Standard. The 'unregulated' energy of 21.9kWh/m^2 is entirely electricity, so we can multiply this by the carbon factor for grid electricity (and then by the average m^2 in a new build South Staffordshire home also available from the EPC data) to get an estimated amount of unregulated carbon in the first year of the home's operation. With grid decarbonisation and per-tonne cost increases over the 30-year period as described above, this would make the following difference to typical offset costs for a home the size of a typical new build in South Staffordshire:

- An additional +£560/home, bringing the total per home to £1,314/home, assuming that the policy does not require any on-site reduction in carbon from unregulated energy use.

The above has been factored into the range of costs previously detailed in Table 9 'Option 2', as that is the only option in which unregulated energy is required to be offset, as opposed to either excluded from scope (Option 1) or dealt with entirely through onsite renewable energy (Options 3 and 4).

Finally, we reiterate:

- These calculation estimates would only be valid if the policy only requires an on-site minimum standard equivalent to the Future Homes Standard and only offsetting the remaining carbon as calculated by building regulations methods using the national valuation of energy and carbon.
- If instead the policy follows the recommendation to seek net zero carbon buildings through entirely on-site measures, or offsetting only via renewable energy equivalent to what should have been provided on site, then there would be no further offset costs beyond what would be modelled as part of on-site cost uplifts. The viability study *must not* add the cost of offsetting on top of the cost of already achieving a net zero carbon home with on-site measures, as this would result in double-counting of costs.
- It is also important that the viability assessment must not double-count the cost of carbon improvements (whether on-site or through offsetting) with the industry rule-of-thumb estimated cost of achieving certifications such as BREEAM or NABERS. This is because energy and carbon savings costed above and in Table 9 will contribute towards both BREEAM and NABERS.

[22] There are some differences: Compared to the UKGBC data, the GHA data has a slightly higher ratio of unregulated energy and a lower ratio of regulated energy. This is to be expected because the GHA data relates to a home with more efficient insulation and a highly efficient heating system, leading to a lower amount of regulated energy use.

Carbon reductions as an issue of design quality

There is evidence that the new National Planning Policy Framework is leading the Planning Inspectorate to place a greater focus on design quality. A recent analysis[cx] of appeals since July 2021 found that inspectors are no longer dismissing poor design as a reason for refusal simply because of a shortfall in housing land supply, and that the likelihood is very low of the developer being awarded costs if their application is refused on design grounds.

The relevant parts of the NPPF state that:

- "Development that is not well designed should be refused, especially where it fails to reflect local design policies … [and] Significant weight should be given to … outstanding or innovative designs which promote high levels of sustainability". (Paragraph 134)

- "Local planning authorities should seek to ensure that the quality of approved development is not materially diminished between permission and completion". (Paragraph 135)

This is likely to be most relevant to the setting of bold local plan policies on the topic of embodied carbon and the use of specific processes to reduce the energy performance gap. This is because:

- Embodied carbon is related to design quality through durability, heritage. biophilia[23] and generally 'innovative design which promote[s] high levels of sustainability'.

- Energy performance gap remediation processes are created solely for the purpose to 'ensure that the quality … is not materially diminished between permission and completion'.

[23] 'Biophilia' refers to humans' innate attraction to the living natural world, and wellbeing benefits experienced via exposure to it. Renewable materials like timber can support this and also reduce embodied carbon, reflected in today's growing focus on biophilic design in architecture.

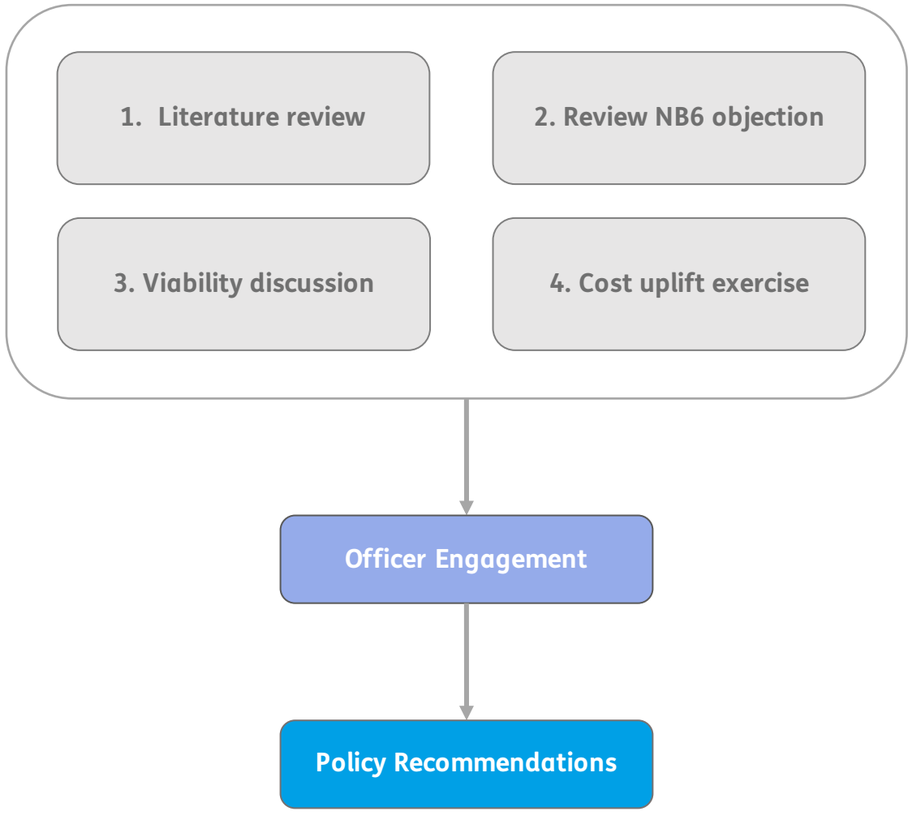
Policy recommendations

Policy recommendations provided in this report reflect findings emerging from the following elements of the evidence base to support amendments to Policy NB6 of the South Staffordshire Local Plan:

1. **Literature review**
2. **Review NB6 objections**
3. **Viability discussion**
4. **Cost uplift exercise**

The literature review section of this report set the scene of what the local plan is able to achieve and importantly what it must do within the context of net zero carbon obligations and commitments at both local and national scales. Recommendations given in this section are supported by preceding information. The exploration of policy examples earlier in this report sets the scene of the ambitious policies that have been adopted and implemented to date elsewhere, which form a baseline that the South Staffordshire local plan can emulate or work to improve upon.

It should be noted that the policy recommendations in this report are not written in a style that is necessarily ready to be immediately placed into the local plan. The aim of the current document is to establish the components of the policy and clarifications about how this should be applied – much of that clarification could be converted to supporting text or supplementary guidance, so that the policy itself could be made more concise. The policy recommendations should be a reference point from which specific local plan policy wording is created.



Policy NB6 context

Policy NB6 has been proposed in the South Staffordshire Local Plan Review and sets the following key requirements:

1. **Residential development carbon reduction**
    a. Achieve net zero regulated carbon emissions
        i. Minimum 63% reduction in carbon emissions through on-site measures against Part L 2021
        ii. Demonstrate at least a 10% improvement on Part L 2021 Target for Fabric Energy Efficiency
        iii. No fossil fuel-based heating systems
    b. On-site renewable energy generation or connections made to on or near site renewable/low-carbon community energy generation and storage networks must be sufficient to achieve at least zero regulated carbon
    c. Offset any remaining residual regulated carbon emissions

2. **Non-residential major development carbon reduction standards**
    a. Demonstrates compliance with the latest BREEAM 'Excellent' standard as a minimum, targeting compliance with BREEAM 'Outstanding' wherever possible;
    b. Whilst achieving compliance with the standards in (a), priority must be given to maximising credits achieved under BREEAM criteria Ene01 in all cases;
    c. Demonstrates the fullest viable use of onsite renewable energy generation measures to meet operational energy demand from the scheme

3. **Embodied carbon and closing the performance gap**
    a. Major development to demonstrate how embodied carbon has been considered and reduced
    b. Large-scale development to complete a nationally recognised Whole Life Carbon Assessment and demonstrate actions to reduce life-cycle carbon emissions
    c. Major development to implement a recognised quality regime that ensures the as-built performances matches calculated design performance
    d. Developers must ensure that a recognised monitoring regime is put in place to allow assessment of energy use, indoor air quality and overheating risk for 10% of the proposed dwellings for the first five years of their occupancy

4. **Retrofit**
    a. Proposals which would result in considerable improvements to the energy efficiency, carbon emissions and/or general suitability, condition and longevity of existing buildings will be supported, with significant weight attributed to those benefits.

Agreed policy approach for NB6 amendments

As agreed with officers at South Staffordshire upon discussion and a cost uplift exercise of various policy options, the following approach is taken forward to inform Policy NB6 amendments for **new residential development**:

- **Energy Use Intensity**: 30 kWh/m^2/year
- **Space heating demand**: 45 kWh/m^2/year
- **On-site renewable energy generation:** to match 100% energy use

The policy requirements above have been selected on the basis that the resultant 6% cost uplift remains within a viable level based on what has already been tested in the viability assessment for Regulation 18 consultation. This policy approach constitutes the most significant recommendation to Policy NB6, whilst other recommendations remain cost neutral to prevent negative viability implications.

Remaining policy elements of NB6 will not be subject to major recommendations due to viability implications. However, a number of policy elements that developers are *encouraged* to implement have been recommended.

Cost uplift information

The estimated costs of achieving the following recommendations are being tested in the viability assessment, using existing published data on the cost of achieving similar or identical standards in other local authority areas.

The policy recommendations made in this section of the report remain within viable cost uplift values that have already been tested in the viability assessment.

As seen in the cost uplift summary of various policy options for new residential development, the energy-based policy approach recommended results in a **cost uplift of 6% over a Part L 2013 baseline and 1.3% over a Part L 2021 baseline**. Regardless of the baseline selected in the viability assessment, both uplift values of this policy approach remain within the 7% already tested in the viability assessment. The embodied carbon limit recommended for new residential and non-residential development is based upon embodied carbon in a modelled Part L 2021 scenario and is therefore cost neutral.

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 already explored in this report, recent examples have detached from the previously typical CO_2 % reduction approach that had been driven by metrics used for Building Regulations compliance, as the selected revised policy approach for NB6 sets out. 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 at new buildings**

Under this energy-based policy approach (explained in previous section)– 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.

As explored in the 'Defining net zero carbon buildings' chapter of this report, 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 should be promoted and integrated into local plans.

Renewable energy

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[24] 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.

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

Partly due to 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.

A note on further potential policy themes considered but not further pursued here

- **Retrofit:**
    - Retrofitting the existing building stock presents a significant opportunity to reduce the district's existing carbon emissions. It will often not be possible to retrofit existing buildings to the same level of fabric efficiency required for new buildings. Because existing buildings vary so widely in type, age and use, both in this location and across the nation, evidence is lacking on the feasible level of improvements that could be made (and their associated costs) to justify the setting of any specific policy targets that could be universally applied through policy.
    - Additionally, the local plan can only effect change in existing buildings when planning permission is needed for a change that is proposed. Therefore, local planning policy's role would most likely be limited to taking a positive stance towards proposals that would reduce emissions in existing buildings through low energy supply, energy efficiency measures and micro renewables (whilst recognising this needs to be sensitive to historic and conservation contexts.)
    - Scope was considered for a policy that could require 'before-and-after' reporting of energy and carbon performance in such proposals. There was a lack of certainty about the ability of small scale applicants to conduct such analysis effectively, coupled with a desire not to deter the effective reuse or continued use of existing buildings (saving embodied carbon compared to demolition and rebuilding). Therefore it was considered that such a requirement would only be suitable for large-scale developments (perhaps even beyond the scale of 'major' development).
    - Discussions with South Staffordshire District Council officers revealed that the District very rarely receives any applications for major proposals relating to existing buildings. Additionally there was a lack of certainty about the development management capability to effectively evaluate compliance with such a policy in practice.
    - Therefore, a verdict was reached that there was not a pressing need for a specific policy on this topic. Subsequently, no specific policy wording recommendation is included in the present report.

- **Overheating:**
    - Similarly to embodied carbon, the link between overheating and operational energy is becoming ever important. 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) could be at increased risk of overheating in summer months due to the ability of the building to retain heat well – unless overheating risk mitigation is integrated into the design through shading, ventilation, other appropriate measures and guidance for the building user.
    - As of mid-2022, the new Part O of building regulations has introduced the UK's first national minimum requirements for the mitigation of overheating in new homes. Part O offers two routes to compliance: A simplified method that just requires the home to meet some basic good practice design parameters, or a dynamic method that takes into account more of the building's actual characteristics and anticipated use patterns to produce dynamic modelling of how the building will perform. This 'dynamic' method is based on the industry best-practice method developed by CIBSE (titled CIBSE TM59). Part O requires the dynamic method only where the development is thought to be at higher risk, such as being in certain higher climatic risk locations (London or some other central urban locations).
    - Scope was considered for a local plan policy that would require either narrative on any new residential development's proposed design approach to mitigate overheating, and/or require all new development to follow the 'dynamic method' to Part O compliance as described above.
    - Discussions with South Staffordshire District Council officers reached a verdict that such a policy was not necessary or suitable given a lack of development management capability to implement such a policy in practice, and an insufficient degree of benefit that would be delivered by such a policy (over and above standard Part O compliance that will occur anyway through building control processes) if such capacity were developed in the development management team.
    - Therefore, no specific recommendation on local plan overheating policy is included in the present report.

The following policy recommendations have been split up according to development type or policy theme. This mix seeks to best ensure 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:

1. **Net zero new build residential development (operational energy)**
2. **New build non-residential development (operational energy)**
3. **Embodied carbon.**

We assess each of the above policy recommendations based on the following:

- **Links to other policy**
- **Scope for future improvements in next local plan review**
- **Alignment with national policy**
- **Implementation considerations**
- **Development industry capability to deliver policies**
- **Development Management capability to assess policies**

A. Net zero new build residential development (operational energy)

A1. Total energy use	≤ 45 kWh/m²/year
A2. Space heating demand	≤ 30 kWh/m²/year 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 predicted annual total energy use. Where an on-site net zero energy balance is not possible[25], it must be demonstrated that the amount of on-site renewable energy generation equates to ≥120 kWh/m²$_{\text{projected building footprint}}$/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.
A4. 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 annual on-site energy use not matched by on-site annual renewable energy generation is to be offset via **S106 financial contribution**.
A5. Reduced performance gap	Energy performance predictive calculations of residential units are to be completed using Passivhaus Planning Package (or other method demonstrably proven to produce accurate predictions of total in-use energy, subject to local authority approval of the method). The energy performance of all residential units is to be calculated individually and each should comply with policy elements A1 and A2. In exceptional circumstances (e.g. where a development contains a large number of flatted buildings and limited roof space is available on these buildings), it may be considered acceptable to achieve a site-wide average that complies with policy elements A1 and A2, subject to no individual dwelling exceeding a certain slightly less stringent cap on space heating demand (35 kWh/m²/year) and EUI (50 kWh/m²/year). 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	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. Where the on-site renewable energy generation peak is not expected to coincide with sufficient energy demand, resulting in a need to export or waste significant amounts of energy, proposals should demonstrate how they have explored scope for energy storage and/or smart distribution systems. The purpose being to optimise on-site or local consumption of the renewable energy (or waste energy) that is generated by the site. Where appropriate, proposals should demonstrate that they have integrated these to optimise these carbon- and energy-saving benefits and minimise the need for grid reinforcements. This may include smart local grids, energy sharing, energy storage and demand-side response, and/or solutions that combine elements of the above.
A7. Post-occupancy evaluation	Major development (over 10 units) 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.

Policy elements A1, A2 and A3 are to be addressed at 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. A5 and A7 compliance should also be demonstrated post-completion through planning condition.

A1 – A7 are to be demonstrated at planning application stage through submission of an energy statement, alongside associated output reports from energy modelling software (e.g. PHPP).

[25] 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.

Links to other policies

These policy recommendations are linked to examples previously explored in the report. A5 specifically is related to the previous section on the energy performance gap.

If South Staffordshire later chooses to also pursue a separate overheating policy, Policy A2 would be linked that due to the potential link between improved space heating demand standards and increased overheating risk (albeit this can be remedied with careful design).

Policies A3 and A6 are linked to standalone renewable energy policies, as any on-site renewable energy development will form part of the larger energy network of the area. Policy A1 also supports any wider policy goals for renewable energy to form an increased proportion of total grid energy supply, particularly as reduced energy consumption will demand less renewable energy from the grid in cases where an on-site net zero energy balance is not achieved. Thermally efficient buildings are heated 'lower and slower' thus don't place the sudden large peak demands on the grid that necessitate rapid response in power input that currently drives dependency on fossil fuelled power stations.

Scope for future improvements

Policies A1 and A2 could be further improved (i.e. reduce target values for Energy Use Intensity and space heating demand if found to be feasible and viable) in subsequent local plans, however this may not be feasible across every typology. Improvements to A1 would however make compliance with A3 easier since less renewable energy supply would be needed.

Alignment with national policy

All of these policies are aligned with national policy 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 report, which in turn is supported by analysis that sets out that all new buildings must be net zero by 2025 have a space heating demand of 15-20 kWh/m^2/year.

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. Detail on why objections in relation to this local planning authority power are invalid is set out in detail previously in this report.

Implementation considerations

Due to the high ambition of 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 A1, A2, A4 and A5 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

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

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.

The standard of insulation and glazing typically required to meet the space heating demand requirement (A2) are similar to those set out in the indicative specification for the Future Homes Standard (FHS) (although airtightness is likely to need some improvement compared to the FHS). Additionally, the total energy use intensity limit (A1) is strongly linked to the use of a heat pump, which equally is part of the indicative FHS specification. Therefore, the development industry should be well prepared to deliver on A3, particularly as the South Staffordshire local plan and the FHS are both likely to be introduced in 2025.

The wider development industry needs to upskill to deliver truly net zero buildings (i.e. on-site net zero energy balance not reliant on offsetting), particularly in terms of predictive energy modelling and high energy performance buildings in-use (rather than just predicted). Delivery of buildings subject to these net zero policies requires quality construction standards to mitigate the performance gap, which the implementation of the A-suite of policies will work towards improving at a larger scale.

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 that may have submitted overly-optimistic building performance values for the sake of policy compliance. These may include:

- Understanding of modelling techniques and tools (e.g. PHPP)
- 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

B. New build non-residential development (operational energy)

B1. BREEAM	Major non-residential development is to demonstrate compliance with the most recent BREEAM Excellent standard. BREEAM Outstanding should be targeted. Maximum credits under BREEAM criteria Ene01 must be achieved.
B2. Total energy use	The following non-residential typologies are encouraged to meet the following total energy use targets: Warehouses: **≤ 35 kWh/m²/year** Offices: **≤ 55 kWh/m²/year** Schools: **≤ 55 kWh/m²/year** Retail: **≤ 35 kWh/m²/year** Other building types not listed are encouraged to demonstrate that regulated energy is limited to **30 kWh/m²/year.**
B3. Space heating demand	All non-residential buildings are encouraged to meet the following space heating demand target: **≤ 15 kWh/m²/year** The use of fossil fuels and connection to the gas grid will not be considered acceptable.
B4. On-site renewable energy	Non-residential development must demonstrate the fullest viable use of on-site renewable energy generation measures to match operational energy use. All non-residential buildings are encouraged to demonstrate that the amount of on-site renewable energy generation equates to **≥120 kWh/m²$_{\text{projected building footprint}}$/year**. 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.
B5. Reduced performance gap	It is encouraged that energy performance calculations of non-residential units are to be completed using **Passivhaus Planning Package**, **CIBSE TM54,** or other method demonstrably proven to produce accurate predictions of total in-use energy (subject to local authority approval of the method).
B6. Smart energy systems	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. Where the on-site renewable energy generation peak is not expected to coincide with sufficient energy demand, resulting in a need to export or waste significant amounts of energy, proposals should demonstrate how they have explored scope for energy storage and/or smart distribution systems. The purpose being to optimise on-site or local consumption of the renewable energy (or waste energy) that is generated by the site. Where appropriate, proposals should demonstrate that they have integrated these to optimise these carbon- and energy-saving benefits and minimise the need for grid reinforcements. This may include smart local grids, energy sharing, energy storage and demand-side response, and/or solutions that combine elements of the above.
B7. Post-occupancy evaluation	Major development (1,000m² non-residential floor space or more) is to monitor and report total energy use and renewable energy generation values on an annual basis. These are to be reported to the local planning authority for 5 years upon occupation.

Policy element B1 and encouraged targets in B2 – B4 are to be addressed at 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 condition.

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

Links to other policies

These policy recommendations are linked to examples previously explored in the report. B5 specifically is related to the previous section on the energy performance gap.

If South Staffordshire later chooses to also pursue a separate overheating policy, Policy B3 would be linked that due to the potential link between improved space heating demand standards and increased overheating risk (albeit this can be remedied with careful design).

Policies B4 and B6 are linked to standalone renewable energy policies, as any on-site renewable energy development will form part of the larger energy network of the area. Policy B2 also supports any wider policy goals for renewable energy to form an increased proportion of total grid energy supply, as reduced energy consumption will demand less renewable energy from the grid in cases where an on-site net zero energy balance is not achieved. Thermally efficient buildings are heated 'lower and slower' thus don't place the sudden large peak demands on the grid that necessitate rapid response in power input that currently drives dependency on fossil fuelled power stations.

Scope for future improvements

Policies B2 and B3 could be made a requirement and further improved (i.e. reduce target values for Energy Use Intensity and space heating demand if found to be feasible and viable) in subsequent local plans, however this may not be feasible across every typology. Improvements to B1 would however make compliance with B3 easier since less energy supply is needed.

Alignment with national policy

All of these policies are aligned with national policy 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 (2023), while boilers have a typical lifetime of 15 years. Therefore, new buildings today should not have these, 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 by the EUI targets, which mandate a heating technology similarly efficient to a heat pump (which a fossil boiler cannot meet).

Implementation considerations

Due to the technical detail of these policies, it is vital that supplementary guidance is provided for the benefit of Development Management officers and the development industry. Specific information for policy compliance must be set such as:

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

For B4, 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.

The wider development industry needs to upskill to deliver truly net zero buildings (i.e. on-site net zero energy balance not reliant on offsetting), particularly in terms of predictive energy modelling and high energy performance buildings. Delivery of buildings subject to these net zero policies requires quality construction standards to mitigate the performance gap, which the implementation of the A-suite of policies will work towards improving at a larger scale.

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.

The standard of insulation and glazing efficiency typically required to meet the space heating demand requirement (B3) are similar 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 B3, particularly as the South Staffordshire local plan and the FHS are both likely to be introduced in 2025.

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. PHPP)
- 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

C. Embodied carbon and waste

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

C1. Embodied carbon reporting	All new residential and non-residential developments are encouraged to complete a whole-life carbon assessment in accordance with **RICS Whole Life Carbon Assessment** guidance.
C2. Limiting embodied carbon	Large-scale new residential (50 and above units) and non-residential (5000m^2 commercial floorspace) development to limit embodied carbon (RICS modules A1 – A5) to **550 kgCO_2/m^2 GIA**.
C3. Building end-of-life	All new buildings are to be designed to enable easy material re-use and disassembly, subsequently reducing the need for end-of-life demolition.
C4. Demolition audits	All major development that contains existing buildings/structures to carry out a pre-redevelopment and/or pre-demolition audit, following a well-established industry best practice method (e.g. BRE).

Information demonstrating compliance with C2 is to be submitted at the planning application stage and post-completion stage (submitted as a planning condition) to verify that as-built embodied carbon quantities remain compliant.

Compliance with C1, C2 and C3 are to be demonstrated within an energy statement. If applicable, output reports for C4 should be submitted alongside an energy statement.

Links to other policies

There are limited links to other policies but opportunities to address embodied carbon and operational energy should be explored holistically to achieve carbon savings across both scopes. Please see examples of embodied carbon policies in previous section.

Scope for future improvements

There is significant scope for future improvements for embodied carbon and waste policies. In particular, standards set for C2 should be lowered in future local plan reviews as embodied carbon policy becomes integrated into local and national policy, as feasible best practice advances and as further evidence emerges on cost. 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

Limited alignment with national policy as embodied carbon is not part of Building Regulations currently. However, this is due to a lack of recognition of embodied carbon emissions and their significance.

The industry proposal of Part Z, as an additional document to Building Regulations, is currently going through the parliamentary process and could be integrated before the adoption of the South Staffordshire local plan. This would require that whole-life carbon reporting is implemented in Building Regulations in 2023 and emissions limits are set from 2027.

The Environmental Audit Committee state 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. There is therefore a clear justification for local authorities to require embodied carbon assessments and limit emissions arising from the construction of new development.

Whilst there is not explicit reference in the NPPF, the reference to low carbon development could readily include embodied carbon as an implicit part of the equation. The case for addressing embodied carbon is justified by the increasing importance of these emissions as the power grid is decarbonised.

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 C2 and C4 should be set out in guidance.

Industry capability

The embodied carbon limit set within C2 are set to a level thought to be achievable and cost-neutral in that it is at or very close to the level of embodied carbon performance of typical new development built to current Building Regulations standards[26]. Nevertheless some developments in recent years have sometimes reported much higher embodied carbon due to poor design choices or materials selection that failed to prioritise embodied carbon reduction. Therefore, the selected target acts as a backstop to prevent large-scale developments from allowing excessive embodied carbon emissions simply through a lack of thought given to the topic (given that embodied carbon emissions of this scale within large-scale development would represent a serious climate impact). This may still prove challenging for some parts of the development industry to conceptualise and demonstrate, but

[26] As shown in evidence bases from other emerging local plans (such as South Oxfordshire and the Value of White Horse feasibility and cost evidence), using techniques and products that are commonly available today.

should be achievable provided responsible and appropriate decision making throughout design stages.

The expectation set by point C3 (demonstrating ease of future building disassembly for future reuse) and C4 (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), which has 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'[cxi]). 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[cxii].
- 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 C4. 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[cxiii] 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 Oxfordshire 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[cxiv] and UKGBC[cxv, cxvi].

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.

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 puts 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 energy and embodied carbon 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 – A3, B2 – B4 and C1 – C2. 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 and embodied carbon assessments.

In cases where standards fall below required levels at the post-completion stage, it is important to have enforcement mechanisms in place to penalise 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 assist the future development of improved policies and informs other local authorities on what is deliverable. The council 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. South Staffordshire could look to distribute this standardised reporting form to neighbouring authorities to form a regional understanding of policy implementation. Examples of monitoring indicators for new buildings and also renewable energy include:

Indicator	Source	Policy link
Average in-use Energy Use Intensity of new buildings (separated by residential and various non-residential uses)	Development data	A1 and B2
Average on-site renewable energy generation capacity as a proportion (%) of on-site annual energy demand	Development data	A3 and B4
Average on-site renewable energy generation capacity (predicted) in kWh/m^2 projected building footprint/year	Development data	A3 and B4
Amount (kWh) and proportion (%) of required renewable energy provided via offsets	Development data	A3 and A4
Amount (£) of offset fund collected and amount (mWh) of renewable energy capacity delivered using this fund	Development data and Council's own S106 records	A3 and A4
MW capacity of solar PV installed on buildings	Planning portal or MCS data	A3 and B4
MW capacity of battery storage installed	DESNZ REPD data	A6 and B6
Annual CO_2 emissions of new build development	Development data	A1, A3, B1 and B3
Number of heat pumps installed	Planning portal or MCS data	A1 and B1
Proportion of development covered by POE	Development data	A7 and B7
Average kgCO_2/m^2GIA up-front embodied carbon by use type (RICS modules A1-A5)	Development data	C2

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 can be 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 may not be able to benefit from this insight. South Staffordshire could help to allay such concerns by emulating the Greater London approach[cxvii] to energy monitoring, which requires that homes' energy use data is aggregated into 'reportable units' of no fewer than five homes per unit, assuring data anonymity for each individual home.

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. Local policy must now move away from the use of SAP as operational energy policies seek to deliver genuinely net zero buildings and instead use robust and proven tools to predict energy performance that can be achieved in practice.

SAP currently underestimates and poorly predicts space heating demand, whilst also neglecting calculations of unregulated energy, which forms a key component of total energy use. It is essentially guaranteed that a significant performance gap will be apparent in any new build that has achieved policy compliance through the use of SAP.

If local policy is to reliably deliver net zero buildings, alternative methodologies must 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:

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

Accurate assessments are equally important for policies on embodied carbon, and on overheating if South Staffordshire later decides to pursue a policy on that topic. For overheating, the simplified method on offer for Part O of Building Regulations is likely to be an inaccurate tool, hence why CIBSE overheating assessments would ideally be completed so that more specific and accurate overheating measures specific to the at-risk building can be implemented.

Appendix 1: Review of key objections

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 building, 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. 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)

The enhancement of Policy NB6 to address sustainable development, energy efficiency and renewable energy was not supported by the majority of respondents, including:

- private housing developers/consultants on behalf of housing developers (Bloor Homes, David Wilson Homes, Taylor Wimpey, Miller Homes, Barratt Homes),
- land promoter/planning consultants (Gladman Developments Ltd, St Philips), nursing/residential/disability care (CWC Group) and
- the Home Builders Federation trade association.

It is important to note that objecting respondents do not wholly represent the views of all stakeholders of the South Staffordshire Local Plan.

Responses included opinion that the changes to the Council's approach were unjustified and unwarranted. Concerns were raised that the Policy set a mandatory requirement for developers to go "beyond national policy" or to accelerate the requirement for net zero. Furthermore, opinion was that to meet the Future Homes Standard in advance of its publication was not "justified".

The Salt Cross Area Action Plan (West Oxfordshire) was noted as one case example of how differences between national and local requirements have been deemed unsound by Inspectors (See Pegasus for Miller Homes and Home Builders Federation objections). However, it is important to note that there are significantly more examples of adopted local policies that exceed national requirements, which *have* recently been found sound by Inspectors. These are explored in a previous section of this report. It is also relevant to note that the Salt Cross decision is subject to an ongoing legal appeal[cxviii] on the grounds that the inspectors' rejection was mistakenly based on out-of-date national statements that do not accord with today's national policy priorities, therefore undermines the overarching goal of creating places that can achieve carbon reductions in line with national goals, and is inconsistent with other recent inspectors' decisions on similar policies.

Though some responders acknowledged they would support the strengthening of policies if deemed viable with appropriate evidence (accompanied by detailed workings, which some argued were missing), others expressed a view that insufficient cost implications had been discussed. With regards to the draft content of Policy NB6, the objections have been grouped into themes as per the table overleaf. Responses have been made according to the objection theme.

Theme	Related NB6 policy wording	Objections	Response
Residential reduction in carbon emissions	New development of one or more new dwellings must achieve net zero regulated carbon emissions. In achieving this all schemes must demonstrate application of the energy hierarchy through submission of an energy statement showing compliance with all of the following: a. A minimum 63% reduction in carbon emissions is achieved for each dwelling by on-site measures compared to the relevant baseline rates set by Building Regulations Part L 2021. In achieving this, each dwelling must demonstrate at least a 10% improvement on the Part L 2021 Target for Fabric Energy Efficiency and must not include fossil fuel-based heating systems or be connected to the gas grid. b. Once minimum improvements in fabric efficiency and carbon reduction in (a) are delivered, additional on-site renewable energy generation must be provided, or connections made to on or near site renewable/low-carbon community energy generation and storage networks. Any such measures must be sufficient to achieve at least zero regulated carbon across the scheme and schemes should also look for opportunities to go beyond this standard where feasible. If full compliance is not achieved proposals must demonstrate how such technologies have been provided to the greatest extent feasible. c. For major developments, any remaining residual regulated carbon emissions which demonstrably cannot be addressed via on or near site, renewable technologies must be offset. Offsetting will only be considered an acceptable alternative to renewable energy generation in meeting net zero carbon requirements if it can be demonstrated that the necessary emission reductions achieved via renewable energy generation are demonstrably unfeasible. Offsetting will be delivered via an in lieu financial contribution to the District Council's carbon offsetting	"Policy NB6 requires a 10% improvement to the Part L 2021 Target for Fabric Energy Efficiency. However, that **benchmark standard is already out of date and is replaced by the introduction of the 2022 changes to the Part L Building Regulations**". "Building regulations (Part L) have recently been amended to require that new homes will need a 31% reduction in CO2 in comparison to preceding standards. **Policy NB6 sets out standards above those required at a national level**". "This Policy states that major developments must achieve a minimum 63% reduction in carbon emissions for each dwelling by on-site measures compared to UK Building Regulations through fabric and energy efficiency measures as well as on-site renewable energy regeneration. These **requirements are considered to be over and above the requirements of PPG** which states that Local Plans "can set energy performance standards for new housing or the adaptation of buildings to provide dwellings, that are higher than the building regulations, but only up to the equivalent of Level 4 of the Code for Sustainable Homes" (Reference ID: 6-012- 20190315)". Policy **requirements should be left to Building Regulations** and a betterment above these should not be required.	It is incorrect to state that the improved on the baseline of Part L 2021 is 'out of date' due to the 2022 changes to Building Regulations – as the change made in 2022 *is* Part L 2021. They are one and the same. The 10% improvement approximately reflects what Part L 2025 (Future Homes Standard) will introduce. Recognising the urgency and scale of the climate crisis, South Staffordshire declared a climate emergency in 2019, with the intention of the Local Plan Review to "play its part in achieving the rapid reductions in greenhouse gas emissions required to provide a liveable future for residents in the district and beyond". General responses to specific policy elements out given below, yet the key objection across this theme relates to standards exceeding those set out under Building Regulations, alongside associated text in the National Planning Policy Guidance (PPG) (also related to the 2015 Written Ministerial Statement (WMS)). A previous section in this report details why objections based on the PPG and the 2015 WMS are invalid. However, in summary, the Planning and Energy Act 2008 was never amended as the associated amendments in the Deregulation Act 2015 were never enacted, as set out in the 2015 WMS. Therefore, the local planning authority power to exceed Building Regulations standards for residential development has remained in place, which is a clear and obvious justification to support standards set out under Policy NB6. This has been reiterated on numerous occasions, most notably in the Government's response to the Future Homes Standard consultation (2021) and in a letter received by Bath & North East Somerset Council from the Department of Levelling Up, Communities and Housing. To directly address the objection relating to the PPG, the courts have confirmed that the PPG is not policy and therefore is not part of the soundness test under the NPPF[27]. Policy requirement: residential target for 63% reduction in carbon emissions over Part L 2021: • As of 2022, Building Regulations Part L has been updated (with the title 'Part L 2021', resulting in a requirement for ~31% reduction in the carbon emissions rate compared to Part L 2013. And from 2025, it will be updated again to a 75% reduction. • South Staffordshire Publication Plan Sustainable Construction and Renewable Energy Topic Paper November 2022 paragraph 7.8 justifies why the 10% target has been set. • 63% is the difference between the Future Homes Standard (imminent building regulations) and Part L 2021 (current building regulations). • 63% reduction in carbon emissions over the Part L 2021 baseline (using SAP 10.2) has been adopted by:

[27] *R (Solo Retail) v Torridge DC* [2019] EWHC 489 (Admin) [33]-[34].

	fund. Any offsetting sum must reflect 30 years of residual emissions arising from the development. The carbon offset price is the latest central figure from the nationally recognised non-traded valuation of carbon, set through the Treasury Green Book.		○ Emerging West Berkshire (according to Evidence Report Local Plan Review Policies SP5 and DM4 Evidence Base December 2022) ○ Emerging Warwick District Council Net Zero Carbon DPD (awaiting Inspector's report) and draft SPD (at consultation). <u>Policy requirement: residential 10% reduction in carbon emissions for energy efficiency:</u> • Improving the energy efficiency of new homes (minimising their energy demand) is a very cost-effective way to minimise the new infrastructure that will be required to support them in a future zero-carbon energy system. New homes should therefore target reductions in energy demand to reduce the amount of total energy that must be supplied, both from the electricity grid and from other renewable energy sources. Put simply, optimising the efficiency of the building fabric is the starting point for the whole net zero journey. • It is critical to set higher fabric energy efficiency standards to ensure buildings do not need to be retrofitted expensively at a later date, which can cost up to 5 times more[28]. • Fabric efficiency (insulation and airtightness) is particularly pertinent for housing schemes that use heat pumps and MVHR, as these will require highly insulated and draught-proofed buildings to operate efficiently. If very high thermal efficiency is reached, the whole construction can become more cost-effective because the developer can then save money on smaller-sized heating systems (pipes, radiators, heat pumps, etc.). • A further final justification for a minimum improvement on energy efficiency is that it helps with the social needs of affordable living, fuel poverty and healthy homes. An energy-efficient home saves energy bill costs for the home occupiers and also often helps make the home interior more comfortable and conducive to good health (warmer, less draughty, and with less condensation on cold spots on walls or windows thus reducing the chance of respiratory harm from mould growth). • As of June 2022, the new national baseline is Part L 2021. In 2025 it will be replaced again by the Future Homes Standard, which involves upgrades to the building fabric. This 10% figure represents the approximate difference in fabric (average of all building element U-Values and airtightness) between Part L 2021 and Future Homes Standard 2025. • This residential target for 10% reduction in regulated carbon emissions as a result of energy efficiency measures is similar to those adopted by the London Plan 2021, in which there is a requirement for a 10% carbon reduction to be achieve d through energy efficiency measures as part of the overall policy requirement to achieve a 35% reduction in carbon emissions over the Part L 2021 baseline. Furthermore, Milton Keynes Local Plan 2019 requires developments to achieve 19% reduction in regulated carbon emissions due to energy efficiency and

[28] https://www.theccc.org.uk/wp-content/uploads/2019/07/The-costs-and-benefits-of-tighter-standards-for-new-buildings-Currie-Brown-and-AECOM.pdf

			energy supply measures (Be Lean and Clean stages of the energy hierarchy). <u>Policy requirement: No fossil fuel-based heating systems:</u> • Although there were no objections to this element of the policy, we note that the LETI net zero framework, currently regarded as best practice, states a key intervention for new building design includes no fossil fuels used for space heating and domestic hot water. • Despite the UK government announcement of a ban on gas boilers in new homes from 2025 being recently delayed to 2035 by Prime Minister Rishi Sunak (20th September 2023), the updates to South Staffordshire Local Plan would be in place for the intended plan duration of 2018-2035 and so the development of new homes during this time would be affected by this requirement. <u>Policy requirement: Follow energy hierarchy to achieve zero regulated carbon as a minimum:</u> • No objections to this element of the policy. <u>Policy requirement: Offset payment (cash-in-lieu payment to the Council) for any residual regulated carbon emissions (based on 30 years of residual emissions), using the Treasury Green Book figures:</u> • No objections to this element of the policy.
Water efficiency	All residential schemes' energy statements must also show compliance with a water efficiency standard of 110 litres/person/day. Water reuse and recycling and rainwater harvesting should be incorporated wherever feasible to reduce demand on mains water supply, subject to viability.	The optional standard of <110 litres/person/day should be justified within a PPG: • an objection states that Housing Standards review states that **reduced water assumption should only be applied to water stressed areas** • another objection argues the Water Cycle Study 2020 identifies Severn Trent Water and South Staffordshire water supply regions as being in moderate water stress and therefore this policy is unsound.	• 110 litres/person/day from South Staffordshire NB6 relates to residential developments only, and is the optional requirement set in Building Regulations Part G since the 2010 edition (ie: has been recognised as the optional standard for planning authorities to implement for at least 13 years). The requirement was the standard needed for the now defunct Code for Sustainable Homes Level 3 stars, widely regarded as an easily-achievable certification level. • Water efficiency measures such as the 'optional limit' of 110 litres/person/day should be incorporated into policy as a minimum. Industry frameworks such as the RIBA Climate Challenge have also devised some suggested targets that are more ambitious, differentiated by different use classes including residential, schools and offices. Additionally, the BREEAM environmental certification framework offers several credits specifically for water use reduction in non-residential developments; policy could require a development to achieve all or some of these credits. • Required for South Staffordshire Council to demonstrate measures implemented for climate change adaptation, water availability and drought-resilience. It is stated in the South Staffordshire Regulation 19 document that the district is under "serious water stress", and the "effects of climate change will only serve to worsen this issue in future", stating that the requirement for water efficiency has been set in Policy NB6 in order to recognise the "scale of the issue facing the district's water supply". • Policy NB6 does not impose minimum requirements on water consumption in non-residential developments.

Embodied carbon	All major development must also demonstrate in the energy statement how the embodied carbon of the proposed materials to be used in the development has been considered and reduced where possible, including with regard to the type, life cycle and source of materials to be used. Proposals for development of 50 dwellings or more or 5,000sqm or more of new non-residential gross internal floorspace must be accompanied by a nationally recognised Whole Life Carbon Assessment and demonstrate actions to reduce life-cycle carbon emissions.	Policy **requirements do not "serve a clear purpose"** and the requirements for decision makers responding to development proposals are unclear **South Staffordshire should allow tolerance** for assessing submitted WLCA (due to some manufacturers lacking EPDs).	• Embodied carbon makes up a very large share of the total carbon emissions caused by the creation and use of a building across a typical 'design lifetime' of a building, usually 60 years. Many commonly used building materials like cement, steel, aluminium, and zinc have inherently high embodied carbon because of how they are produced. Vice versa, plant-based materials like timber can have less than zero embodied carbon because the tree absorbed carbon dioxide from the atmosphere and this is locked up in the material for as long as it is in use. • Unlike operational energy and carbon, there is currently no mechanism to address embodied carbon in national building regulations or other national legislation for planning and building. • Precedent plans have primarily taken one or both of the following approaches: requirement to assess the building's embodied carbon, reported within the planning application; or requirement to provide narrative about what steps are being taken to minimise embodied carbon, such as reusing existing buildings, use of lower-carbon materials, or efficient design to reduce material use. However, there are now also examples of adopted local plans that set a limit on embodied carbon emissions. Therefore, the requirement for reporting under Policy NB6 is less onerous on developers and is a reasonable starting point to introduce this scope of carbon into local policy. • The industry standard method to calculate a building's embodied carbon is the RICS Whole Life Carbon Assessment for the Built Environment, which builds on the relevant British/European Standard (BS EN 15978). Using the RICS 'modules', LETI and RIBA Climate Challenge (both building industry specialist bodies) have created benchmarks and 'good practice' targets expressed in kilogrammes of embodied carbon per square metre of floor area. • South Staffordshire has recognised and stated in its Regulation 19 that embodied emissions are "as significant a source of emissions as a building's energy needs", however have not set minimum requirements for embodied carbon targets as it was thought this could inhibit the delivery of housing, affecting housing targets. Instead, they propose that developments provide an embodied carbon narrative, and major developments calculate the whole life carbon of the proposals. • Collection of whole life carbon and embodied carbon information will help improve knowledge across the industry of the carbon required for production and transportation of materials and construction on site, which in turn will help inform decision makers across the industry for how this can be reduced in future. Furthermore, over time it provides the Council with a relevant body of information that is locally-specific and representative of the majority of projects and helps demonstrate what 'business-as-usual' and what 'good' looks like to enable future target setting/benchmarking (locally, regionally or nationally) for use in subsequent local plan policy or supplementary planning documents. • Applications subject to Policy NB6 should ensure that associated supply chains are supported by products that have been assessed

			environmentally, which should be provided through EPDs. Supply chains absent of products with EPDs should be improved upon to ensure environmental impact can be assessed.
As-built performance/closing the performance gap	For all major residential and non-residential developments, applicants must also implement a recognised quality regime that ensures the 'as built' performance (energy use, carbon emissions, indoor air quality, and overheating risk) matches the calculated design performance of dwellings as specified above. This will be secured via planning conditions. Developers must ensure that a recognised monitoring regime is put in place to allow the assessment of energy use, indoor air quality, and overheating risk for 10% of the proposed dwellings (of the council's choosing) for the first five years of their occupancy, and ensure that the information recovered is provided to the applicable occupiers and the planning authority.	Requirement for 10% post occupancy monitoring have **no clear purpose and it is not clear how decision makers will respond to development proposals** **Not clear what the Council will do with this information** once the development is completed Argue that it is **unlikely householders will want to share information with the Council/developer** (e.g. personal energy usage). Have the Council addressed GDPR requirements?	• The performance gap is the difference between predicted and actual energy a building uses in operation, and is caused by poor modelling methods, construction errors and system operation and behaviours of the building users differing from early assumptions. Relying on Part L SAP and SBEM calculations will not accurately demonstrate the as-built performance, and not fully confirm how the building performs as it only reports carbon emissions. • A post-occupancy evaluation and monitoring regime can measure carbon emissions, energy use, water use, indoor air quality and overheating and identify items for remediation to enable the dwelling to perform as intended, or where residents may benefit from further information about how to use the controls for optimal performance. This could lead to improvements for future schemes, based on the data collected and enables the Council to have data to help inform developers how to close the performance gap. • A recognised quality regime could include testing such as air tightness testing (minimum of two tests), thermographic testing, u-value testing, or CIBSE TM54 (Evaluating operational energy use at the design stage, 2022). These may need to be carried out by a verified third-party. • Recognised schemes such as the Home Quality Mark, BSRIA Soft Landings Framework, BS40101, or Passivhaus, could also be used. • The above requirements have been adopted in Milton Keynes Local Plan 2019 (Sustainable Construction SPD requiring a recognised quality regime for developments over 11 dwellings), and the Greater London Authority Energy Assessment Guidance (2022) requires Be Seen guidance to be followed and CIBSE TM54 to be used. • Some householders may wish to not share personal energy usage data with the Council/developer, but post-occupancy monitoring is a commonly understood and utilised mechanism in the industry. Frameworks and guidelines for how to approach this (in terms of consent and grouping homes' data together for anonymity) are available and regularly implemented elsewhere, e.g. in London as per the GLA's 'Be Seen' guidance. Therefore, it will be expected that developers propose this to residents through an effective method that mitigates personal data exposure and accurately explains the purpose of data collection. • 10% has been selected as this provides a minimum sample size to gain knowledge on the performance of the development, whilst not being overly onerous on developers.

Appendix 2: References and endnotes

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