Coventry City Council:

Carbon policy support

Evidence base and policy recommendations

13 August 2024

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Glossary of terms and acronyms

BRE	Buildings Research Establishment. The UK's building science research institution which develops and/or tests various building products, techniques, standards, and qualifications and data. Originally a UK civil service body, but now independent.
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.
B&NES	Bath & North East Somerset [local plan]. Cited as a recent successful precedent example of innovative and highly effective net zero carbon planning policy.
Carbon, or carbon emissions	Short for 'carbon dioxide emissions' but can also include several other gases with a climate-changing effect, that are emitted to the atmosphere from human activities (see 'GHG', below).
Carbon budget	Amount of greenhouse gas that can be emitted by an individual, organisation or geographic area. Usually set to reflect a 'fair share' of the global amount that can be emitted before reaching a level of atmospheric carbon that causes severely harmful climate change.
Carbon intensity/ carbon factors	A measure of how much carbon was emitted to produce and distribute each kWh of grid energy at a certain point in time. For electricity, this has been falling as coal-fired power stations have been phased out over years. It also varies on an hourly basis: at times of high renewable energy generation, the carbon intensity is lower than at points where gas-fired electricity dominates the generation mix.
CCC	Coventry City Council
CIBSE	Chartered Institution of Building Services Engineers.
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'; see above.
GLA	Greater London Authority. Cited as a well-established example of a planning authority that has developed one type of net zero carbon buildings policy and produced implementation guidance for this.
IAS	International aviation and shipping. One of the sectors into which carbon emissions are often categorised.
kW	Kilowatt. A unit of energy generation capacity.
kWh	A unit of energy, which can be either generation or usage.
kWp	Kilowatt-peak. A measure of energy generation capacity typically used to describe the size of a solar PV array in terms of the maximum amount of energy it can generate under optimum conditions.
LETI	Low Energy Transformation Initiative. A coalition of built environment professionals working to establish and achieve the energy performance needed for net zero.
MVHR	Mechanical Ventilation with Heat Recovery
MW	Megawatt. A unit of energy generation capacity.
NPPF	National Planning Policy Framework. A central government document laying out how the planning system should function, including plan-making and decisions.
Part L	Building regulations section that sets basic legal requirements regarding buildings' energy and CO_2.
Performance gap	The difference between the amount of energy a building is predicted to use during design, versus the actual amount of energy it uses. The gap is due to poor prediction methodologies, errors in construction, and unexpected building user behaviour.
PV	Photovoltaics: solar panels that generate electricity.
PHPP	Passivhaus Planning Package – a tool to accurately predict a building's energy use. It is used to design buildings that seek Passivhaus certification but can be used without pursuing certification.

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).
RIBA	Royal Institute of British Architects.
RICS	Royal Institute of Chartered Surveyors.
SAP	Standard Assessment Procedure – the national calculation method for residential buildings' energy and carbon, used to satisfy building regulations Part L. SAP is based on BREDEM model, but with fixed assumptions and thus less flexibility.
SBEM	Simplified Buildings Energy Model – the national calculation method for non-residential buildings' energy and carbon, used to satisfy building regulations Part L.
SEA	Strategic Environmental Assessment.
Sequestration	Removal and storage of carbon dioxide (or other GHGs) so that it cannot perform its harmful climate-changing role in the atmosphere. Currently only achieved by trees/plants and soil. May be achieved by technologies in future.
Space heat demand	Amount of energy needed to heat a building to a comfortable temperature. Expressed in in kilowatt-hours per square metre of floor space per year.
TER	Target Emission Rate – a limit set by Part L of building regulations on CO_2 emissions per square metre of floor, from regulated energy use in the building.
TPER	Target Primary Energy Rate – limit set by Part L of building regulations on 'primary energy' use per square metre of floor. Unlike metered energy, 'primary energy' takes into account energy lost to inefficiencies during power generation and distribution.
TFEE	Target Fabric Energy Efficiency – limit on space heat energy demand per square metre of floor, set by Part L of building regulations. Based only on fabric; not affected by building services like heating system, lighting, ventilation[i].
TM54	A method to accurately calculate buildings' energy use. Devised by CIBSE (as above).
UKGBC	UK Green Building Council.
Unregulated energy or carbon	Carbon associated with energy use in a building or development but which is not covered by Building Regulations Part L. Includes plug-in appliances, lifts, escalators, external lighting, and any other use not covered by Part L.
U-value	A measure of how much heat is transmitted through a building element, such as the walls, floor, roof, windows or doors. Lower U-values mean a greater retention of heat within the building.
WMS	Written Ministerial Statement. A formal statement made by a Government minister that can form a relevant statement of national policy that needs to be a material consideration in the creation and examination of local plan policies. In this report, where appended by a year (e.g. 'WMS15', 'WMS2015', 'WMS2023') this denotes a specific written ministerial statement made in that year that has been referred to and explained in a prior paragraph of this report.

Introduction

Bioregional is appointed to provide Coventry City Council (CCC) with an assessment of options available within the local planning system to address climate change in Coventry to inform Local Plan policy.

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

Our appointment to support Coventry City Council in this effort has comprised the following workstreams:

A. **Literature review of powers, precedents, existing local carbon and climate strategies**
    1. In parallel: Support the Council with input towards its review of Regulation 18 consultation representations regarding policies relevant to this workstream.

B. **Policy options and evidence in light of the 13th December 2023 Written Ministerial Statement,** including
    1. Produce a range of policy options taking into account the impact of the Written Ministerial Statement of 13th December 2023
    2. Produce/assemble secondary evidence to fill any gaps in what is needed to support chosen policy approach (beyond what was covered in the initial Literature Review) and insert these into an updated version of the Literature Review
    3. Liaison with the Council's third-party consultants on other matters such as viability, where necessary

C. **Final report bringing together the above, including policy approach recommendation** based on Parts A and B, with draft recommended wording.

This current document forms the main documentation output of Tasks B-C of the revised appointment. However, as Task B3 involved further developing the Literature Review, that updated Literature Review also forms part of this report.

Please note this report has an executive non-technical summary.

Please note there is also a separate appendix itemising the justification and evidence (feasibility, necessity and cost) for each individual element of the recommended policy suite.

Executive non-technical 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 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. 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,iii] 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 greatly by the building's form (shape and size). By contrast, the UK's carbon budgets are absolute and thus need[iv] 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 an efficient form nor require better fabric where the form is inefficient.

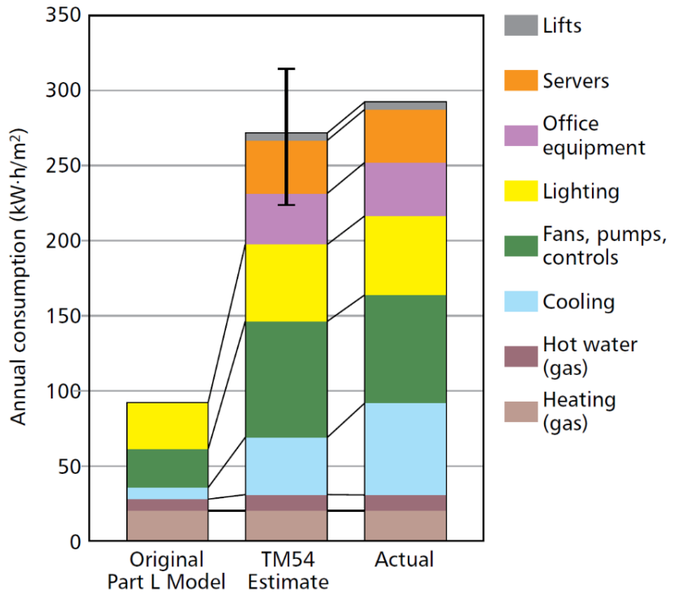


Figure 1: CIBSE graph that reveals the inaccuracies of Part L SBEM prediction of energy use, compared to a prediction using the CIBSE TM54 method, and the building's actual measured energy use in operation. This is for an office building.

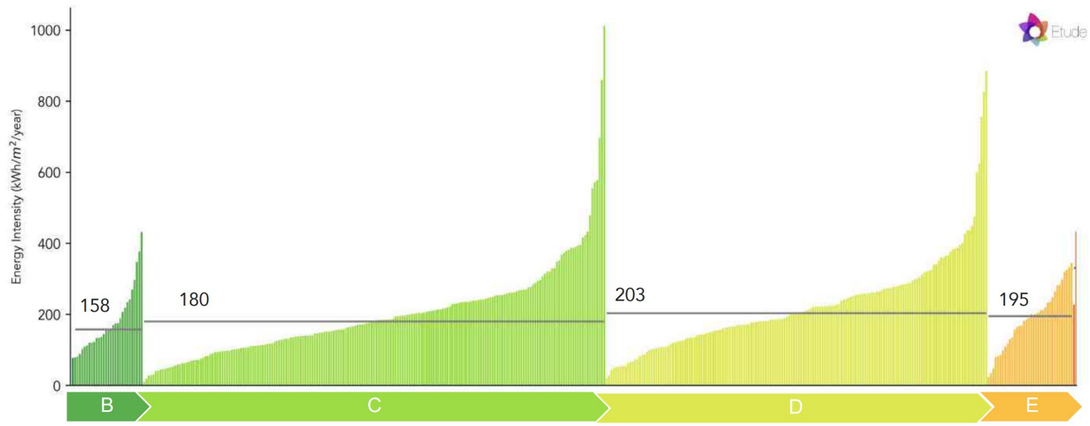


Figure 2: Illustration of variability of metered actual energy use per square metre between different EPC bands, from a metered study of 420 homes. EPCs are based on SAP calculations. Credit: Etude. Source: Etude et al (2021)[v].

[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 *in*to 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.

Other 'net zero carbon' definitions are available along with methods to calculate this. The two leading alternatives are:

- LETI[2] 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[3] 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.

To understand the relative impact of operational carbon and embodied carbon as a share of new buildings' total lifetime carbon emissions, see Figure 3 which is reproduced from UKGBC's document. That figure also indicates how much of the operational carbon emissions are split across energy uses that are 'regulated' by Part L of building regulations, versus the energy uses that are 'unregulated'.

Because the LETI and UKGBC definitions are for *actual* 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 of building regulations. Again, see the orange-coloured segments of Figure 3 to understand the relative proportion of regulated versus unregulated energy use and associated carbon emissions.

Building on the work by LETI and UKGBC, a unified industry definition is in the works by a coalition that includes LETI and UKGBC alongside BRE, RIBA, RICS, and other standard-setting professional organisations in the built environment sector. This "UK Net Zero Carbon Buildings Standard" will align with science-based trajectories needed for net zero by 2050 and a 78% reduction by 2035 in the UK. A draft version for beta testing was anticipated in Spring 2024[vi] but has not yet been released as of August 2024. Timelines for finalisation are unknown.

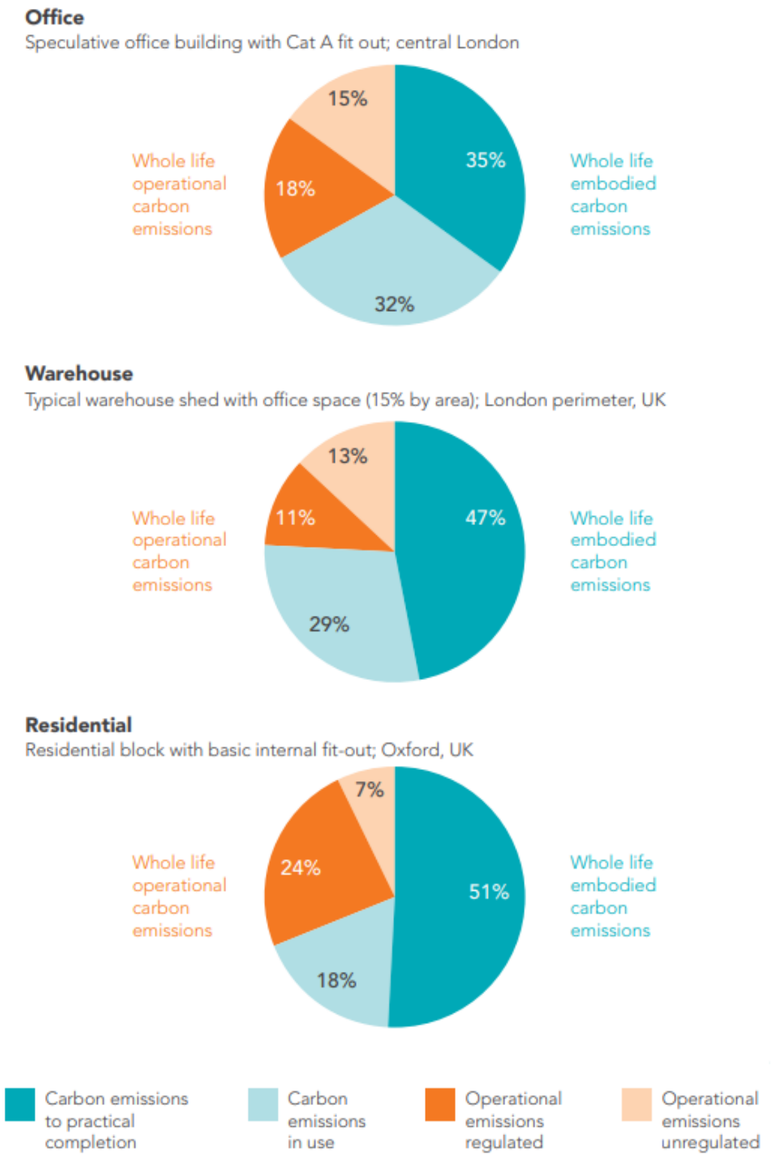


Figure 3: UK Green Building Council. Illustrative graph of the breakdown between embodied carbon (in blue) and carbon emissions from operational energy use (in orange).

[2] Low Energy Transformation Initiative.

[3] UK Green Building Council.

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. One of these is a target for the delivery of housing to meet identified housing 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.

A local plan sets out policies that define the acceptable type, quality and location of land use changes 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 on 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, as well as energy efficiency/carbon emissions (the latter is 'Part L' of the regulations). Building Regulations apply not just to new developments, but also extensions or alterations.

The local plan must be in accordance with the National Planning Policy Framework (NPPF), which is set by central government (most recently in 2023). The NPPF sets out principles and aims that the planning system should aim to fulfil. The NPPF establishes that the overarching purpose of the planning system is "the achievement of sustainable development". 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. At this examination, the Inspector assesses whether the draft local plan 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 proportionate 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. often taken to mean that the policies should not make it impossible to deliver the required amount of housing within the plan period).
- 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 relevant to climate and carbon 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' and thus 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. Some changes to existing land or buildings can occur via permitted development in some cases, without the need for planning permission and therefore without an opportunity for the local plan to influence.

About the local plan

- **Has a duty to deliver 'sustainable development'** that meets environmental, social, and economic needs – housing delivery targets are a key part of this
- **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 calculation method

Why must the 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".

Climate change *mitigation* means reduction in the impact of human activity on the climate[vii] by reducing greenhouse gas in the atmosphere[viii,ix]. 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. This has two parts: reduction of emissions and increase of sequestration (removal and storage of carbon by trees/natural features, or 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 targets for the UK. Thus, to be 'in line with' the Act, the local plan would need to be designed to take the necessary local action to achieve:

- Net zero carbon by 2050 (based on a 1990 baseline)
- Steeply reducing 'carbon budgets' for each five-year period up to 2050 (see Figure 4 to right)

The 'carbon budgets' set a limit on the amount 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[x] shows that national government plans are insufficient to deliver all these necessary changes. The government's Net Zero Strategy was (2022) found unlawful[xi] for failing to deliver on the Climate Change Act obligation to create sufficiently detailed policies showing 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.

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 (2023)** 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.

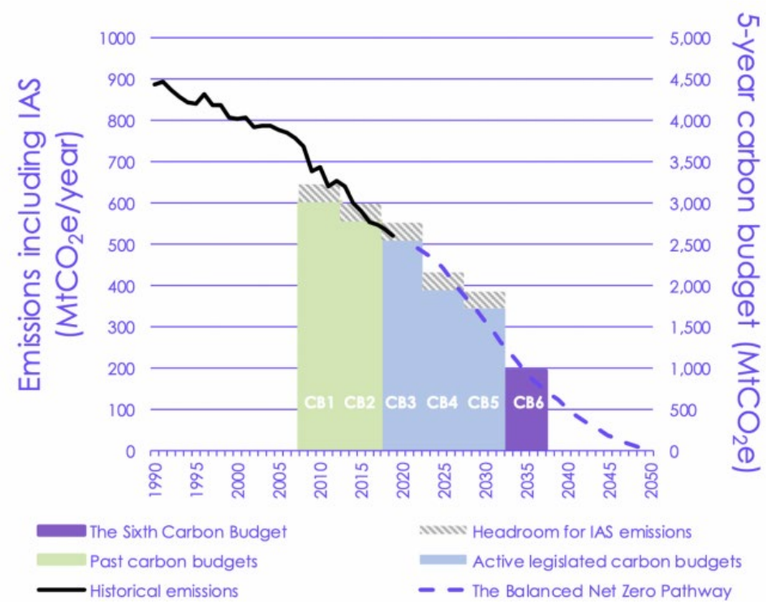


Figure 4: UK legislated carbon budgets under the Climate Change Act. From Committee on Climate Change (2020), The Sixth Carbon Budget: The UK's Path to Net Zero. "IAS" = international aviation & shipping.

How can the local plan take action towards net zero carbon?

The main sources of emissions (and removals) that a local plan can influence 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 also 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 Act permits local energy efficiency standards based on TM54, which accounts for *total* energy use, not just regulated (see glossary).

The Act does not define 'reasonable requirement', nor does it define 'energy used at the development'. It therefore appears to empower the local plan to set requirements for renewable energy to meet a proportion of the new building's *total* energy, not just 'regulated' energy (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 directly plug into SAP/SBEM.

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

- Section 106[xii] 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[xiii] 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 159b: "New development should be planned for in ways that … reduce [carbon] emissions, such as [via] location, orientation and design … Local requirements for [buildings'] sustainability should reflect the Government's policy for national technical standards".
- Paragraph 160a-b: "Plans should … provide a positive strategy for energy from [renewable and low carbon] sources … consider identifying suitable areas for [these] and supporting infrastructure … [and] identify opportunities for development to draw its energy supply from [these sources]".
- Paragraph 196: "Set out a positive strategy for the conservation and enjoyment of the historic environment, including … putting [heritage assets] to viable uses consistent with their conservation". This is relevant to carbon because energy efficiency affects whether use is viable.

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 (2023)**
  - Policies should 'reflect national technical standards' – this may influence the metrics or calculation methods that can be used in local policy on 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 via new development's location, orientation and design, and to plan for renewable energy
- **Building Regulations Part L 2021 exceeds a supposed previous limit on how far the local plan carbon and energy policies could go** (the limit was expressed in Planning Practice Guidance and a 2015 Ministerial Statement),
  - Therefore it appears that limit is obsolete and that local plans can go as far as needed to fulfil their climate mitigation duty
  - … 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
- **A new Written Ministerial Statement on 13th December 2023** attempts to limit energy efficiency policies to be expressed as a percentage reduction on the Building Regulations Target Emission Rate. However, this is subject to ongoing legal challenge in that it would inhibit local plans' ability to meet their climate mitigation duty.

How have local plans used their powers towards carbon reductions?

Most adopted local plan example policies on net zero carbon buildings have been based on metrics from Building Regulations, taking the following approach:

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

Some example policies 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.

It is important to note that this kind of policy necessitates a definition of renewable energy, and which energy technologies will count towards the renewable energy requirement. Some technologies (such as heat pumps) could be counted either as an efficiency feature or a renewable energy feature, and have been categorised differently by different example policies. Biomass technologies are technically renewable but might have unacceptable impacts on air quality and transport. With such policies, clarity must be provided either in the policy, supporting text or supplementary guidance.

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.

However, there is a vanguard of newer pioneering local plans that are moving away from Building Regulations metrics and taking a more effective route of energy use limits and/or 100% renewable energy. Examples are given in the table here, outlining their differences and comparing them to the London Plan 2021 which is based on Building Regulations as previously noted.

Table 1: Comparison of 'net zero carbon' definitions and performance standards in several recent precedent local plans.

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 (B&NES) 10p/kWh (Cornwall)
Years' worth of emissions to be offset	30	1	n/a	30

Table 1 (previous page) shows that some recent successfully adopted local plans now go well beyond the Building Regulations approach, and instead require absolute energy use limits and on-site renewable energy generation capacity to reach net zero carbon.

These more recent pioneering policies are inspired by LETI and UKGBC net zero carbon buildings definitions (previously explained), and are 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 carbon emissions baseline. They use the metrics of EUI (Energy Use Intensity), space heat demand, and renewable energy generation. 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 using similar energy metrics (that is, not 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
- Uttlesford Emerging Local Plan
- South Oxfordshire & Vale of the White Horse Emerging Joint Local Plan 2041

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.

These 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 receiving positive feedback in the Inspector's examination report, by contrast West Oxfordshire (Salt Cross Area Action Plan) and Lancaster City Council were instructed by their Inspector 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'. The Inspectors' main reasoning for this decision was their view that the proposed local energy targets (in Policy 2 – Net Zero Carbon Development) were not sufficiently justified by evidence and also conflicted with expressions of national policy (in the form of a Written Ministerial Statement of 2015 which had placed a restriction on how far local energy performance standards could go – a limit which was in fact overtaken by national building regulations Part L 2021). The Salt Cross case was successfully challenged by a third-party organisation focusing on that interpretation of the policy's soundness. The case was heard in the High Court in November 2023. On 20th February 2024 a decision was passed down that the Planning Inspectors "erred in law in their approach by finding that Policy 2 of the AAP was inconsistent with the WMS[2015]" because the limit placed by the WMS[2015] was overtaken by the introduction of Part L 2021 and had been contradicted by subsequent expressions of national policy[xiv,xv,xvi].

A decision on whether the Salt Cross AAP can proceed to re-examination or adoption is likely to follow in coming months. But if re-examined, it will now face a new hurdle: the Written Ministerial Statement of 13th December 2023. The WMS2023, unlike the WMS2015, does not limit *how far* a policy can go in requiring carbon reductions, but instead prescribes a specific (and in our view, highly inappropriate) carbon metric to be used to express any energy efficiency policy that goes beyond building regulations. However, any future argument to overcome the new WMS may now be bolstered by the comment in that High Court decision that a WMS "cannot restrict the legal powers of the LPA under the 2008 [Energy and Planning] Act". A further indication in favour of Salt Cross is some pre-action legal correspondence (as yet unpublished) between the Secretary of State and the legal representative of a coalition of local authorities, who had posited that the WMS2023 would be unlawful if it sought to restrict the exercise of local planning authorities' primary powers stemming from the Energy & Planning Act 2008. The Secretary of State's response was that the WMS2023 did not intend to do that, and that it is only a *material consideration* to be taken into account in the planning system, not a fixed constraint on how policy is expressed, despite the forceful language within the WMS.

Policy options and recommendations

Identifying the options for local plan policy in light of the 2023 national policy changes

As noted in the previous section about powers and precedents, there are two key ways that an operational carbon reduction policy could be designed:

- Using Building Regulations metrics for operational energy and carbon – which would utilise the national calculation methods 'SAP/SBEM' (see glossary), which are inaccurate and exclude all energy used by plug-in appliances (potentially half of the total energy use in the building)
- Using alternative metrics for operational energy, such as PHPP or TM54 (see glossary), which in turn would more effectively address carbon emissions, because these alternative metrics use calculation methods that fully and more accurately predict the energy use of the building.

Additionally, within each of the two routes described above, the targets for energy efficiency and renewable energy can be made looser (for a less ambitious policy that would be easier for developers to achieve but less effective for carbon purposes) or tighter (which may require greater effort from developers but would be more effective for carbon and also for occupants' energy bill savings).

However, the WMS2023 purports to restrict local energy efficiency policies to be expressed using Building Regulations metrics – specifically to use the 'TER' metric which is in fact a carbon emissions metric, not truly an energy efficiency metric.

Whichever of the above approaches is chosen and whatever level of ambition is pursued, it is advised to structure the policy according to the Energy Hierarchy in order to make the policy most effective in the long term and protect occupants from avoidably excessive energy bills. The energy hierarchy is as follows, in order of steps to take in the building design and mitigation:

i. **Energy efficiency (reduce energy demand)**
ii. **Generate and use renewable energy**
iii. **Offset any operational energy/carbon that cannot feasibly be dealt with on site.**

The energy hierarchy means these steps should be fully prioritised in the order they appear.

In addition to these guidelines on operational energy and the carbon impact of that, a policy to address the fuller picture of a building's carbon impact and climate suitability would also include:

- Embodied carbon (the carbon emitted up to the point of completing the building – therefore material extraction, manufacturing, materials transport, construction process etc)
- Overheating risk mitigation (because the UK is expecting hotter summers in coming decades with climate change, and if the building is not designed to stay cool via passive designs, future occupiers may add active cooling systems such as air conditioning which would raise the energy use, which may make it no longer zero carbon)

'Passive' means 'without using energy'. Passive overheating mitigation includes, for example, shading.

Embodied carbon is not part of the energy hierarchy. Nor is overheating, albeit passive overheating mitigation would contribute towards the 'energy efficiency' step.

In light of the restrictions that the WMS2023 purports to impose on local energy efficiency policies, three options for 'net zero' policy configuration are identified, in terms of three levels of ambition:

Policy element (structured by energy hierarchy)	Option 1: Safely compliant with WMS2023	Option 2: Compliant with WMS2023, but testing boundaries	Option 3: Diverge from WMS2023 (non-national metrics)
Energy efficiency improvement target	Set a % reduction on Part L TER (Target Emission Rate)	Set a % reduction on Part L TER (Target Emission Rate)	Set targets for total Energy Use Intensity and space heat demand
Renewable energy generation target	Fossil fuel free on site, AND Renewable generation on site to reduce regulated carbon to zero	Fossil fuel free on site AND Renewable generation on site equal to 100% of total energy use	Fossil fuel free on site AND Renewable generation on site equal to 100% of total energy use
Offsetting (where renewable target not met)	£/tonne of regulated carbon emissions	£ / kWh of energy use not met by renewables	£ / kWh of energy use not met by renewables

The ambitiousness (and climate-protecting effectiveness) increase from left to right. Option 1 is the least effective/ambitious, while Option 3 is the most effective but also the riskiest in terms of planning acceptability, in that it would need a stronger argument to convince the Planning Inspector to permit a divergence from the WMS2023. Option 3 diverges from the WMS only by using more effective, accurate metrics that are not the national metrics used in Building Regulations. Option 2 sticks to the letter of the WMS (which affects *energy efficiency* only), but the renewable energy target is raised to cover *total* operational energy, not just the share that is covered by building regulations. This can still use national calculation methods and stays within the local plan's legal powers as previously noted.

Also, three levels of potential ambition for embodied carbon were identified:

Policy element	Option 1	Option 2	Option 3
Embodied carbon	Major development to report embodied carbon.	Major development to report embodied carbon. Large-scale to hit cost-neutral targets (kg carbon/m^2 floorspace)	Major development to report embodied carbon. Large-scale to hit industry best practice targets (kg carbon/m^2 floorspace)

Because embodied carbon is separate from operational energy/carbon, any of these embodied carbon options could in fact be combined with any of the operational energy/carbon options described above. They are expressed in three levels only to differentiate the range of ambition that could be pursued.

In light of the balance of merits in terms of climate effectiveness and planning risks, Coventry City Council representatives chose to pursue Option 2.

Draft recommended policies for Coventry

Draft recommended policies for Coventry, as described above, have been devised to cover the three topics as previously recommended:

- **Operational energy and carbon** (these are the matters for which the local plan is explicitly empowered to act through the Planning & Energy Act 2008, but also for which most of the national policy constraints or caveats apply, as previously outlined)
- **Overheating** (this is a matter on which there is national regulation but that national regulation does not guarantee the most effective risk mitigation method in light of coming climate change, therefore the policy pushes for the use of the more effective method within that national regulation, in order to meet National Planning Policy Framework instructions that the planning system should bring about adaption to climate change through designs)
- **Embodied carbon** (this is a matter which addressed by only a few existing local plans, and for which there is no national regulation in place with which the local plan would need to align, however there is an accepted industry methodology to account for this and it causes a very large share of new buildings' total climate impact, therefore should not be neglected if Coventry's plan is to fulfil the expectation to mitigate climate change, as set in legislation and national policy as previously outlined).

These have been split into four separate policies, as follows:

Topic	Policy
Operational energy and carbon	A. Net zero (regulated operational carbon) new build residential development
	B. Net zero (regulated operational carbon) new build non-residential development
Overheating	C. Overheating in new buildings
Embodied carbon	D. Embodied carbon

The drafted policies reflect Policy Option 2 as previously described, following the Council's selection of Policy Option 2 on the balance of merits of climate effectiveness versus planning acceptability. This means they follow the stipulations of the Written Ministerial Statement 2023 which defines the metrics that are used for energy efficiency. Meanwhile their renewable energy

Policies A and B are structured to follow the energy hierarchy (as outlined on the previous page).

Policies A and B are designed to achieve net zero carbon buildings in operation, for new buildings only, by firstly pursuing energy efficiency improvements and subsequently by requiring sufficient renewable energy annual generation on-site to match the total annual energy use of the building – including both 'regulated' and 'unregulated' energy uses (see glossary and previously provided explanation).

Please note that the full version of the report provides not only the itemised policy wording, but also an in-depth discussion of each policy on a range of considerations, such as:

- **Implementation**
- **Alignment with national policy**
- **Feasibility & industry capability to meet the policy**
- **Coventry development management capacity to assess compliance with the policy**
- **Cost estimations**
- **Scope for future improvements to policy, should there be a future improvement in feasibility, industry capability, cost or national policy constraints.**

To keep this non-technical executive summary suitably concise, we cannot here replicate all of that detail or all of those topics. However, starting overleaf we provide an abridge version of some key points from that discussion.

Further detail on itemised alignment with national policy, and feasibility/cost, is provided in the separate appendix to this report.

Please note that the full version of the report also provides a section on policy implementation and monitoring, which includes::

- Suggestions for verifying policy compliance at various stages of the design and construction, including options for mitigation of the energy performance gap (the gap between predicted energy performance and actual performance) and 'assured performance' schemes to assist that goal
- Discussion of the role of third-party verification
- A suggested range of indicators that could be tracked to understand the policies' success over time, of which Coventry City Council could select some key indicators for publication in the planning department's Annual Monitoring Report.

Again, we do not replicate those in this executive summary for reasons of brevity, but we encourage interested readers to visit that section in the full main report. The section in question is only 2 pages long.

Policy A: Net zero operational carbon new build residential development					
Energy hierarchy step	**Code**	**Requirement (summarised/paraphrased)**	**National policy alignment**	**Implementation considerations**	**Scope for future improvement**
Energy efficiency	A1.1	≥63% reduction on Part L 2021 TER (Target Emissions Rate), from energy efficiency measures. As a measure in aid of this TER target, achieve a reduction on Part L 2021 Fabric Energy Efficiency metric (FEE) as follows: • End terrace: ≥12% • Mid terrace: ≥16% • Semi detached: ≥15% • Detached: ≥17% • Bungalow: ≥9% • Flats / apartment blocks: ≥24%	Aligns with 'Future Homes standard' specification for fabric and heating system, as published within Government's Response to the Future Homes Standard Consultation 2021. Utilises national metrics. Overarching requirement is expressed as % TER reduction, therefore complies with WMS2023. (The FEE target is in aid of, not as well as, the TER target).	Training for officers to understand different calculation methods, design features, and definitions of 'energy efficiency measures' could be helpful.	Targets could be tightened in future subject to emergence of further evidence on feasibility and cost/viability.
Energy efficiency	A1.2	Positive weight will be given to proposals that demonstrate the following absolute energy metrics: • Total Energy Use: 35 kWh/m^2/year • Space heating demand: 15 kWh/m^2/year To be evidenced by a methodology that accurately predicts buildings' operational energy use.	This is a non-mandatory guideline, therefore does not set a 'standard' nor interfere with delivery of homes, thus does not conflict with the WMS2023. Aligns with performance needed for national carbon budgets.	Training or guidance on acceptable methodologies for calculating performance against these metrics could be helpful.	Making these absolute energy targets mandatory (subject to feasibility, cost and national policy alignment) rather than merely encouraged.
Energy supply	A2	The use of fossil fuels and connection to the gas grid will not be considered acceptable.	Echoes the Future Homes Standard. Aligns with national carbon budgets.	None	None
Energy supply	A3	On-site annual renewable energy generation capacity (in kWh) at least equal to the predicted annual total energy use (regulated energy use, plus unregulated energy use). Or if unfeasible: generate 114.9kWh/m^{2}building footprint/year and proceed to A4 (offsetting).	Follows NPPF instruction to proactively promote renewable energy generation and identify ways for new buildings to draw their energy from this. Aligns with national carbon budgets.	Training and/or guidance could help ensure the correct data is submitted, and help to identify situations in which the main target may be unfeasible, making the fallback target acceptable.	None
Offsetting	A4	Where A3 is not fully feasible, then offset the unmet annual energy demand at £2.15/kWh paid to the local authority, to be ringfenced for the delivery of renewable energy in Coventry.	Helps proactively bring forward renewable energy, as per the NPPF expectations. Aligned to national estimation of PV installation costs.	Training and/or guidance may be helpful to evaluate legitimacy of feasibility claims, as above.	Offsetting cost could be updated annually in line with national data on costs of PV installation.
Performance	A5	Utilise an assured performance method throughout construction to reduce energy performance gap.	Helps deliver actual energy efficiency as targeted.	Training and/or guidance could be helpful on the best methods.	More specific methods could be identified.
Performance	A6	Demonstrate consideration of scope for energy storage and/or smart energy systems to bridge gaps in time between energy generation and energy use, to maximise self-consumption.	Supporting infrastructure for renewable energy, thus supports NPPF aspirations around renewable energy as above.	None	None.
Performance	A7	Schemes of 50 homes or more: Monitor & report energy use and renewable energy generation for 5 years from first occupation.	Educates the industry on actual energy performance thus helps deliver on FHS and carbon budgets.	None	Potential to report the results to a national or regional platform, if one emerges.

B. Net zero (regulated operational carbon) new build non-domestic development					
Energy hierarchy step	**Code**	**Requirement (summarised/paraphrased)**	**National policy alignment**	**Implementation considerations**	**Scope for future improvement**
Energy efficiency	B1.1	% improvement on Part L 2021TER (or equivalent reduction on future Part L updates), through on-site measures as follows: • Offices: ≥25% • Schools: ≥35% • Industrial buildings: ≥45% • Hotels (C2, C5) and residential institutions (C2, C2a): ≥10% • Other non-residential buildings: ≥35%	Utilises national calculation methodology metrics that are also used in Building Regulations Part L.	Training for officers to understand different calculation methods, design features, and definitions of 'energy efficiency measures' could be helpful.	Targets could be tightened in future subject to emergence of further evidence on feasibility and cost/viability.
Energy efficiency	B1.2	Positive weight will be given to applicants who can demonstrate the following absolute energy metrics: • Total Energy Use: 65 kWh/m^2/year • Space heating demand: 15 kWh/m^2/year	As a non-mandatory guideline, this does not set a 'standard' nor interfere with development delivery. The WMS2023's stipulated energy calculation is inapplicable to non-residential.	Training or guidance on acceptable methodologies for calculating performance against these metrics could be helpful.	Making these absolute energy targets mandatory (subject to feasibility, cost and national policy alignment) rather than merely encouraged.
Energy supply	B2	The use of fossil fuels and connection to the gas grid will not be considered acceptable.	Aligns with national carbon budgets.	None	None identified.
Energy supply	B3	On-site annual renewable energy generation capacity to at least equal predicted annual regulated energy use (residual energy use after B1.1 has been achieved). In buildings subject to Part L's [Building Regulations] energy forecasting, that should be the source of the 'annual regulated energy' figure. Or if unfeasible: generate 114.9kWh/m^{2}building footprint/year and proceed to A4 (offsetting).	Follows NPPF instruction to proactively promote renewable energy generation and identify ways for new buildings to draw their energy from this. Aligns with national carbon budgets. Utilises forecasting data required by latest version of Building Regulations.	Training and/or guidance could help ensure the correct data is submitted, and help to identify situations in which the main target may be unfeasible, making the fallback target acceptable.	None identified.
Offsetting	B4	Where B3 is not fully feasible, then offset the unmet annual energy demand at £2.15/kWh paid to the local authority, to be ringfenced for the delivery of renewable energy in Coventry.	Helps proactively bring forward renewable energy, as per the NPPF expectations. Aligned to national estimation of PV installation costs.	Training and/or guidance may be helpful to evaluate legitimacy of feasibility claims, as above.	Offsetting cost could be updated annually in line with national data on costs of PV installation.
Performance	B5	Utilise an assured performance method throughout construction to reduce energy performance gap.	Helps deliver actual energy efficiency as targeted.	Training and/or guidance could be helpful on the best methods.	More specific methods could be identified.
Performance	B6	Demonstrate consideration of scope for energy storage and/or smart energy systems to bridge gaps in time between energy generation and energy use, to maximise self-consumption.	Supporting infrastructure for renewable energy, thus supports NPPF aspirations around renewable energy as above.	None	None identified.
Performance	B7	Schemes of 5000+m^2 floorspace: Monitor & report energy use and renewable energy generation for first 5 years of occupation.	Educates the industry on actual energy performance thus helps deliver on FHS and carbon budgets.	None	Potential to report the results to a national or regional platform, if one emerges.

C. Overheating in new buildings					
Topic	**Code**	**Requirement (summarised/paraphrased)**	**National policy alignment**	**Implementation considerations**	**Scope for future improvement**
Cooling hierarchy	C1	Demonstrate that overheating risk measures have been incorporated in accordance with the cooling hierarchy: 1. Minimise internal heat generation via energy efficient design. 2. Reduce the amount of heat entering the building in summer via: a. Building orientation b. Shading c. Albedo d. Fenestration e. Insulation. 3. Manage heat within the building through exposed internal thermal mass and high ceilings. 4. Passive ventilation. 5. Mechanical ventilation. 6. 6. Active cooling measures.	No national policy on cooling hierarchy with which to align.	Guidance or training could be helpful on evaluating how well a design has balanced overheating risk mitigation with energy efficiency goals of separate policies A1-A2 and B1-B2.	None identified.
Overheating assessment	C2	Residential development should complete CIBSE TM59 overheating assessment as their route to compliance with Building Regulations Part O. The simplified Part O route will not be considered acceptable. Non-residential development should complete CIBSE TM52 overheating assessment.	CIBSE TM59 is the more effective of the two methods accepted for compliance in Building Regulations Part O (applicable to residential only). For non-residential buildings, there is no national policy with which to align.	Guidance or training may aid officers' confidence and speed in interpretating CIBSE TM52/TM59 outputs. However, these are usually fairly self-explanatory as they are given as 'pass/fail'.	None identified.

D. Embodied carbon and waste					
Topic	**Code**	**Requirement (summarised/paraphrased)**	**National policy alignment**	**Implementation considerations**	**Scope for future improvement**
Embodied carbon reporting	D1	Major new development (10+ homes or 1,000+m^2 floorspace) to complete an RICS whole-life carbon assessment.	There is no national policy with which to align regarding embodied carbon technical standards, assessment methods, targets, or regarding design to avoid demolition without material reuse at end of life. However, all of this policy suite will help deliver the national carbon budgets; the Committee on Climate Change identifies embodied carbon as a gap in national policy that must be remedied.	Training or guidance to interpret information in such assessments.	None identified.
Limiting embodied carbon	D2	Large-scale development (50+ homes or 5,000+m^2 floorspace) to limit up-front* embodied carbon to 600kg/m^2 floorspace (*RICS modules A1 – A5).		Guidance on the scope of embodied carbon assessments could be helpful.	Tighter targets or extending to lower size thresholds, when feasibility/capability allows.
Building end-of-life	D3	All new buildings are to be designed to enable easy material re-use and disassembly, reducing need for end-of-life demolition.		Training and/or guidance may be helpful on how to interpret information that would be submitted with regards to design for end of life reuse, pre-demolition audits, and 'what good narrative looks like' for embodied carbon choices in materials and designs.	None identified.
Demolition audits	D4	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).			None identified.
Embodied carbon narrative	D5	New development of 1+ homes or 100+m^2 floor space is to provide general narrative on options considered (and where possible, decisions made) to minimise embodied carbon of the proposed development.			None identified.

Full report

Literature review (powers, duties, mandates and precedents)

Defining ‘net zero carbon’

Overview

Because climate and carbon emissions are global challenges, consistency of effort is key (from the building scale through to the local, regional, national and international scales). If carbon emissions are not consistently accounted for, there will be a risk of not reducing emissions but simply displacing them – or failing to account for the full emissions of new development.

When devising local plan policies for Coventry, it will be vital to make sure those policies use a definition of ‘net zero carbon development’ that fully contributes to the achievement of a net zero carbon Coventry and net zero carbon UK.

We here look at the global, national, area-wide and building-level definitions of net zero carbon that are generally accepted. Precedents of how local plans have defined and pursued net zero carbon is then explored.

This context is important because most of the older adopted precedent local plans use a definition of ‘net zero carbon development’ that is significantly different to how a fully-fledged carbon accounting methodology would define it.

The reason for this difference is that most – although not all – of the older local plan adopted precedents have set their ‘carbon reduction’ requirements based on energy and carbon metrics set by national building regulations. These building regulations metrics do not account for the building’s full energy use, let alone the embodied carbon of the building’s materials and construction, or the transport carbon that will be induced in the lifestyles of the building’s users. The use of building regulations metrics in local plan policy has been due to the way in which planning legislation defines the local planning authority’s powers, and the ways in which other pieces of national government policy may constrain how those powers are exercised.

As set out later in this report, some pioneering local planning policies have begun to move beyond these potential constraints arising from planning legislation and associated national policy. However, due to a Written Ministerial Statement (WMS) released in 2023 which purports to limit how local energy efficiency policies are expressed (see later section on this topic), this surge of ambitious local plan policy is likely to diminish until the WMS2023 is either revoked or found to be unlawful and hold minimal weight once inspected at Examination in Public sessions.

This section firstly looks at the global, national, and district-level definitions of net zero carbon. This makes it possible to understand the relative merits of different definitions of net zero carbon buildings in existing and emerging precedent local plans.

This report also helps contextualise the levels of performance or change that would be necessary to achieve those definitions of net zero carbon – in terms of changes to new buildings, existing buildings, transport, the energy system, and land use.

Net Zero Carbon at global level

At global level, "net zero carbon" means that emissions of greenhouse gases (GHGs) are balanced out by removals of GHGs from the atmosphere.

'Greenhouse gas' encompasses a bundle of different gases that have a climate-changing effect. The most common greenhouse gas is carbon dioxide (CO_2) which represents 80% of the UK's climate impact[xvii]. Six other GHGs are also relevant: methane (12%), nitrous oxide (5%), and four types of fluorinated gas (refrigerants, 3%). Some of these have a weaker global warming effect, and some have a stronger effect but stay in the atmosphere for longer and therefore cause more change over time.

As CO_2 stays in the atmosphere for a long time, there is a fixed amount – a 'carbon budget' – that we can emit between now and 2100 if the world is to avoid the worst impacts of climate change (limiting global warming to less than 2˚C above pre-industrial climate). The other greenhouse gases are not subject to the 'budget' approach, because they stay in the atmosphere for a different amount of time, but should still be reduced as far as possible.

Together, the bundle of greenhouse gases is referred to as 'carbon dioxide equivalent' or 'CO_2e'. This refers to the global warming effect that the gas would have in a 100-year timeframe, compared to that of carbon dioxide. 'Carbon emissions' can refer to carbon dioxide, or the whole collection of greenhouse gases.

'Net carbon' or 'net emissions' refers to the amount of CO_2 or greenhouse gas that remains after deducting the amount that was removed from the atmosphere, usually over the course of a year.

'Net zero carbon' is sometimes used interchangeably with the term 'carbon neutrality'. These are overlapping concepts which essentially mean the same thing at global level, but at sub-global levels they are used slightly differently[xviii], to reflect whether the emissions and removals are achieved *directly by* or purely *on behalf of* a particular country, area or organisation. This becomes a question of 'carbon accounting', discussed next.

Where is carbon emitted from and how can carbon be removed from the atmosphere?

The main *source of rising GHG levels* in Earth's atmosphere is the burning of fossil fuels (as this is an emission of carbon that had been locked up underground for many thousands of years until recently). Greenhouse gas is also emitted by many other human activities including fertiliser use (nitrogen fertilisers are often made from fossil fuel), ruminant livestock's digestive systems, breakdown of organic waste, and the chemical reaction during the production of cement.

Greenhouse gas *removals* are achieved by plants and soils such as forests, grassland, and wetland. These are currently the only reliable and scalable means to remove greenhouse gases, as no technology for carbon capture has yet been developed that is appropriate, efficient or scaleable for most purposes. Still, research is underway to develop such technologies, and future carbon removal technology is a significant part of many countries' long-term strategy to limit the total amount of carbon emitted this century.

Carbon accounting methodologies: whose carbon is whose?

Human activities and economies are highly interconnected across local, organisational and international lines. Activity by a person in one location (such as using electricity) can cause carbon emissions by another entity elsewhere (such as burning coal to generate energy in power stations).

Therefore we need 'carbon accounting' methodologies to work out what share of carbon 'belongs' to each entity. An entity could be a person, organisation, building, local area, or country.

Returning to the question of 'net zero carbon' compared to 'carbon neutral', the Intergovernmental Panel on Climate Change[xix] essentially explains that:

- 'Net zero carbon' typically means a balance of emissions and removals under direct control or territorial responsibility of the entity reporting them (such as a country, district, or sector)
- 'Carbon neutral' can also apply to a firm or commodity, and typically also includes emissions and removals beyond the entity's direct control or territorial responsibility.

Following this logic, 'net zero carbon' would be the appropriate term if the district or country achieves enough carbon removals within its own area to balance out its own carbon emissions, while 'carbon neutral' is a less appropriate term for a country/district but would be the term to use if the balance of emissions/removals is achieved by buying carbon offset credits from outside that location. We note West Midlands Combined Authority (WMCA) uses these terms interchangeably for its 2041 goal[xx,xxi].

For the purposes of the local plan, we should consider the carbon account of three key entities: firstly Coventry City, secondly WMCA area, each new building. If development is to truly *mitigate* (i.e. reduce overall) carbon emissions, we must consider how the building's carbon emissions fit into the city's carbon account, and how the city's emissions fit within WMCA's carbon account, and how this fits within the wider UK's carbon account which is legally bound to achieve net zero by 2050 and steep reductions in the preceding years. If we use inconsistent definitions or accounting methods, then our 'net zero carbon' buildings might not help Coventry or the West Midlands to achieve their net zero goals, and Coventry in turn might not help the UK meet its 2050 goal or its interim carbon budgets.

Several carbon accounting approaches are available to determine how much carbon a geographical area is responsible for:

- Global Greenhouse Gas Protocol for Cities (GPC) – which has three 'scopes'
- PAS2070
- Local area CO2e inventories, released annually by the UK government DESNZ (formerly BEIS)
- Tyndall Centre local carbon budgets / SCATTER local carbon emissions accounts.

Each of these methodologies is designed to define the area's 'carbon account' based on the degree of direct or financial control the area has over activities that emit or absorb carbon. Although each methodology differs slightly from the others, a local area would usually achieve 'net zero carbon' status when the GHG removals achieved within the local area are equal to greenhouse gas emissions from directly within the local area plus the greenhouse gases due to production of grid energy the local area consumes. If an area exports grid energy to other locations, any emissions associated with the production of that energy would not count towards the area's carbon account. The methodologies generally agree that the local area's carbon account should not include offsets purchased from outside the area. These should be reported separately, if at all. However, such offsets may still help towards the overall UK net zero carbon goal so long as they are within the UK.

The Global Greenhouse Gas Reporting Protocol for Cities (GPC)

The Greenhouse Gas Reporting Protocol is the most widely used and accepted methodology to account for any entity's carbon emissions. The GPC is a version of that methodology that has been adapted for the use of cities or any other local area. Its aim is to enable local area carbon accounts to be tracked consistently enough to be aggregated to the regional or national level.

The GPC covers several gases (along with CO_2) and splits the account into three 'scopes' which reflect the degree of responsibility and control the local area has:

- Scope 1: emissions directly from within the area – such as through burning fuel, or through methane emissions from livestock kept within that area. Ditto, carbon removals achieved directly within the area, such as by trees growing in the area.
- Scope 2: emissions associated with that area's use of grid electricity, whether that energy was actually generated inside the area or outside the area.
- Scope 3: emissions that happen outside the area but caused by activity or spending by entities inside the area – such as production and transport of goods imported from elsewhere.

The GPC states that if an area purchases carbon offsets from outside the area in order to mitigate some of its emissions, these should be reported separately and not deducted from the total.

If Coventry or WMCA chooses to use any external 'offsets' in its quest for emissions reduction (as a last resort), these should be from within the UK so that they fall within the UK's Scope 1 account and thus contribute to the UK's overall net zero carbon goal (which should not include overseas offsets).

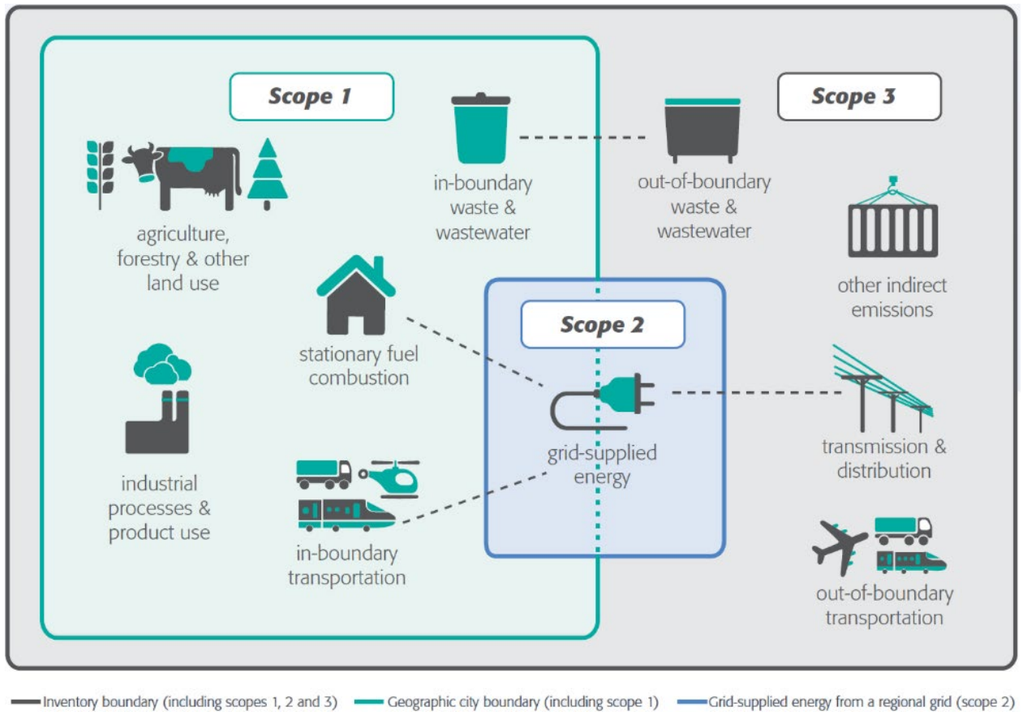


Figure 5: Various emissions sources according to Scopes 1, 2 and 3.

PAS 2070

A PAS is a Publicly Available Specification, which is essentially the precursor to a British Standard or European EN standard. A PAS defines good practice standards for a product, service or process.

PAS 2070 aims to define good practice for the assessment of the greenhouse gas emissions of a city. It builds on the GHG Protocol for Cities (GPC) to include a wider range of emissions sources and a slightly wider bundle of gases. It also offers two ways of accounting, one of which is equivalent to the GPC's three scopes ("direct plus supply chain"), and the other of which allows exclusion of emissions from goods produced in the area that are then exported ("consumption-based emissions").

Just like the GPC, PAS2070 notes that if out-of-boundary offsets have been bought (whether by the municipality, businesses, organisations or residents) these should not form part of the total of a city's GHG account by deducting them from the total. Instead, such offsets should be accounted separately.

UK DESNZ/BEIS official subnational emissions inventories

The Department of Energy Security and Net Zero (DESNZ, formerly BEIS) releases annual figures that break the UK's carbon emissions down to a local level[xxii] to help local authorities make decisions. Until recently this counted CO_2 only, but now includes CO_2, methane and nitrogen dioxide (although not F-gases). It uses data from the National Atmospheric Emissions Inventory and national statistics on local area's energy consumption. It excludes aviation, international shipping and military transport because there is no clear basis for how these would be allocated to local areas.

These DESNZ/BEIS figures include only local direct emissions (including from land use and chemical use as well as fuel use) and grid energy use. They are not broken down into 'scopes', but would mostly equate to Scope 1 + Scope 2 as they do not include emissions from the local area's consumption of goods produced elsewhere (except electricity).

The DESNZ/BEIS figures are broken down into several sectors: industry, homes, commercial buildings, public buildings, transport, and land use/forestry ('LULUCF'). Transport emissions are calculated based on traffic flow data on local roads, plus fuel use on inland waterways and trains. Electricity use in railways is accounted for separately (in the 'industry/commercial' sector instead of 'transport').

The DESNZ/BEIS figures show how much carbon is removed by the area's grassland and woodland. This is positive, but also shows the scale of the challenge: The woodland/grassland is nowhere near enough to zero-out the area's emissions even if the green areas were expanded many times over.

The figures also reveal how important it is to plan for reduced car use and enable low-emissions deliveries – as transport is responsible for more than half the area's emissions.

Tyndall Centre local area carbon dioxide budgets (and SCATTER trajectories)

The Tyndall Centre is a climate change research organisation made up of several UK universities working to get climate science evidence into policy. It created a tool[xxiii] that produces municipal-level carbon budgets towards a 2˚C global climate pathway that are necessary and fair, taking into account each location's sectoral base by looking at its historical portion of the country's emissions.

These trajectories show the UK's **total CO_2 budget to 2100** if the UK is to pull its weight towards fulfilling the **Paris Agreement** (to **limit global warming to 2˚C**, with **carbon cuts equitably distributed to each country** in proportion to its technological and financial capability, its needs, and its responsibility for historic emissions). This starts with the middle-range global carbon budget likely to

limit global climate change to "well below" 2˚C, determined by the IPCC. The Tyndall Centre derives the CO_2 budget for the UK from this global budget, based on equity principles that account for our existing level of development and sectoral base, and the local budget is derived from the UK one. The resulting totals are split into five-yearly budgets. The Paris-compliant carbon budgets for Coventry are shown here (Figure 6, and would be used up by the end of 2026 if emissions continue at the 2017 level.

This methodology **only covers CO_2 occurring due to energy use** (whether in transport, buildings, agriculture or other industries). It does not cover the other six greenhouse gases, or releases of CO_2 from activities other than energy use. The reasons are as follows:

- Other gases are left out because "a cumulative emission budget approach is not appropriate for all non-CO_2 greenhouse gases, as [they have] … differing atmospheric lifetimes and warming effects", with more uncertainties around them.
    - There is a parallel methodology named SCATTER[4] that builds on Tyndall carbon budgets to estimate these other gases, and breaks down the local area's emissions into 'scopes 1, 2 and 3' as per the GHG Protocol for Cities (previously explained, above) which Tyndall does not do.
- Other activities are excluded because energy use is the main source of CO_2 emissions and therefore the main activity that needs to be addressed.
    - Emissions from cement production (except fuel use) are excluded because cement production is assumed to be unavoidable to some extent, therefore a deduction for cement is made from the global budget before the UK's budget is allocated.
    - Aviation and shipping are excluded from the local budget, because it is considered that those cannot be fairly allocated to local areas – so a deduction is made from the UK budget to make room for aviation and shipping, before the local budget is allocated.

The Tyndall Centre assumes that global forest levels do not change between 2020-2100, assuming afforestation in certain areas to counteract deforestation in others. It recommends that GHG removals achieved by further afforestation are monitored separately from this budget and used instead to compensate for unavoidable non-CO_2 emissions, such as agricultural methane.

Unlike the Committee on Climate Change national carbon budgets, Tyndall does not assume that carbon capture technologies appear in future, as this would risk over-estimating the budget. If these technologies were to be developed in future, they could expand the size of the available budget.

Offsetting is not part of the budget, because the budget is designed to reveal the actual CO_2 reductions needed from each local area.

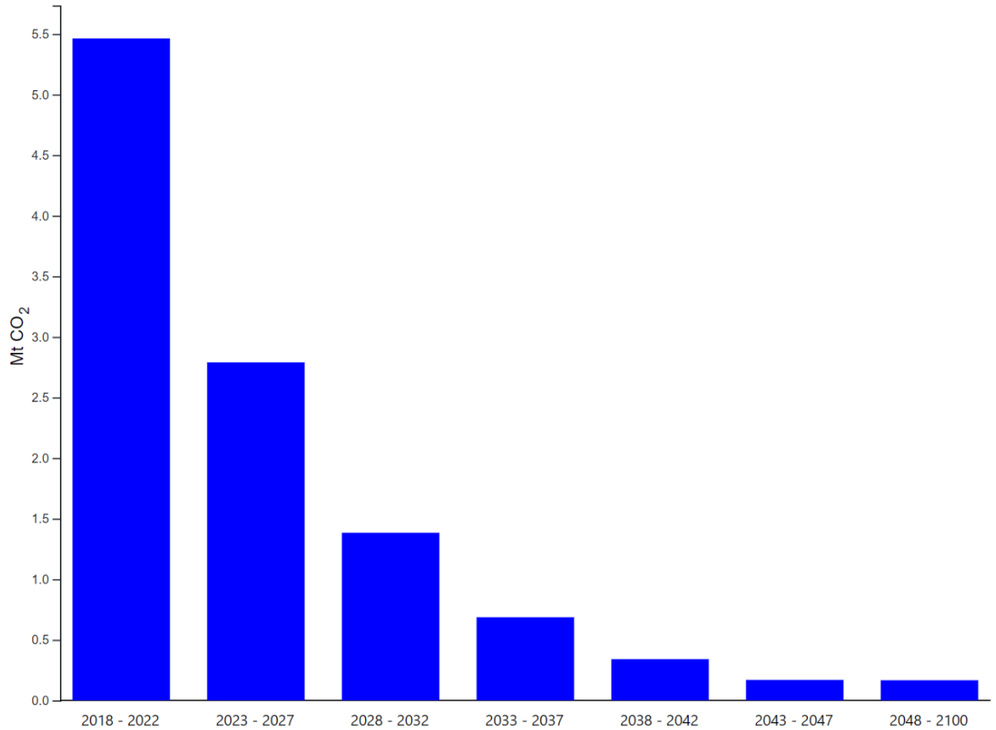


Figure 2: *Cumulative CO_2 emissions for budget period (based on Table 1) from 2018 to 2100 for Coventry*

Figure 6: Coventry's carbon budgets to 2100 (energy-only, CO_2 only) compliant with the UK's commitment to the Paris Agreement. Calculated by the Tyndall Centre.[xxiv]

[4] Setting City Area Targets and Trajectories for Emissions Reduction. https://scattercities.com/. As well as estimating the local area's current emissions, the SCATTER tool and can be used to explore the impact of a range of potential future interventions in the local area (such as expediting the rollout of low carbon heat to existing buildings, or shifting a certain proportion of car journeys to alternative transport modes). The range of potential interventions within the SCATTER tool, if all set to the maximum possible level, result in a carbon reduction transition that SCATTER names the 'high ambition scenario'.

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’[xxv]. 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.

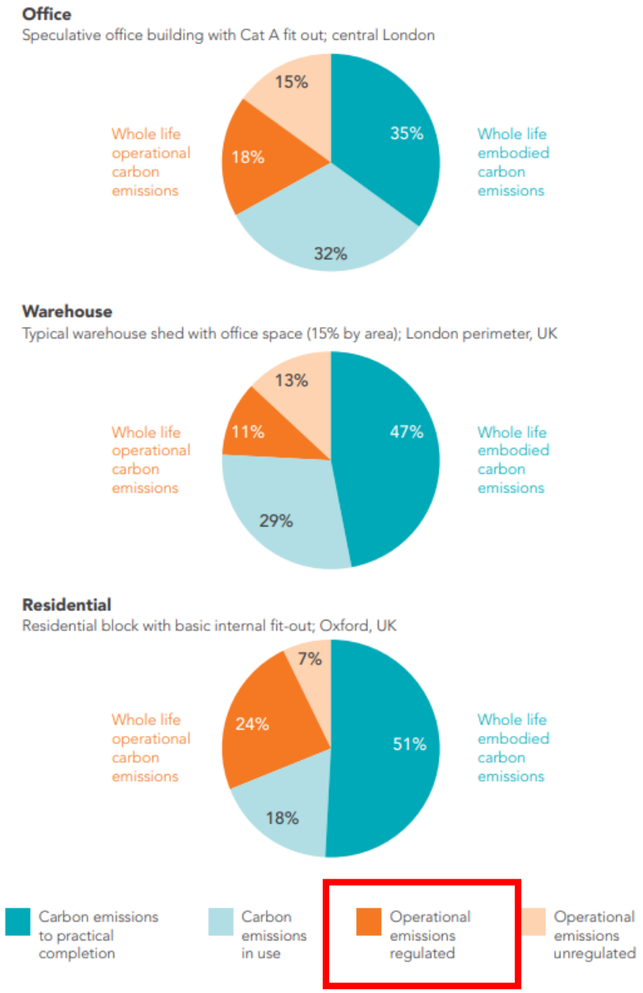


Figure 7: Diagram showing a breakdown of whole-life carbon emissions for three building types. Building Regulations Part L only looks at the orange segments - and even then quite inaccurately. Source: UKGBC.

‘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[xxvi]
- 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[xxvii], 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[xxviii] 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[xxix] confirms that off-site renewable energy supply does not have to be via a long-term power purchase agreement[5], 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.

Please note: We do not advise the adoption of the UKGBC energy procurement guidance as a route to net zero carbon in the planning policy. This is because:

- It is likely to be impossible to set planning conditions requiring the long-term use of a particular tariff by building occupants, as this may infringe on the legal right to switch energy suppliers
- Even if this were legal and acceptable in planning terms, the availability of suitable tariffs changes over time and any specified tariff may make the plan obsolete very quickly.

Nevertheless the UKGBC's conceptualisation of net zero as 'carbon emissions zero or negative on an annual basis' is useful. Knowledge of this early concept by UKGBC and aids understanding of how the industry's thinking has built on this concept since then, including through the LETI definition and UK Net Zero Carbon Buildings Standard (described overleaf).

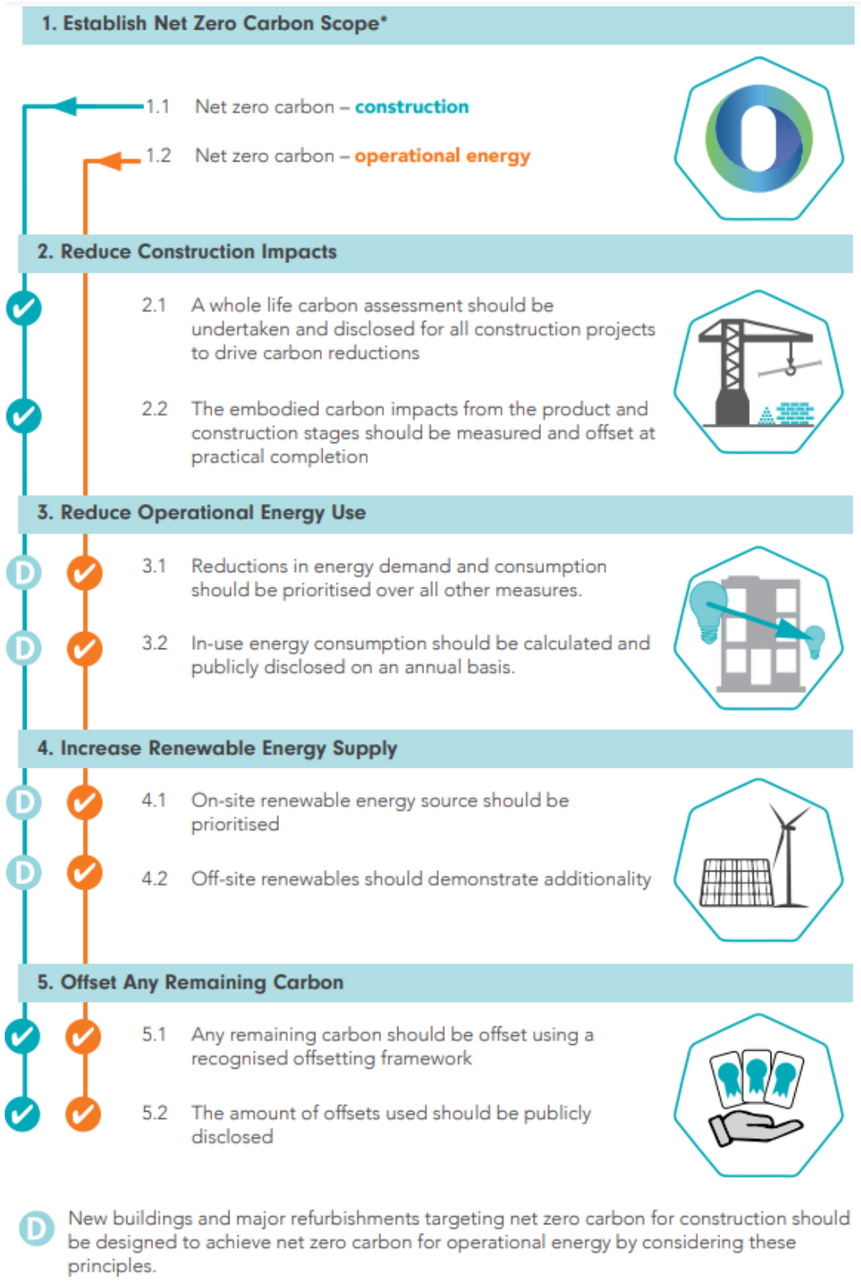


Figure 8: UKGBC Net Zero Carbon Buildings Framework Definition - twin track diagram.

[5] 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.

Low Energy Transformation Initiative (LETI) Net Zero Operational Carbon

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

Its definition[xxx] 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[xxxi]), such as Passivhaus Planning Package (PHPP)[6]
- 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 industry certification 'Passivhaus' (albeit Passivhaus basic certification does not require any renewable energy or 'net zero carbon'). This means the LETI targets are well-aligned to the interventions that would be needed for the Tyndall and SCATTER carbon budgets described previously (as the SCATTER tool 'high ambition' route includes Passivhaus-level efficiency in new builds).

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

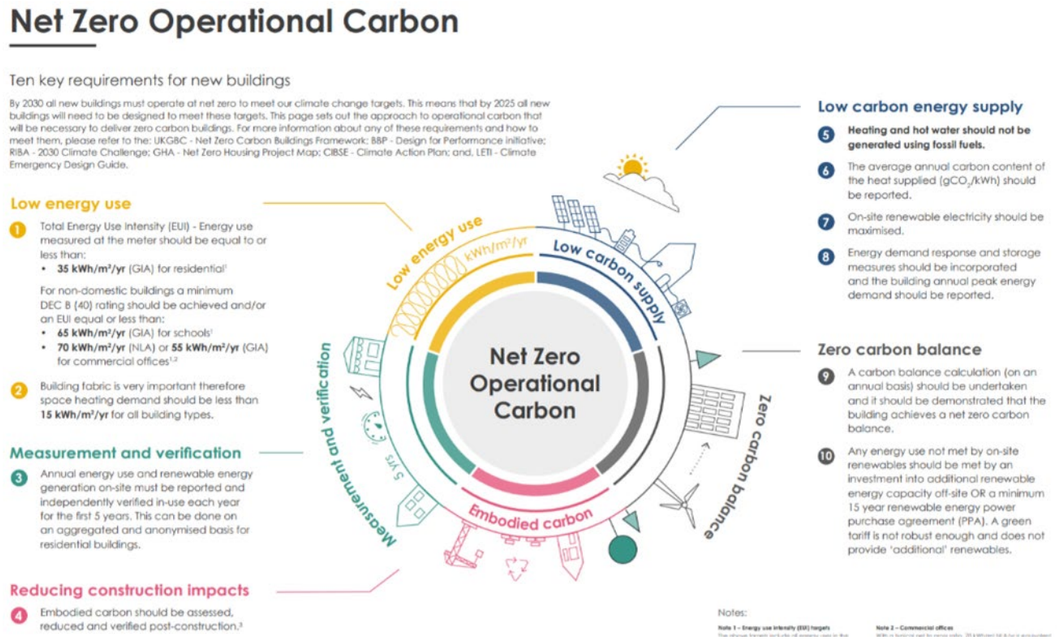
LETI also recommends annual reporting of energy use and renewable energy generation on site for 5 years to verify the net zero carbon status, and that embodied carbon should be separately assessed and reported. It offers separate targets[xxxiii] for embodied carbon, but does not expect the embodied carbon 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[xxxiv].

UK Net Zero Carbon Buildings Standard (Emerging, 2023-24)

Building on the work by LETI and UKGBC, a unified industry definition is in the works by a coalition that includes LETI and UKGBC alongside BRE, RIBA, RICS, and other standard-setting professional organisations in the built environment sector. This "UK Net Zero Carbon Buildings Standard" will align with science-based carbon goals including net zero by 2050 and a 78% reduction by 2035 in the UK. A draft version for beta testing is anticipated in Winter 2023/24; timelines for finalisation are unknown.

[6] 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.



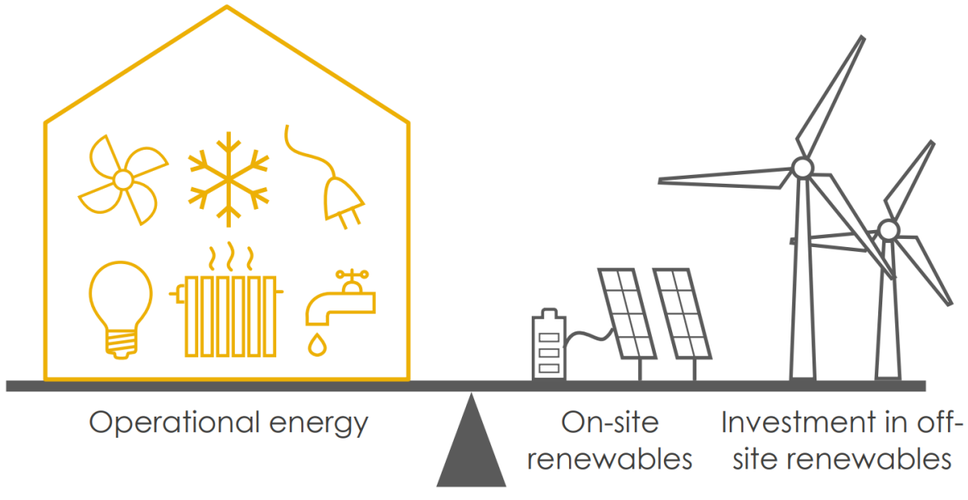


Figure 9: Diagram of LETI net zero operational balance. From LETI Climate Emergency Design Guide

Why must the 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'[xxxv] to be emitted before the 1.5˚C and 2˚C limits will be reached – and a rise of 1˚C has already happened. To stay below 1.5˚C, the world would need[xxxvi] to cut global emissions nearly in half by 2030, compared to the 2010 level. 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[xxxvii].

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[xxxviii] 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[7]).

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).

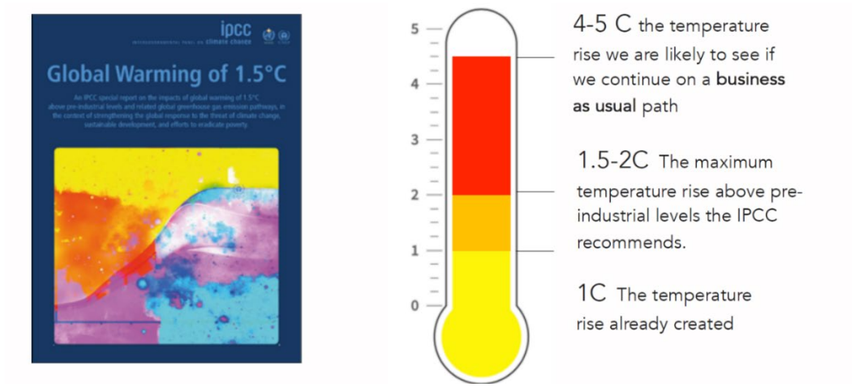


Figure 10: Special Report on 1.5C by IPCC, and diagram of the potential range of climate change to 2100 (Diagram credit: Etude, 2021).

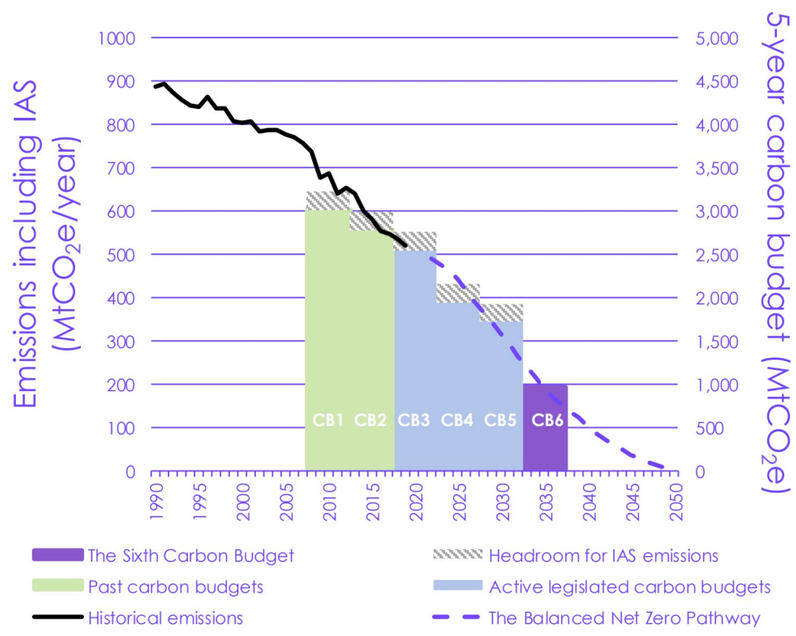


Figure 11: UK legislated carbon budgets under the Climate Change Act. From Committee on Climate Change (2020), The Sixth Carbon Budget: The UK's Path to Net Zero. "IAS" = international aviation & shipping.

[7] 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[8]. 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[xxxix] (and ideally be zero carbon[xl]), instead using low-carbon heat such as heat pumps or gas-free heat networks
- New homes to have a very low space heat demand of only 15-20kWh/m²/year (a 60-70% reduction on a new home that just complies with the previous 2013 building regulations[xli])
- 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[xlii]
- 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[xliii]. 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[xliv] nor make buildings net zero carbon from first operation, nor include any regulation around low-carbon materials or material efficiency.

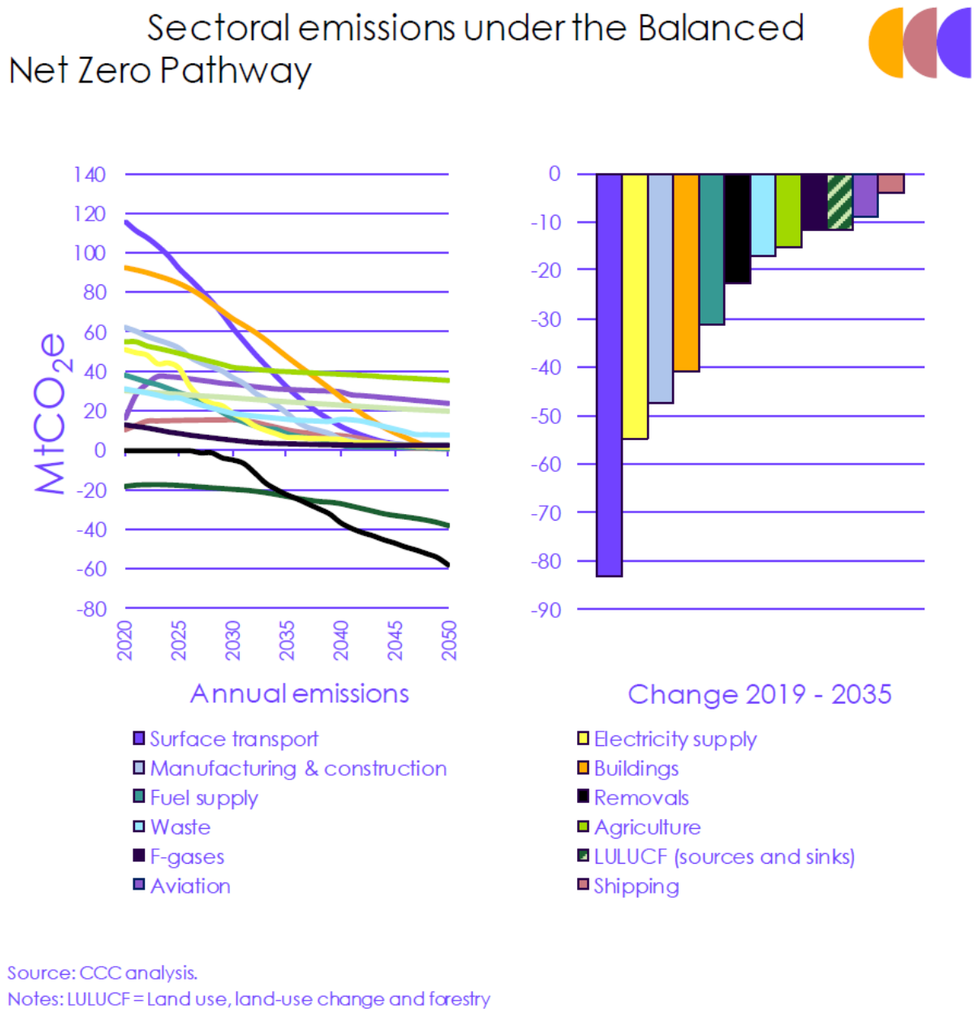


Figure 12: Committee on Climate Change Diagram showing how the carbon emissions of each sector must fall to achieve the 'balanced' pathway towards net zero carbon in 2050 and meet carbon budgets. From Committee on Climate Change (2020), *The Sixth Carbon Budget: The UK's path to net zero.*

[8] 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[8] 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. 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 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 and commitments of Coventry

Recognising the global and national urgency of the climate crisis – and in particular the need[xlv] to cut global emissions by 2030 – Coventry City Council released a draft Climate Change Strategy in February 2023 for public consultation which ran until early July. This strategy is being updated following consultation feedback and an action plan being developed[xlvi].

This 2023 draft Strategy was produced by the City Council in collaboration with the city's Independent Climate Change Board, which includes private and third sector leaders. The draft Strategy's purpose and function is to identify and work towards targets for carbon emissions reduction and climate adaptation, identifying actions not only by the authors but also those needed from third parties and other externals. The work with partners on the Climate Change Board has helped to inform some of the 103 areas of activity in the Strategy, with the aim for this to be developed into collective action across the organisation and partner stakeholders working across the City.

The 2023 draft Strategy refers to evidence produced within the following local or regional documents:

- West Midlands Climate Change Adaptation Plan 2021-26 – This plan was produced by Sustainability West Midlands (a nonprofit membership organisation with members in the private, public and third sectors) in collaboration with the Environment Agency. This document's purpose is to set out "the climate change adaptation actions that should be considered for implementation by decision makers in the West Midlands, to ensure that our natural environment, people, infrastructure, buildings and businesses are prepared for the impacts of climate change, including greater incidence and severity of flooding, a higher likelihood of water scarcity and more intense and prolonged heatwaves".
- West Midlands Circular Economy Route Map (2021) – this recognises the vital role Coventry and Warwickshire has to play in promoting decarbonisation of the manufacturing sector and opportunities within the green industrial revolution. This includes development of the proposed Gigafactory which could provide batteries to enable the UK's switch to electric vehicles by 2030.
- Net Zero Route Map for Coventry (2023) – commissioned by the Council from consultancy 'Your Climate Strategy', led by economics and environmental policy expert Professor Andrew Gouldson. This analysis looks at Coventry's current carbon emissions, then identifies an appropriate local carbon budget consistent with a 'fair share' of the global carbon budget needed for a safe climate future, and actions that need to happen in Coventry to meet this.
- Coventry Local Air Quality Plan Full Business Case (2021) – In 2021 the City was named as one of 28 towns and Cities in England where Nitrogen Dioxide (NO_2) levels from motor vehicles and the burning of fossil fuels were forecast to exceed legal limits. This plan defined a range of a range of activities to improve air quality including improvements to the use of the road space and promotion of active travel such as new cycle routes and integration with transport hubs.
- Coventry's Urban Forestry Strategy 2019 –2029- this strategy highlights the importance of urban trees and forests in serving an ecosystem function for the City helping to cool the City down, clean the air and, contamination in soils, reduce the risk of flooding, improve water quality and enhance the urban visual landscape.
- West Midlands Climate Change Risk Assessment and Adaptation Plan 2021 – 2026 – developed by the Environment Agency and Sustainability West Midlands, this plan was informed by the National Flood and Coastal Erosion Risk Management Strategy for England (2020) and Living Better with a Changing Climate Report (2021) under the Climate Change Act.

Key headlines and suggested commitments within that Coventry draft Climate Change Strategy include, of which the most relevant to planning, split across five 'pathways':

- **Low emissions pathway** – the City Council seeks partners to invest in a plan and develop new technologies such as renewable energy, energy from waste, retrofit, and vehicle electrification.
- **Circular economy pathway** – using the waste management hierarchy with the minimisation of waste and maximising recycling participation rates by the public and businesses across the City.
- **Nature based pathway** – intending to gather more insight to better target resources for biodiversity, and highlighting the need for more stringent planning conditions and monitoring.
- **Resilient pathway** – the Council is working with partners to improve readiness to increased frequency of climate related events like flooding. There is a focus on Sustainable Urban Drainage Schemes and vegetation in built up areas to help cool the city and improve air quality.
- **Equitable & People Centred pathway (renamed "Fairer green" pathway post-consultation[xlvii])** – aiming to partner with other local authorities and the energy sector to upscale energy efficiency retrofitting to improve the many properties with poor energy performance, which also tackles fuel poverty and offers opportunities for workers to reskill.

Drawing the Net Zero Route Map for Coventry and Tyndall Centre analysis, that draft Strategy recognises the concept of local carbon budgets, the need for them, and that the Local Plan should:

- Consider opportunities to further promote energy conservation and renewable energy,
- Promote high quality design that promotes active travel, and
- Minimise the need for private motor vehicles (by ensuring accessibility to other modes).

Logically, the UK's carbon budget must represent a share of the global carbon budget, and the local carbon budget would logically derive from the national one. This requires expert analysis to derive an estimated 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.

The Net Zero Route Map for Coventry (as above) makes one such estimation by dividing the total global carbon budget by global population, and multiplying this by Coventry's population. Its carbon budget thus reflects the total amount of carbon that is acceptable for Coventry to emit, including all sectors and activities. Its figures are in CO_2e, so presumably include all greenhouse gases, not just CO_2. The Route Map and its methodology do not state if any assumption was made about future carbon-removal technology (whereas the UK's national legislated carbon budgets *do* assume this technology will emerge). The Route Map identifies that even all modelled interventions combined would still not quite reach the carbon budget. We here note a few interventions most relevant to plan policy design:

- Existing homes to have internal/external wall insulation, loft insulation or whole-house retrofit
- Heat pumps and solar PV in domestic buildings
- Passivhaus standards in new buildings (homes, offices, retail and others)
- Fabric improvements in existing industrial/warehouse buildings
- Switching large proportions of car journeys to train and bus (ideally electric, but also diesel bus).

The Route Map does not set a specific tree cover goal, but we note that Coventry's Urban Forestry Strategy[xlviii] found it has 15% (as per previously cited figures, this is greater than the national 13% but lower than the 2050 UK-wide 18% needed within the route to the UK's legislated carbon goals).

As previously noted in 'carbon accounting methodologies' section, academic experts at the Tyndall Centre have also conducted a carbon budgeting exercise for all local areas of the UK similar to the Coventry Net Zero Route Map but with different assumptions about the fairest way to derive the local budget, and the activities that should be accounted for at national level rather than local level. Like the Coventry Route Map but unlike the national carbon budgets of the Climate Change Act 2008, the Tyndall Centre does not presume that carbon removal technology will appear in the future. The Tyndall budgets also 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.

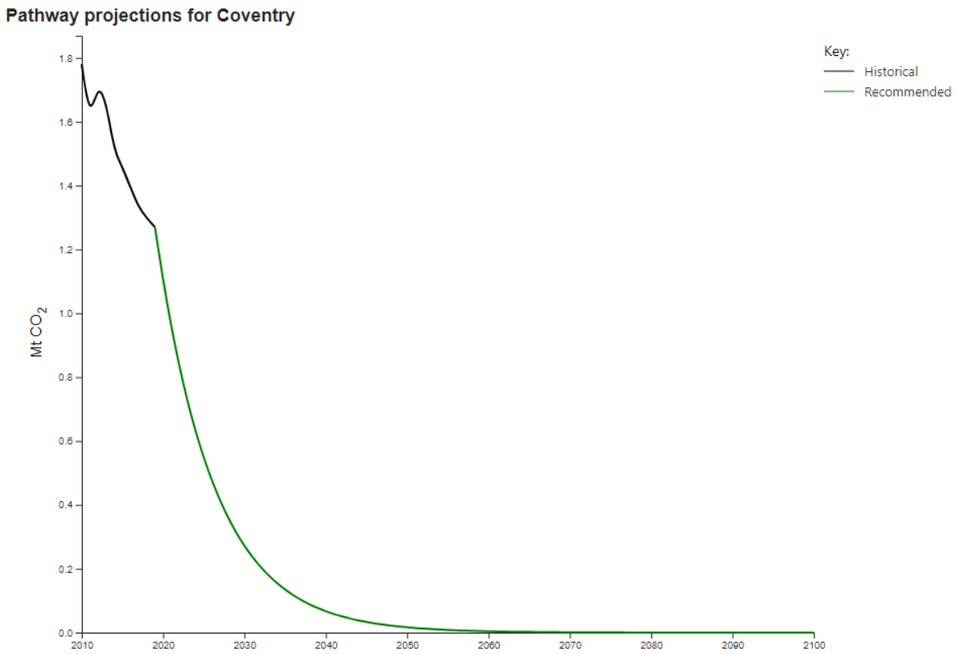


Figure 13: Emissions reduction pathway for energy-only CO_2 emissions to fulfil carbon budgets for Coventry from 2018 to 2100 compatible with the Paris Agreement. Tyndall Centre (2023).

The Tyndall Centre's recommended pathways to net zero within the Coventry carbon budgets are represented in *Figure 9, respectively*. To avoid exceeding the Tyndall carbon budget, Coventry emissions would need to fall as *Figure 9*, starting from the 2018 baseline. This pathway amounts to a required annual 13.1% reduction to energy-related CO_2.

Also, West Midlands Combined Authority (WMCA) of which Coventry is a full member, is committed to a 2041 target that it describes interchangeably as 'carbon neutral'[xlix] or 'net zero'[l]. WMCA noted the Tyndall budget for the WMCA area, but diverged from it because WMCA analysis considered that it was "at the limit or beyond what is technically possible". The WMCA analysis shows 45% of the area's emissions are due to gas use, and that its 2041 goal is feasible depending on rapid rollout of energy efficiency, clean heat, rooftop PV, standalone renewables, car use reduction, and tree cover.

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 the ambitions of Coventry and the wider West Midlands Combined Authority.

A local plan that achieves dramatic carbon reductions will help to avoid contributing to the risk of Coventry's residents being impacted by financial and health-related harms that would come with climate change. The Committee on Climate Change[li,lii] has found (and UK central government has recognised[liii]) 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 Coventry City Council'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.

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

Much of this is also recognised in the Coventry draft Climate Change Strategy 2023, which makes reference to Met Office climate projection data sets for the local area and in response sets the following desirable goals and actions:

- To promote the use of natural courses of filtration as part of the City's Sustainable Urban Drainage Systems and to develop a series of coherent land use policies to promote the use of natural vegetation rather than engineered hard landscaping features which speed up the flow of water and risk of flooding incidents.
- To promote the City's plant a tree scheme and link in with the City's biodiversity objectives and where appropriate consider the further development of wetland areas.
- To promote reflective materials on roofs and where possible the planting of green roofs and green walls to help cool the city down by reducing the levels of absorption of radiant heat.
- Working with the Environment Agency and other bodies to secure funding where needed and rollout of strategic flood defence schemes. Ensure any vulnerable properties that are not protected by such schemes, are prioritised for property-level flood protection measures.
- Working with their partners in health and social care to ensure climate risks to health, buildings and infrastructure that affect hospitals, care homes, GPs and other health and care settings are embedded into corporate risk / business continuity plans.

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[lv], primarily by reducing the level of greenhouse gas in the atmosphere[lvi],[lvii]. 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) December 2023

This document[lviii] 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:

- **157:** "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".
- **158[+footnote 56]:** "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".
- **159:** "New development should be planned for in ways that … help to reduce greenhouse gas emissions, such as through its location, orientation and design".
- **160:** "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[lix] 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[lx] 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[lxi]. (Note: As of 2020, energy storage of over 50MW is now the domain of the local planning authority, except pumped hydro[lxii]).

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 local plan take action towards achieving net zero carbon?

As previously explained[9], 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.

The Act does not define what is a 'reasonable' requirement. In the absence of a definition, this might logically be interpreted as 'technically feasible, viability-tested, and effective in climate mitigation'.

Most definitions and requirements for 'net zero carbon buildings' in existing 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). However, we note that some have used different approaches and these are noted in precedents later in this report.

Town and Country Planning Act 1990

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

- Section 106[lxiii], 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[lxiv] 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[lxv] 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 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.

[9] 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 the county's and district'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 relevant local net zero target date). 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".

National Planning Policy Framework (December 2023 update)

This national policy document, updated in December 2023[lxvi], 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 seem 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)
- 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 157-160 in the previous section, the following paragraphs also become relevant to the question of which interventions are considered appropriate by the NPPF:

- **Paragraph 161**: "Local planning authorities should support community-led initiatives for renewable and low carbon energy, *including developments outside areas identified* in local plans or other strategic policies that are being taken forward through neighbourhood planning."
- **Paragraph 163+a**: "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 164**: **"**In determining planning applications, local planning authorities should give significant weight to the need to support energy efficiency and low carbon heating improvements to existing buildings, both domestic and non-domestic (including through installation of heat pumps and solar panels where these do not already benefit from permitted development rights)."
- **Paragraph 196**: "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 … 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.

Paragraph 164 (as above) is a new insertion as of 2023. This is a positive change, 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.

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 159b**: "Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards."
- **Paragraph 162a** 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 were introduced in 2022 through the new Part S of building regulations.

However: Although the NPPF confirms that the above ways *are* appropriate for the local plan to address climate change, Government has confirmed that the local plan is not limited to only taking the steps described within the NPPF: "The Framework does not set out an exhaustive list of the steps local authorities might take to meet the challenge of climate change and they can go beyond this"[lxvii].

Finally, we note that a small but potentially important change in the NPPF's stance on wind energy development was brought into the NPPF through the 2023 updates. Previously, the NPPF was extremely negative towards wind energy development, saying that any wind energy development should only be approved if it is in an area identified as suitable for such within the development plan, and where it is demonstrated that any community concerns had been "fully" addressed and that the proposal had the community's "backing". The relevant paragraphs now read that:

- **Paragraph 163** ***(emphasis added)***: "When determining planning applications for renewable and low carbon development, local planning authorities should … approve the application if its impacts are (or can be made) acceptable."
    - **Footnote 57 (*emphasis added*)**: "Wind energy development … can also be permitted through *Local Development Orders*, *Neighbourhood Development Orders* and *Community Right to Build Orders*."
    - **+Footnote 58 (*emphasis added*)**: "Except for applications for the repowering and life-extension of existing wind turbines, a planning application for wind energy development involving one or more turbines should not be considered acceptable unless it is in an area identified as suitable for wind energy development in the development plan *or a supplementary planning document*; and, following consultation, it can be demonstrated that the planning impacts identified by the affected local community have been *appropriately* addressed and the proposal *has community support*."

While generally still restrictive towards wind energy development, this now means that wind energy proposals do not have to have the community's universal backing nor to have fully solved every single concern raised by any community member – only that there is general support and the concerns have been *appropriately* addressed. This still presents a hurdle for windfarms that is not applied to other kinds of development, but no longer allows individual community members to unilaterally veto it.

A lack of clarity remains over what constitutes sufficient 'community support'. If central government truly wants to enable local plans to fulfil their legal duty to mitigate climate change, it could be argued that this footnote should be adjusted to relax barriers experienced uniquely by onshore wind development and so that the technology has equal opportunities for growth as it will be more needed as other kinds of development place ever greater demands on the energy system. 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[lxviii].

We also note that the previous NPPF consultation[lxix] which ran from 22 December 2022 to 2 March 2023, in the context of the Levelling Up and Regeneration Bill, had also proposed to potentially remove the option of 'Supplementary Planning Documents' in their current form as a document subservient to the local plan itself (and with less material weight). In their place it was proposed to replace these with 'Supplementary Plans' which would essentially be more agile, rapidly-produced bolt-on additions to the local plan, with similar weight to the local plan itself but most likely with much narrower focus. If so, these might have been similar to single-issue DPDs (Development Plan Documents) that some local planning authorities have used in the past. In the proposals, existing SPDs would expire after a new-style plan has been adopted. This potential replacement of SPDs was 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.

However, the current NPPF (December 2023) still makes reference to SPDs (including the definition of these that reflects their existing role). Therefore it appears SPDs still have a role to play for now. That proposed change may still occur in future as part of wider changes occurring under the aegis of the Levelling Up & Regeneration Act 2023.

Planning Practice Guidance (PPG)

The PPG section on Climate Change[lxx] 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 report]
- **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. This part of the PPG reflects an obsolete Written Ministerial Statement made in 2015, which was replaced by a new Written Ministerial Statement in December 2023 (WMS2023), but at the time of writing this report, the PPG has *not* yet been updated to reflect this.]
- **For non-residential buildings, the PPG expresses that the plan is not restricted or limited** in setting energy performance standards above the building regulations. However, this could be now out of line with the WMS2023, depending on interpretation of the WMS' unclear language: the WMS refers to "buildings" which could be interpreted to mean any building, but the WMS' stipulations are expressed using metrics (SAP) and terms (affordability) that are only relevant to homes.
- **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[lxxi] 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[lxxii]]
- **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[lxxiii] 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[lxxiv] (such as Section 106 payments) notes that:

- Obligations are subject to tests (necessity, scale and direct relation to development).
- 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
- The Community Infrastructure Levy "is the most appropriate mechanism for capturing developer contributions from small developments".
- Obligations should not be sought where development consists only of a residential extension.

Other government outputs that constitute 'relevant statements of national policy' and therefore may affect how local plans can wield powers

Written Ministerial Statement on Planning Update (WMS2015) [lxxv]

In 2015, Government announced that it would update building regulations to have on-site carbon emissions equivalent to the withdrawn Code for Sustainable Homes Level 4 (a 19% reduction on the emissions rate of Part L 2013). It stated that on this change, it would remove local plans' Energy and Planning Act powers to require higher energy standards. It stated that meanwhile, local plans should not set policy requiring any level of the Code nor other standard in layout, performance or construction and that local authorities were 'expected' not to set conditions requiring more than the 19% reduction.

This, along with the tension between the duties for carbon and viability/housing delivery, has caused many to discard policies – or else to adopt only nominal 'zero/low-carbon' policies that stop far short of requiring carbon improvements to the extent that would have been technically feasible.

However, these changes to building regulations and the Energy and Planning Act are, as yet, still not implemented. As a result, the 2015 statement should carry limited weight with the planning inspector. There has since 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%). London (among others) also requires other standards relating to 'construction, internal layout or performance' such as the Home Quality Mark or BREEAM, despite the 2015 ministerial statement. Developers in these locations have for many years proven able to consistently comply with these higher standards.

The 'interim uplift' to Part L of building regulations in force since June 2022 (see 'Future Homes Standard consultation response') now makes the 2015 Ministerial Statement obsolete, because the new Part L already delivers a carbon saving greater than the supposed 19% limit. Relatedly, a recent planning 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 quite clearly more relevant.

Similar views appeared in the Inspectors' reports on several recent successfully adopted plans that further diverge from the WMS2015. Bath & North East Somerset Council, Cornwall Council and Central Lincolnshire Council recently adopted ground-breaking new housing policies that require an on-site net zero energy balance and specific absolute targets for energy efficiency. These plans were supported by evidence of feasibility and viability. The Inspectors' examination reports considered the 2015 WMS and found it no longer relevant. Bath also received a letter from Government reaffirming local plans' power to exceed Building Regulations standards. Correspondence with Bath indicates no drop in housing applications in 2023 (with the policy) compared to 2022 – in fact, the number was higher in 2023.

Legal advice[lxxvi] in the 'net zero evidence' suite produced for Essex Design Guide (to support more effective 'true operational net zero' policies) 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 [that] 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".

Additionally, an inspector's decision to reject a similar policy in Salt Cross Area Action Plan due to the WMS2015 was recently overturned (February 2024) in the High Court[lxxvii] on the basis that the decision placed too much weight on the WMS2015 which had been overtaken by Part L 2021.

Finally, it is also important to note that **this WMS of 2015 was then overtaken and replaced by a subsequent WMS of 13th December 2023.** That latter WMS is discussed overleaf.

Written Ministerial Statement on Energy Efficiency 2023 (WMS2023)

On 13th December 2023, a new Written Ministerial Statement (WMS) was made by Lee Rowley (Minister of State for Housing) together with Baroness Penn (Parliamentary Under Secretary of State for Levelling Up, Housing and Communities). Its topic is "Planning - Local Energy Efficiency Standards".

The new WMS2023 attempts to place severe new limitations on the exercise of existing powers held by local planning authorities to require improvements in the energy performance of new buildings.

What does the WMS2023 say?

The WMS2023 does not remove the ability to set improved local standards, but purports to constrain them in this way:

- Energy efficiency policy must be expressed as % reductions on a building's TER (Target Emissions Rate set by Building Regulations), using a specified version of SAP.
- Policies that go beyond national building regulations should be "applied flexibly to decisions … where the applicant can demonstrate that meeting the higher standards is not technically feasible, in relation to the availability of appropriate local energy infrastructure … and access to adequate supply chains."

The above would affect how the plan can exercise its power to require energy efficiency standards beyond those of building regulations (a power granted by the Energy & Planning Act 2008).

This WMS therefore undermines several recent adopted local plan precedents that used other more effective metrics to deliver buildings suitable for the UK's carbon goals, such as energy use intensity and space heat demand (Cornwall, Bath & North-East Somerset, and Central Lincolnshire).

The WMS also states that any such energy efficiency policies should be rejected unless they have a "well-reasoned and robustly costed rationale that ensures that development remains viable, and the impact on housing supply and affordability is considered in accordance with the National Planning Policy Framework". This is not really new – any new policy should typically come with such justification. Still, this reiteration in the WMS is likely to bring additional scrutiny to any evidence put forward.

What impact does the WMS2023 therefore have on local plan climate mitigation efforts?

For new buildings, the WMS2023's stipulations make it much harder to fulfil local planning authorities' legal duty to mitigate climate change (Planning & Compulsory Act 2004) and the expectation laid on them to support "radical reductions in greenhouse gas emissions … [taking] a proactive approach … in line with the objectives and provisions of the Climate Change Act 2008" (National Planning Policy Framework).

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

1. **Pushing the use of a *carbon* metric, when contrarily the goal is *energy efficiency*.** The biggest problem is that the WMS asks for energy efficiency policies to be expressed using the Part L TER metric – but TER is in fact not an energy efficiency metric. As the acronym suggests, TER is instead a *carbon emissions* metric. It is unclear why this choice was made in the WMS, given that the Part L methodology (SAP) does also contain two energy efficiency metrics: the TFEE (Target Fabric Energy Efficiency) and TPER (Target Primary Energy Rate). Additionally, as previously noted, the SAP methodology is notoriously poor at estimating the actual energy performance of a building, and therefore any of the SAP metrics would not reliably ensure that buildings have the absolute energy efficiency performance that is known to be a necessary part of the UK's legally binding carbon goals. That unsuitability is why several recently adopted precedents (Cornwall etc, as above) had used alternative metrics that are effective for delivering energy efficiency and measuring whether a building is 'net zero'.
2. **Forcing the use of a 'specified version of SAP' for the required metric:** SAP is the method used to calculate all target metrics set by Part L of Building Regulations, including the TER metric named by the WMS. SAP is updated more often than Part L. SAP updates can include anything from changes to the assumptions about the baseline building characteristics or the performance of standard types of equipment, through to changes in the carbon intensity of grid electricity. The current version is SAP10.2. Some precedent local plans had previously overcome this issue by stating that calculations must simply use 'the latest available version' of SAP. That way, the policy does not go out of date each time a new version of SAP is released.
    a. The WMS does not make clear whether it would be acceptable to say 'the latest version of SAP', or if it would have to be 'SAP10.2' or similar. If the latter, then the WMS would require the policy to be at risk of going out of date very quickly.
    b. SAP is due to be replaced with a new model, HEM (Home Energy Model) in 2025 when the Future Homes Standard (FHS) is introduced. This too would put local policy out of date unduly quickly if written only for a 'specified version of SAP' to placate the WMS. The HEM recently underwent consultation alongside the FHS consultation – therefore HEM's final form, function and outputs are not yet known. Thus it is not yet possible to write a policy that uses HEM metric for targets, as it could not currently be robustly assured that these would be feasible or their cost uplifts assessed, even if the WMS had not failed to acknowledge HEM's imminent introduction.
3. **Creating a hostile climate towards buildings energy and carbon improvement policies:** Beyond constraining on how policy is expressed and implemented, the WMS sets a tone that is generally discouraging (albeit not prohibitive) towards any local policy that goes beyond "current or planned building regulations", stating that the government does not "expect" this. This negative stance is likely to be used in objections from developers in local plan consultations and examination. However, the WMS does not actually prohibit the use of such policies so long as they are well-justified. The Council should prepare to strongly and accurately counter any such claims that the WMS contra-indicates any such local energy policy.

What is the status of the WMS compared to the legal duties and powers, and must it be followed?

The National Planning Policy Framework confirms that Written Ministerial Statements are one of the "statements of government policy [which] may be material when preparing plans or deciding applications". However, being a 'material issue' does not make a WMS incontrovertible.

Legislation holds far more material weight than a WMS. Therefore, it might be possible to diverge from the WMS' stipulations if a strong case can be made that following the WMS would prevent the local authority from fulfilling its legal obligation to 'contribute to the mitigation of climate change' imposed by the Planning & Compulsory Purchase Act. This argument could be further strengthened by similar evidence relating to the ability to meet the NPPF expectation for 'radical' carbon reductions *in line with*

the Climate Change Act. The NPPF, too, should hold far more material weight than the WMS, as the NPPF undergoes extensive public consultation before adoption – whereas the WMS2023 was released without any consultation or democratic process. There may also be other formal statements of national policy (e.g. around energy efficiency targets) whose achievement the WMS2023 would inhibit.

Government has not indicated that there was any assessment of how the WMS would affect the ability to fulfil those climate mandates, nor advised which should take priority where they are in conflict.

The most robust evidence for this argument is energy and cost modelling to demonstrate the difference that would occur as a result of following the WMS stipulations as opposed to using the more accurate energy metrics. For example:

- The difference in carbon emissions, thus moving the buildings sector's carbon reduction trajectory even further from what it needs to be within the 'balanced pathway to net zero' as analysed by the Committee on Climate Change to comply with the UK's legislated carbon budgets (set under the aegis of the Climate Change Act)
- The difference in energy efficiency compared to what the Climate Change Committee has shown to be necessary as part of the UK's wider energy system transition needed for all sectors (not just buildings) in order to meet the legislated carbon budgets as above. This may also be relevant to any other local plan objectives about the affordability of home running costs, as opposed to the up-front price of buying or renting a home.

Even with such evidence, there remains a risk that it may be challenging to fully express this argument to the Inspector in the time available at examination, as it is a highly technical topic to explain, both in written form and verbally, to anyone not already expert in net zero carbon building design. The WMS states that such policies may draw close scrutiny from central government, meaning the Council may have to defend against not only the usual objectors but also central government pressure to comply with the WMS.

Regarding the WMS' effect on local plans' powers, we note a recent High Court decision[lxxviii] (February 2024) overturned a planning inspector's decision based on a *different* WMS. The decision confirmed that the WMS "cannot mis-state the law, or restrict the legal powers of the LPA under the 2008 [Planning & Energy] Act." This should therefore also be true about the WMS2023. However, that decision also notes that the Planning and Energy Act includes a clause saying that local policies using the powers of that Act 'must not be inconsistent with relevant national policies for England'. It is therefore difficult to predict how this would be interpreted by a planning inspector or the court, as there would appear to be something akin to a 'circular reference' in that the Planning and Energy Act could be interpreted to contain within it a clause allowing 'national policy' to invalidate the exercise of the powers that it grants, although the Act itself – as a piece of formal legislation – holds primacy over the ill-defined set of items that could be considered to constitute 'national policy'.

However, we note that legal challenges are underway against the WMS2023. A non-profit and local authority have won permission from High Court[lxxix] to hear their case that the WMS2023 is an unlawful overreach of Government power. Similarly, the Secretary of State had to defend itself in pre-action legal correspondence against a similar case raised in a pre-action letter by a coalition of local authorities and had to concede that the WMS is only a material consideration (not a concrete constraint) and cannot limit the use of powers granted to local planning authorities in legislation. Meanwhile, Good Law Project has also begun a public campaign[lxxx] to pressure Michael Gove to revoke the WMS, and Essex County Council has updated its open legal advice[lxxxi] to explain why the 2023 WMS should not legally be interpreted as a binding constraint from which local policy cannot diverge with sufficient justification. If successful, these legal challenges could reopen the door for the Council to revert to the more effective policy later on.

What can the Local Plan still do if the WMS2023 were strictly interpreted?

The WMS only relates to *energy efficiency* policies, not to policies on *renewable energy, embodied carbon*, or *overall carbon reductions*.

Therefore, policies on renewable energy could still:

- Require a certain proportion of energy use to be met with on-site renewable energy provision.
  - Define 'energy use' to mean *total* energy use, not just the regulated energy use as calculated by building regulations
  - Support this with feasibility and cost evidence – noting that several other local plans' similar requirements have been shown to be feasible, albeit those required that energy efficiency targets were met before calculating the amount of renewable energy needed.

And policies on embodied carbon could still (with suitable feasibility and viability evidence):

- Require reporting of embodied carbon, and/or
- Require new development to stay within certain target limits on embodied carbon
  - Support this with suitable feasibility and cost evidence – either from the local context, or pointing to suitably relevant data from other recent local plans' evidence bases.

These embodied carbon requirements might need to apply over a certain threshold so as to ensure the cost of the embodied carbon assessment itself is not prohibitive and that smaller sites are not held back by any shortage of professionals able to undertake the calculation.

Meanwhile, policies on *energy efficiency* – which is what the WMS affects – could either:

- Comply with the WMS by expressing the policy as a requirement to 'achieve a certain % carbon reduction on the Part L 2021 Target Emission Rate *through energy efficiency measures*' (see examples later in this report, e.g. London Plan 2021; this would require a definition of what is an 'energy efficiency measure'),
  Or
- With sufficient evidence to justify diverging from the WMS - continue to use metrics that are not endorsed by the WMS, including:
  - A fixed or relative improvement on the Target Fabric Energy Efficiency metric calculated by Part L SAP10.2 (less risky, as this is still a metric from national technical standards),

    Or
  - Fixed targets for space heat demand and energy use intensity, set to align with the performance known to be necessary for the UK's carbon budgets as previously noted; see later section of this report for examples of how existing and emerging local plans have formulated similar policies – these are now more risky in light of the WMS).

The above array of potential post-WMS2023 policy options was further developed and evaluated through our separate 'Policy risk matrix' report, which aided Coventry in deciding the policy approach set out in the later 'Policy recommendations' section.

Written Ministerial Statement on brownfield development, February 2023

A statement was made by Michael Gove on 19th February 2024[lxxxii] which could make it difficult to implement some policies on sites that are recognised as brownfield (previously developed land).

This approach was also previously announced on 13th February 2024 via a press release[lxxxiii].

This Statement indicates the Government's intent to introduce a 'presumption in favour of brownfield development' in 'the twenty most populous cities and urban centres in England'.

Based on the accompanying consultation paper[lxxxiv], the national policy changes would mean:

- In planning decisions, additional weight would be given to the benefits of housing delivery on brownfield sites (in all local planning authority areas)
- A 'presumption in favour' for development proposals on brownfield sites where the local authority is failing to meet at least 95% of its housing requirement.
- Any policies relating to the *internal layout* of development, including daylight and sunlight policies, should be applied flexibly on brownfield so that they do not "inhibit making the most efficient use of a site (as long as the resulting scheme would provide acceptable living standards)". This would apply to all local planning authority areas.

The latter point should not strongly affect the ability to implement *carbon*-related policy, as this is not strictly a policy about 'internal layout', nor external layout and appearance or other policy standards. However, the consultation also asks a question about whether the consultee agrees that 'internal layout' should be the only kind of policy that has to be made flexible in this way. It is therefore not impossible that the Government's future policy direction could be further extended to include any other policies that could potentially add to the cost or perceived complexity of brownfield sites.

However, the 'presumption in favour' principle, depending on how it is interpreted, could make it more difficult to refuse brownfield housing schemes that fail to comply with carbon or energy policies.

The press release linked above also notes that the Government is extending Permitted Development Rights. This may make it difficult to impose carbon and energy-related policy expectations on changes to existing buildings, especially in the case conversion from commercial to housing.

‘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:** 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**: Government intends that the Future Homes Standard (FHS) from 2025 will deliver 75-80% reduction in homes’ (regulated) carbon emissions versus the Part L 2013 rate, and 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 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 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, but does not say that this still applies, and recognises that many local plans exceed this.

The response document also lays out an indicative specification for the ‘notional building’ for the 2021 & 2025 Part L. This is the imaginary building with several energy efficiency and renewable energy measures, whose carbon emissions rate the proposed building must not exceed. See table below. It was later confirmed (December 2021) that the response document formed a piece of official government policy.

Part L Interim uplift 2021 (changes vs 2013)	Part L Future Homes Standard 2025
Minor improvements to roof, windows, doors Solar PV panel m^2 equal to 40% of ground floor Wastewater heat recovery system Still has gas boiler as basic assumption	Major improvements to walls, roof, floors, windows, doors Low carbon heat system (air source heat pump) Solar panels and wastewater heat recovery are not part of notional building spec
Result: 31% reduced target emissions rate compared to 2013	**Result: 70-80% reduced target emissions rate compared to 2013 (low enough to rule out gas boilers)**

Table 2: Comparison of Part L 2021 (compared to Part L 2013) and indicative Part L 2025 (Future Homes Standard) as indicated by Government's Response to the Future Homes Standard Consultation, 2021.

Future Homes Standard second consultation (2023-24)[lxxxv]

In December 2023, Government commenced a new round of consultation on the standard that is to be adopted for new homes’ energy and carbon from 2025. As this is a consultation only, looking at multiple options for future regulation, its contents presumably do not yet constitute a formal statement of national policy. This consultation runs until 6th March 2024, therefore it is unlikely that Government will digest the responses and release its response (which would constitute a national policy statement) in time for it to be considered within the present scope of net zero carbon local plan support work for Coventry.

However, we here summarise the content of the current consultation to inform Coventry of the potential future national policy direction that could be implied. This could further strengthen the evidence of need for local policy, because the current approaches described in the FHS consultation do not meet the standards needed for the national carbon budgets as described previously.

This new consultation puts forward two options that Government may adopt as the Future Homes Standard, both of which are significantly weaker than the previously drafted standard that had been described in 2021. Essentially, these are the weakest two options from the range of six ‘Contender Specifications’ that had been devised[lxxxvi] by the Future Homes Hub (a collaboration involving major developers along with various industry professional bodies and central government observers).

The two options now on the table are shown in Table 3. Please note the ‘DFEE’ and ‘space heat’ figures are not taken from the consultation itself, but rather from prior analysis by the Future Homes Hub[lxxxvii].

We note that the consultation also proposes to replace the SAP calculation methodology with a new model titled HEM, the Home Energy Model, which is intended to be more transparent and adaptable.

Table 3: Future Homes Standard options consultation 2023-24 , compared to current standard and previously indicated FHS

Part L 2021 (today’s standard)	FHS (as previously indicated in 2021)	FHS (2023 consultation) Option 1	FHS (2023 consultation) Option 1
Fabric: [see Table 3]	Fabric: [see Table 3]	Fabric: All U-values identical to Part L 2021. Small improvement to airtightness.	Fabric: No changes therefore no improvement on Part L 2021.
Heat: Gas boiler.	Heat: Air-source heat pump.	Heat: Air-source heat pump and wastewater heat recovery	Heat: Air-source heat pump.
PV: Equal to 40% of ground floor area.	PV: None.	PV: Equal to 40% of ground floor area.	PV: Removed; none.
Results: **[Carbon - see Table 2]** • **Heat bill/year: £640** • **DFEE: 19.3 – 55.9 kWh /m^2 /year**	**Results:** **[Carbon - see Table 2]** • **Heat bill/year: Unknown** • **DFEE: 13.5 – 51 kWh/m^2/year**	**Results:** • **Carbon emissions in semi-detached home: 0.05t/year** • **Heat bill/year: £520** • **DFEE & space heat demand unknown, as this Option does not match any of the Future Homes Hub Contender Specifications**	**Results:** • **Carbon emissions in semi-detached home: Not given.** • **Heat bill/year: £1,220** • **DFEE: Identical to Part L 2021.**

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[lxxxviii]. 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[lxxxix].
    - 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?

Coventry's local existing policy context

The Coventry Local Plan was formally adopted in December 2017 following receipt of the Planning Inspectors Report. The existing Local Plan contains two policies that reference meeting carbon reduction targets specifically.

- Policy EM2: Building Standards
- Policy EM3 Renewable Energy Generation

Policy EM2 states new development should be designed and constructed to meet the relevant Building Regulations, as a minimum with a view to:

a. Maximising energy efficiency and the use of low carbon energy
b. Conserving water and minimising flood risk including flood resilient construction
c. Considering the type and source of the materials used
d. Minimising waste and maximising recycling during construction and operation
e. Being flexible and adaptable to future occupier needs
f. Incorporating measures to enhance biodiversity value

Policy EM2 also expects development to meet carbon reduction targets set out in Building Regulations and should following the energy hierarchy of be lean, be clean, be green.

Policy EM3 states that proposals for the installation of renewable and low carbon energy technologies, including both building-integrated and standalone schemes will be promoted and encouraged, provided that:

a. any significant adverse impacts can be mitigated
b. where biofuels are to be utilised, they should be obtained from sustainable sources and transportation distances are minimised
c. any energy centre is suitably located and designed to a high quality such that it is sympathetically integrated with its surroundings
d. all proposals are consistent with any relevant Policies in this Plan.

The above summary indicates that although Coventry's existing adopted Local Plan includes policies that generally encourage the improvement of climate performance in new developments, it does not exercise its powers to *require* specific standards to meet or specific quantifiable degrees of energy efficiency, renewable energy provision or other measure of carbon reduction.

Other relevant Coventry policies beyond the local plan

The City Council and its partners on the Independent Climate Change Board are committed to addressing the UN's 17 Sustainable Development Goals and have adopted the International Council of Local Environmental Initiatives' five Development Pathways. The Coventry City Council emerging climate strategy consulted in 2023 is an important part of the 'One Coventry Plan 2022-2030' highlighting priorities for the year 2030 and hoping to achieve a 55% reduction in Carbon emissions to 1990 levels. Coventry City Council is targeting reaching net zero emissions by 2050.

The five development pathways to sustainability identified are:

1. **Low emission – new economic opportunities**. Priorities for this workstream include:
    a. Establishing joint venture for design and plan of energy generation, storage, and infrastructure
    b. Gaining funding for retrofitting homes to EPC C or above
    c. Promoting training and development of relevant skills
    d. Developing renewables projects on the ground e.g., rooftop PV and solar farms
    e. Establishing improvement to the zero carbon public transport infrastructure and services across the city
2. **Nature-based – enhance the biodiversity and urban ecosystems**. Focus for the Council in this area includes:
    a. Data gathering on distribution of species/habitats and applying prioritisation in the planning system
    b. Conversation management of open spaces/parks reengaging volunteers
3. **Circular economy – new models of production and consumption**. Priority areas for the Council include:
    a. Focusing on the waste hierarchy and participation in recycling
    b. Supporting businesses with energy management and focusing on repair/reuse opportunities
4. **Resilient – anticipate, prevent, absorb, and recover from shocks**. For Coventry this equates to:
    a. Focussing on climate resilience including urban heat island and air quality
    b. Focussing on flood resilience noting the area is significantly water stressed
5. **Equitable and people centred – inclusive urban communities and addressing poverty**. Priorities for the area include:
    a. Addressing inequalities from climate change impacts such as health risks, food and fuel poverty, support for low-income households
    b. Developing partnerships with other City Councils and Housing Associations to retrofit social housing across the city

The report highlights the need to retrofit domestic properties, which account for approximately 30% of all emissions, with the number of properties with households on low incomes below a C Energy Performance Certificate (EPC) rating at over 13,000. The Council are working with other City Councils in the area and local Housing Associations to speed and scale up the retrofit programme.

The draft Climate Change Strategy aims to provide context and the path for future action in the city with over 103 areas of activity outlined, organisation wide and involving partner stakeholders.

Emerging Coventry local plan policies to date

Emerging Coventry policies signify a starting point for policy improvements to be made. Initial proposed policy wording changes to the Local Plan underwent Regulation 18 consultation in Summer 2023. These proposed changes cover the policies of Chapter 12: Environmental Management, Minerals and Waste of the Local Plan.

Key points from the emerging proposed changes include amendments to:

- Policy EM1: Planning for Climate Change. It was proposed to amend this to ensure alignment with the approach and direction of COP15, COP26, NPPF (2021) and the Council's published draft Climate Change Strategy (2023). Policy EM1 proposed changes express an intent to work towards achieving net zero in all new homes and set targets for topics such as green infrastructure and biodiversity. The Council will develop an Adaptation and Resilience Plan for the city, considering the West Midlands Combined Authority Climate Change Adaptation Plan.

- Policy EM2: Building Standards. The proposed changes acknowledge that the existing policy will likely be replaced with a new approach to address recent updates to national Building Regulations. The proposed changes recognise that any policy amendments will need to account for the introduction of the Future Homes Standard in 2025. The FHS will stipulate a 75-80% reduction in carbon emissions for new homes on Part L 2021 building standards.

- Policy EM3: Renewable Energy Generation. The proposals acknowledge that there will need to be an increase in renewable energy generation and associated infrastructure across the city. They also mention scope for a level of mandatory inclusion of renewables including **roof top solar or small-scale ground mount such as carports**. Policy EM3 updates support decentralised energy networks and encourage development proposals of new additional utility networks and enhancements to existing utility networks. This is critical to enabling zero carbon, resource efficient, resilient and adaptable buildings and transport, with the appropriate energy supply capacity for expected future demands.

- The remaining policies of Chapter 12 were acknowledged to require minor technical updates to align with current policy, including the NPPF (2021). Policy EM4 Flood Risk Management will be amended to reflect the increased likelihood of flood events as a result of climate change and more intense rainfall. Minor technical amendments will also be made to Policy EM5 Sustainable Drainage Systems and Policy EM6 Redevelopment of Previously Developed Land.

The Climate Change and Sustainability Topic Paper published in July 2023 (as part of the local plan Regulation 18 consultation as above) clarifies that the intended policy approach is to seek to go beyond current proposals for changes to Building Regulations as part of the Future Homes Standard. It notes an intent to consider all energy used in buildings to deliver homes that are true net zero carbon from an operational emissions perspective, as well as considering the carbon associated with the materials used to construct those buildings, which is an aspect not included within Building Regulations. This would be relevant to policies EM1, EM2 and EM3. The paper identifies two key target metrics for operational energy:

- Space heating demand of 15-20 kWh/m^2/yr.
- Energy Use Intensity target of 35-65 kWh/m^2/year, varying by building type.

A range of best practice examples from other local authorities are next detailed throughout the rest of this section in the present report, to highlight precedents and approaches to implementing net zero carbon policy effectively.

Reductions on the building regulations baseline carbon emissions (TER)

Using powers granted by the Planning and Energy Act, most existing local plans that have 'low carbon' or 'net zero carbon' policy requirements lay these out 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[xc]. 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 further evidences the invalidity of that WMS (a fact also confirmed by the previously discussed 2023 WMS).

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.

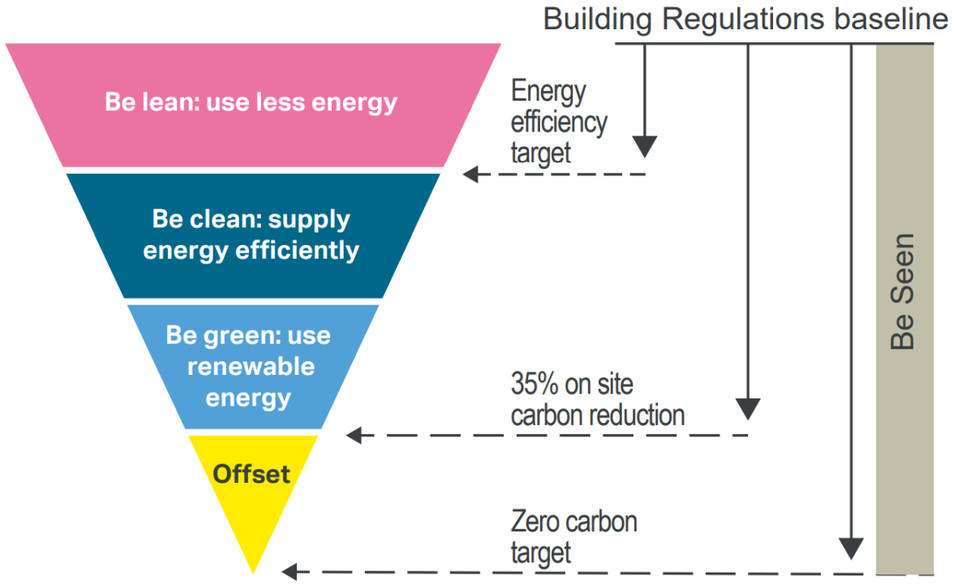


Figure 14: New London Plan (2021) Diagram of the energy hierarchy to reach 35% on-site reduction compared to baseline carbon emissions rate set by Building Regulations Part L 2013.

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 energy-based approaches based on Energy Use Intensity (as opposed to carbon-based approaches, although the energy-based approach is still designed to deliver buildings that have zero operational carbon emissions).

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[xci]. 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 so long as efficient and effective ventilation is also provided).

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 5-15% against the emissions rate set by Building Regulations. In the examples we cited, this contributes part of the total required % improvement on the Part L baseline, set to ensure that energy efficiency played a role within that total target. These targets may now be outdated as they were set to reflect good practice already being achieved locally at the time.

An alternative could be a target improvement on the 'Target fabric energy efficiency' (TFEE) set by Part L via SAP. The TFEE is the legal limit on how much heating and cooling a home needs per m^2, based on the *fabric* not 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 and reduce the risk of high energy bills that could otherwise result from the equally necessary switch from gas to electric heating. The target could be a % improvement on the Part L 2021 TFEE, or an absolute kWh/m^2/year figure. The target may need to be updated when Part L 2025 (Future Homes Standard) enters force, to be expressed against the new baseline.

Potential targets for fabric energy efficiency	Justification *[Note: All space heat targets would diverge from the Written Ministerial Statement 2023 previously described]*
Homes: 9-30% improvement on the Target Fabric Energy Efficiency Rate (TFEE) set by Part L 2021, using SAP10.2 Non-residential: Fabric and supply efficiency measures to deliver 19% reduction in carbon emissions versus Part L 2013 or equivalent versus Part L 2021.	At the time of writing, the new baseline is Part L 2021. In 2025 it will be replaced again by the Future Homes Standard, which may upgrade the building fabric. This % figures quoted here reflect the approximate uplift in fabric between Part L 2021 and the originally indicated Future Homes Standard, in a range of home types[xcii]. We have not yet identified evidence of the difference that the Future Buildings Standard will make in *non-residential* buildings' efficiency. A 19% improvement on Part L 2013 is implemented successfully in Milton Keynes, therefore is presumably feasible, viable and sound.
Homes: 15-20kWh/m^2/year Fabric Energy Efficiency (FEE) using Part L SAP10.2. Non-residential AND homes: 15-20kWh/m^2/year space heat demand. Calculation: PHPP or TM54.	Homes: kWh limit in space heat demand shown to be necessary for the UK to stick to its carbon budgets between now and 2050 (using FEE as a proxy for space heat demand. Some feasibility evidence available[xciii] about feasible levels of FEE improvement from Part L 2021 baseline, although this also shows that FEE does not always correlate in direct proportion to space heat demand. Other buildings: kWh limit shown to be feasible in evidence bases of Greater Cambridge; Central Lincolnshire; South Oxfordshire & Vale of White Horse. This evidence uses different energy modelling methods (PHPP or TM54), as SBEM is 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). Milton Keynes Sustainable Construction Supplementary Planning Document (2021) states why the overall requirement is considered to be feasible:

> "As the Whole Plan Viability Study (2017) for Plan: MK demonstrates, the requirement to exceed the TER by 19% would not be unduly onerous for developers. Analysis of BRUKL data for recently consented schemes in Milton Keynes also indicates an average improvement of 41% over the TER is already being achieved at the design stage."

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 to 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.

Renewable and low carbon energy at new buildings

The third step of the energy hierarchy is to decarbonise energy supply (see *Figure 14*): 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[xciv]. 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[xcv] 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' feature would allow buildings to show carbon reductions at this stage even if the building is not suitable for solar panels due to shadow or orientation. However, heat pumps could equally validly be an 'energy efficiency' feature, allowing a clearer policy structure that complies with the Written Ministerial Statement 2023 by seeking a % improvement in carbon emissions from 'energy efficiency' (fabric + heat system) equivalent to the Future Homes Standard, leaving PV to be treated entirely separately as a 'renewable energy supply' feature.

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. Building Regulations defines airtightness as "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

[Please note that although the above policy was subject to scrutiny as part of the Inspector's Matters, Issues and Questions 'Matter 9' in December 2021, the outcome of this examination is not yet clear, as this plan appears to have been significantly delayed. As of January/February 2024 it appears to be stalled to allow further representations to be made by interested parties in light of the new NPPF that was released in December 2023.].

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

Please note: all targets described in this section diverge from the WMS of 13th December 2023, which is a relevant national policy statement but less material than the climate mitigation duty.

Before the WMS2023, a small but growing number of local authorities had begun to pursue an alternative, industry-recommended approach to achieving genuine (operational) 'net zero' new build development. This approach does not use baselines or % reductions based on previous iterations of Part L (as previously explored). Instead, it instead sets threshold limits on energy use and minimum required amounts of renewable energy. A policy following this approach sets three key requirements:

1. Energy use intensity (EUI) – the predicted *total* annual energy use to operate the building.
2. Space heating demand – the amount of energy required to heat the building.
3. On-site renewable energy generation – must annually match total energy use, to be a net zero building.

Comparison of absolute energy targets for residential development

Space heating demand (kWh/m²/year)	Energy use intensity (kWh/m²/year)	Target referenced
30	40	Cornwall Climate Emergency DPD[xcvi]
		Bath & North East Somerset Local Plan Partial Update[xcvii]
15-20	35	Central Lincolnshire Local Plan[xcviii]
		Greater Cambridgeshire Emerging Local Plan[xcix]
	n/a	Committee on Climate Change (CCC)[c]
15	35	Low Energy Transformation Initiative (LETI)[ci] (supported by CIBSE[cii] and Good Homes Alliance)
n/a	35 (from 2030)	RIBA[ciii]

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 include electric vehicle charging in the calculation. The main aim of the EUI approach is to reduce the energy used by the building, making it low enough that it can then be matched by renewable energy generation capacity on-site at the development (e.g. rooftop solar PV). The LETI /CIBSE / RIBA / CCC targets are also informed by a top-down view of the limited amount of total renewable energy capacity growth that the UK could feasibly achieve as a necessary part of its legislated carbon reduction trajectory, noting that most of the UK-wide capacity will be needed for other sectors' net zero carbon transition as existing buildings and transport phase out fossil fuel use. 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 the space heating demand targets set out here. Part L of Building Regulations does not guarantee such high performance, since Part L's targets vary by the proposed building form and ignore energy use by appliances (unregulated energy). A further benefit is that EUI can be easily monitored and verified in-use by meter readings.

Additionally, the EUI target essentially bans the use of on-site fossil fuels, (such as gas boilers). Although technology-agnostic, the EUI target does this implicitly since gas boiler efficiency (c. 90%) will likely result in too large a load on overall energy use to result in a compliant EUI value. Contrarily, the superior efficiency of heat pumps makes achieving the EUI target far easier, as the technology can produce 3 to 5 units of heat per 1 unit of electricity used.

The more stringent EUI and space heating demand targets, as in Central Lincolnshire and Greater Cambridgeshire, may need more than just a heat pump and high fabric efficiency. To meet the more stringent targets, decisions must be made at an early stage of the design process to make appropriate choices on form factor, glazing ratios and building orientation. Some developers' standard designs may already have these characteristics; others may need slight adjustments. These decisions will help maximise energy demand reductions (in line with national carbon budgets) 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 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). As the UK's carbon budget is fixed not relative, we need energy targets that are fixed not relative.

To implement a policy with this approach, a robustly accurate energy modelling methodology must be used. SAP, used for Part L compliance, is currently unable to accurately assess unregulated energy since the relevant equation (SAP Appendix L) is based on 1998 appliances, which were far behind modern efficiencies. It is therefore more difficult to comply with an EUI target using SAP because the unregulated energy, which can be up to 50% of total, is severely overestimated. SAP also underestimates space heat demand by up to 270%[civ], 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)

Cornwall Climate Emergency Development Plan Document (DPD) was adopted in February 2023 with all key parts of its net zero policies unscathed at examination. Contrarily to the Salt Cross AAP, the Inspector's report positively stated that the WMS2015 has clearly been overtaken by more recent events.

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, then instead:
        - Maximise renewable energy generation as far as possible
        - Connection to an existing or proposed district energy network
        - Offset residual energy demand via Cornwall Council's Offset Fund.

This is evidentially supported by energy modelling analysis[1] by expert green building engineers. This analysis used an 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). It also compared the performance of the proposed 'net zero carbon' options against that the Future Homes Standard.

The analysis gave costs for each modelled building. This was used in the viability assessment, showing that most residential development remained viable with the policies applied, and that most of the cost uplifts over the 2013 building regulations will be incurred by developer anyway in order to meet the 2021 building regulations.

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 energy 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.

An additional challenge is that a developer may not know the exact kind of use that their proposed non-residential building will experience (especially with the new flexible use class E, as this could be anything from retail to professional/financial services, restaurants/cafes, non-residential institutions, and assembly/leisure). Even where it is known that a unit will be for retail use, the *type* of retail can have an enormous impact on the energy usage – in particular whether or not the goods need to be refrigerated. Similarly, a standard 'office' occupant might have fairly predictable energy use, but if this is a research laboratory with data servers or other specialised technology, this again can dramatically increase the energy use.

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).

One further option could be to have the non-residential EUI targets apply only to regulated energy uses (permanent heating, permanent lighting, ventilation, fans and pumps). This would avoid the risk of unpredictable energy use profiles driven by plug-in equipment that the developer might not be able to predict. This however does mean that it wouldn't be possible to tell the amount of renewable energy that the developer needs to add to make the building operationally truly 'net zero'. As a fallback, it may be possible to require a certain 'reasonable' provision of renewable energy per square metre of building footprint, which is likely to generate an amount that would match the typical energy usage of *most* types of occupier of this kind of building. This approach is being pursued in the emerging policy of South Oxfordshire & Vale of White Horse (see below), based on insight from South & Vale's evidence base which found that certain unpredictable energy use profiles within the same type of building (e.g. retail) could put the ideal EUI targets out of reach.

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 necessary because Cornwall and B&NES share the same typical housing typologies and climate that influence the ability of solar PV to reach 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 … 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' decision (since found unlawful by the High Court) represented 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.

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."

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[cv] 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[cvi,cvii] 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[cviii].

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.

Emerging example: South Oxfordshire & Vale of the White Horse Joint Local Plan 2041 (draft 2024)

This draft Joint Local Plan[cix] had Regulation 18 consultation in January-February 2024. Proposed Policy CE2 (Net Zero Carbon Buildings) includes, for new build:

- Space heat demand (calculated with PHPP, CIBSE TM54 or similar):
  - Residential 15kWh/m^2/year (or 20kWh/m^2/year in bungalows)
  - Non-residential: 15kWh/m^2/year
- Energy use intensity (calculated with PHPP, CIBSE TM54 or similar):
  - Residential: 35kWh/m^2/year (total energy use)
  - Offices & schools: 55kWh/m^2/year (total energy use)
  - Warehouses & retail: 35kWh/m^2/year (total energy use)
  - OR if the above are unfeasible: 30kWh/m^2/year *for regulated energy uses* (or 40kWh/m2/year regulated energy uses for types not listed above).
- Renewable energy: Sufficient to match demand, or 120kWh/m^2 footprint/year. Offset any residual unmet energy demand via Council fund or direct support.

All targets are informed by evidence of feasibility and cost uplift (to inform the viability assessment). A footnote states that this policy will be reviewed in light of the WMS2023.

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

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)[cxi]

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 (Publication version November 2023)[cxii]

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

All development will be expected to:

- Achieve a maximum 15-20 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 £99/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. This target easily enables 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.

This thorough exploration of the successfully adopted examples shows that, prior the aforementioned Written Ministerial Statement 2023 (WMS2023), local plan policies could include standards on:

- Energy Use Intensity[13]
- Space heating demand[13]
- On-site renewable energy generation
- Potentially an additional technical certification for non-residential buildings such as BREEAM

However, the aforementioned WMS2023will raise the hurdle for the degree of justification and argument necessary for the energy use intensity and space heat demand targets, although it has not yet been legally tested whether it is lawful for the WMS to constrain the use of local authorities' legislated powers in this way. These precedents' approach to renewable energy targets should not be affected by the WMS which specifically relates only to energy *efficiency*. To ensure it is clear that on-site renewable energy generation has been truly maximised, a target using a kWh/m^{2}building footprint/year could be set.

[13] Subject to clearly stated arguments to justify divergence from the WMS2023.

Links between energy-based policy approaches and overheating risk

In addition to the key energy metrics for these policies, the local plan should 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 energy efficient and 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 offers either a simplified method or a dynamic modelling method to assess overheating, but the more effective 'dynamic method' is not necessarily required although it provides more detailed information on specific risks and their locations within a building. Alternatively, CIBSE TM52 and TM59 overheating risk assessment methodologies provide a robust approach for accurately assessing and mitigating such risks, which could be implemented as policy alongside operational energy/carbon measures. Requiring that new development appropriately integrates the cooling hierarchy into design decision-making also best ensures 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. Therefore, it is recommended that this more detailed policy approach requiring CIBSE overheating methods should be utilised.

Overheating and operational energy/carbon should 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 or 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 remove or prevent the same amount of carbon.

The recommended London offset price is based on a 2017 study[cxiii] 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 AECOM 2017 study notes that £95/tCO_2 price point reflected the 'high' value in the national valuation of energy and carbon (which offers a low, medium and high value) at the time (2017). The equivalent price today is now £403/tCO_2 (2024). This national value reflects the average 'cost of abatement' for all interventions necessary to hit the UK's carbon budgets[cxiv], therefore the price rises over time due to a combination of inflation and previous implementation of cheaper measures. 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), re-tested in a local viability assessment. It is vital that viability assessments must not 'double count' the cost impact of net zero carbon policy: the viability assessment should firstly consider the cost of meeting policy requirements for carbon reductions on-site via improvement to the building, and then only apply the cost of offsetting where there is any *remaining* carbon.

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[cxv] 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 the calculation of energy offsetting (as opposed to carbon offsetting). This means energy offsetting leads to a more direct reflection of exactly what is being offset. By contrast, carbon offsetting must use 'carbon factors' which often become 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 (or across the lifetime of the development if the policy requires offsetting of multiple years' worth of emissions[14]); energy offsetting avoids this problem.

Energy offsetting simplifies the process for project selection due to the absence of carbon factors, since it is 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 PV installation project funded through the proposed 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

[14] Government does annual release a dataset for projected grid carbon factors through to year 2100, which could be considered 'reasonable' figures on which to base carbon offset calculations. However, as with any future predictions that rely on technological and social change in future, those factors are not infallible nor guaranteed to be realised in practice. Instead, energy offsetting avoids this particular source of uncertainty.

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

Policy SCR6 provides a last-resort option for offsetting as a route to 'net zero' 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 **9.9p/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.

Emerging example: South Oxfordshire & Vale of the White Horse Joint Local Plan (Preferred Options Draft, 2023)

This emerging plan underwent a Preferred Options consultation in January 2024.

It includes fixed energy efficiency targets (space heat demand and energy use intensity) in conjunction with a requirement to provide on-site renewable energy generation capacity sufficient to annually match to the building's annual energy use.

If unfeasible to match the development's energy use with on-site renewable energy, the policy requirement is to offset the residual energy use through a payment to allow the local authority to deliver off-site renewable energy equivalent to the shortfall in on-site provision (or direct delivery of the offsite provision by the developer).

The price for offsetting is not set within the emerging 'preferred option' policy, but the supporting evidence base includes a suggested starting price of £1.94/kWh. This price was based on national evidence of the average cost per kWp of PV installations, in conjunction with the kWh generation per kWp of PV capacity. This enables an uncomplicated conversion from the residual demand to the offset amount needed.

Emerging example: Westminster City Plan Partial Review (2024)

Westminster's City Plan Partial Review underwent Regulation 19 consultation in March to May 2024.

Its draft Policy 40 includes the standard London-wide requirements to meet the London-wide carbon emissions reductions against the Target Emissions Rate set by Building Regulations (London's policy was expressed against Part L 2013, but subsequently released guidance confirms the same % reductions should now be achieved against the new baseline of Part L 2021).

Its separate draft Policy 43 sets limits on embodied carbon per m^2 of development and must offset any exceedance of this in the same way that regulated operational carbon emissions must be offset. This goes beyond the Greater London Plan approach.

Also as per the London-wide approach, Westminster's draft Policy 40 includes a requirement to offset the remainder of regulated carbon emissions multiplied by 30 years at the locally set price* per tonne of carbon (or address them through off-site measures). However, Westminster's offsetting policy innovates from the rest of London, in that any additional savings in embodied carbon beyond the standards set by Policy 43 can be deducted from the residual *operational* emissions in order to reduce the size of the offset payment.

*Westminster's local price per tonne of carbon is not stated in the emerging plan nor the 2021 adopted plan. However, Westminster is one of the 18 London Boroughs for whom a recent evidence piece (2023) recommended a price of £880/tCO^2, nearly10 times that of the Greater London Authority's minimum recommended price of ~£90.

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[cxvi] of the actual energy use of a building. SAP and SBEM are compliance tools[cxvii], 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[15] 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[cxviii].

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[cxix] 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. The Coventry Local Plan team 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

[15] 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.

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 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[16] are provided:

- Air tightness testing ~£1000 per property
- Thermographic testing[17] ~£400 per property
- U Value testing ~£400 for a dwelling (3 weeks per property)[18]
- Post-occupancy evaluation testing: ~£5000[19]. (if applied to scalable developments >c.50 dwellings, the economy of scale would reduce the cost burden through sample testing only).

[16] Communities and Local Government (2008), Performance Testing of Buildings BD 2535
[17] 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.
[18] 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.
[19] 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[cxx]:

"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[cxxi] 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, to be sure of the targets' effectiveness, policies also 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.

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 Coventry area 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 two emerging plans 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 many local planners do not yet feel confident to set these requirements, robustly justify them at inspection, or interpret whether developers have sufficiently complied.

There is an industry standard method to calculate a building's embodied carbon: the RICS Whole Life Carbon Assessment for the Built Environment[cxxii], 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 is important to note 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[cxxiii] 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. 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:

RIBA Climate Challenge embodied carbon targets[cxxiv]: 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 $kgCO_2e/m^2$

LETI Embodied Carbon Primer targets[cxxv]**:** 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, yet this does not go as far as the LETI standards. However, it forms a highly important example that it is possible to justify such a target. Going further, the South Oxfordshire & Vale of White Horse emerging example does align to some of the LETI targets.

LETI/RIBA levels of target 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.

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.

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[cxxvi] 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 Coventry, if an embodied carbon policy is successfully adopted.

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.

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 exceedance of these 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.

Emerging example: South Oxfordshire & Vale of White Horse Joint Local Plan (draft 2024)

Policy CE3[cxxvii] would require:

- All new development to provide narrative on actions taken to avoid embodied carbon and waste generation
- All new major development to have RICS Whole Life Carbon Assessment (WLCA)
- New large-scale development (50 homes or 5,000m^2 floor space) to achieve the following targets within its modules A1-A5 of the RICS WLCA:
    - Residential (excluding flats): ≤300 kgCO_2e/m^2 floor space
    - Non-residential and flats: ≤475 kgCO_2e/m^2 floor space
    - Non-residential and flats (from 2030): ≤350 kgCO_2e/m^2 floor space.

These targets are approximately aligned to the best 'LETI embodied carbon band' that could be achieved with existing construction materials/techniques without excessive cost, as shown in the plan's associated feasibility and cost evidence reports.

To conclude: The Local Plan can and should look to setting embodied carbon targets, as solely requiring embodied carbon reporting is insufficient to deliver emissions reductions that align with net zero targets locally and nationally. Importantly, this topic was not mentioned (and therefore is not affected) by the Written Ministerial Statement of 13th December 2023 and we have been unable to identify any other national policy statement to restrict the creation of policy on this topic so long as it is justified in the usual way. 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. 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.

Policy recommendations

Coventry has been informed on a range of potential broad policy options in light of the 2023 WMS in addition to the range of other material considerations and evidence. The options that have been presented to Coventry are displayed in the diagram overleaf. Upon review of the issued outputs and further liaison between Bioregional and Coventry, **Option 2 has been selected by Coventry as the preferred policy approach.**

The following policy recommendations are therefore a more detailed iteration of Option 2. Recommendations expand upon what was presented to Coventry as part of Tasks 1 of the original scope and part A of the revised scope of works by this consultant team.

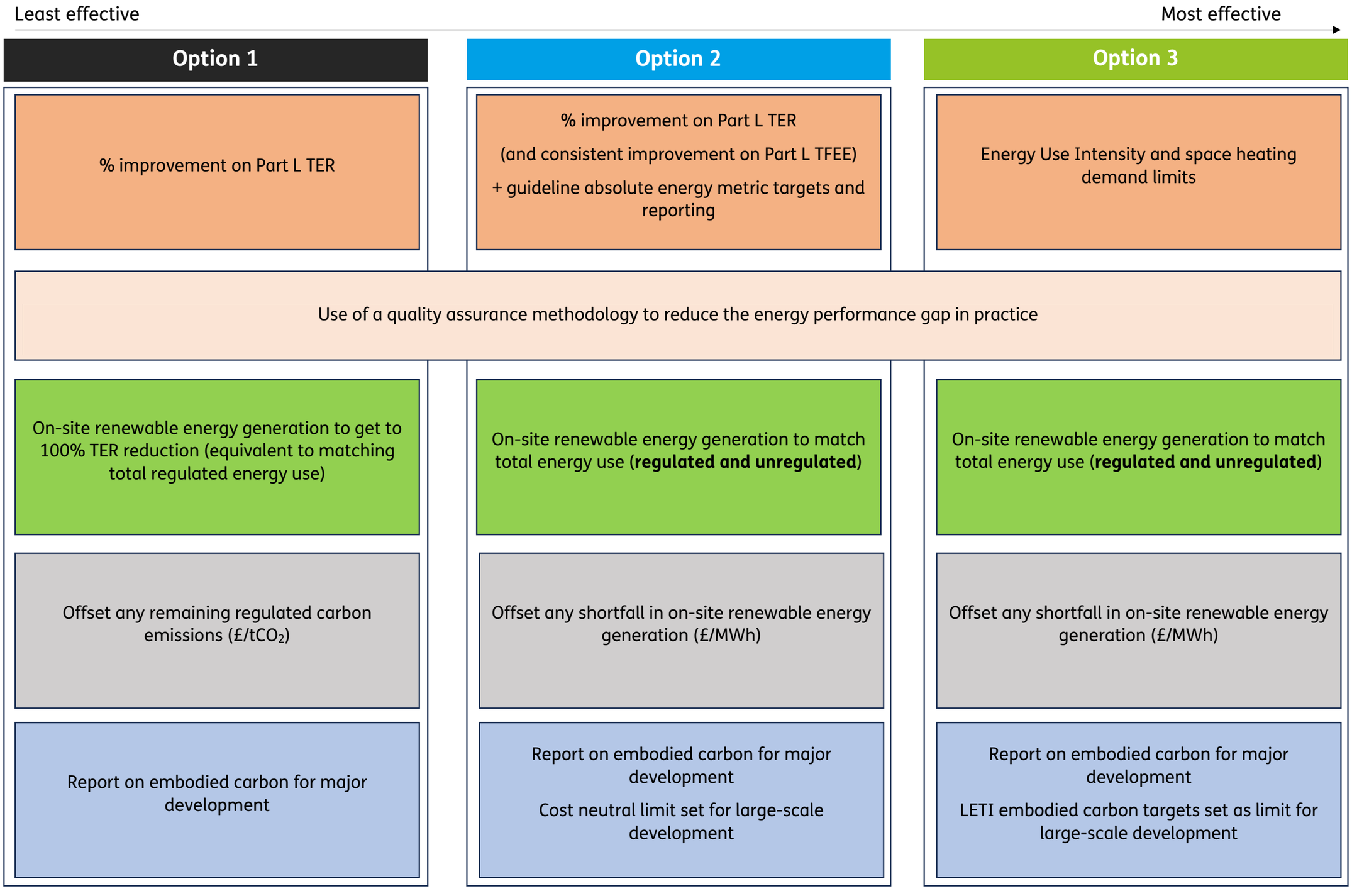
As shown by the graphic below, three different policy approaches were presented to and considered by Coventry before selecting Option 2 as the preferred approach. The range of policy approaches presented to Coventry represented a range of levels of ambition and risk.

The requirements within the policy options previously presented were indicative, to provide an idea of what the final policy formation could be and the mechanisms each option would use. The recommendations presented in this current report have since been refined from the previous indicative options, following extensive secondary evidence research. In some cases, indicative policies have been amended to ensure the requirement is feasible and likely to be viable.

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

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

Option 2 was selected by Coventry as a result of balancing risk levels among topics, of which ‘planning powers’ and ‘compatibility with national approach’ were given significant weight in the decision-making process, particularly relating to the 2023 WMS. The significant weight given to the 2023 WMS in selecting a preferred policy approach reveals the negative impact the WMS is having on the ability of local authorities to pursue best practice policies. Such policies, as had been outlined under Option 3, are now at risk due to the release of the 2023 WMS (which is now subject to a High Court challenge over the lawfulness of its attempt to restrict the use of local planning authorities’ legislated powers and fulfilment of their legal obligation to mitigate climate change). The perceived constraints of the 2023 WMS have led Coventry to select a reasonable policy approach – Option 2. Industry consensus is that policies as per Option 3 should still be pursued and are defensible at examination. However, the current planning risks associated with Option 3, as determined by Coventry, deemed Option 3 unsuitable.


Least effective
Most effective
Option 1
Option 2
Option 3
% improvement on Part L TER
% improvement on Part L TER
(and consistent improvement on Part L TFEE)
+ guideline absolute energy metric targets and reporting
Energy Use Intensity and space heating demand limits
Use of a quality assurance methodology to reduce the energy performance gap in practice
On-site renewable energy generation to get to 100% TER reduction (equivalent to matching total regulated energy use)
On-site renewable energy generation to match total energy use (regulated and unregulated)
On-site renewable energy generation to match total energy use (regulated and unregulated)
Offset any remaining regulated carbon emissions (£/tCO2)
Offset any shortfall in on-site renewable energy generation (£/MWh)
Offset any shortfall in on-site renewable energy generation (£/MWh)
Report on embodied carbon for major development
Report on embodied carbon for major development
Cost neutral limit set for large-scale development
Report on embodied carbon for major development
LETI embodied carbon targets set as limit for large-scale development

Relevant policy themes

Operational carbon

Operational carbon 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. However, due to newborn constraints posed by the 2023 WMS, Coventry has decided to select a policy approach based on Building Regulations and its metrics.

The key metric utilised for operational carbon is the Target Emissions Rate (TER) used for Building Regulations, which represents the annual carbon emissions from a building. Since the 2023 WMS only applies to local energy efficiency standards, not renewable energy, the policy recommendations below focus on a TER within an energy efficiency focus. The subsequent stage to assessing energy efficiency improvements through the TER is then to require that on-site renewable energy matches total regulated energy use – this effectively achieves a 100% TER reduction. Option 2 goes one step further to require that unregulated energy use is also met by on-site renewable energy generation.

As with any well-designed building, the lower the total energy use, 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. A key step to maximise energy consumption mitigation is to reduce the space heating demand – closest aligned to the Dwelling Fabric Energy Efficiency (DFEE) rate in SAP – to ensure that the building is demanding as little energy as possible to comfortably heat the building. 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.

Due to the 2023 WMS constraints, it is not possible to confidently set a space heating demand or a DFEE requirement in policy. However, it remains essential that developers prioritise these metrics and subsequent total energy consumption to best ensure that on-site renewable energy can feasibly match total regulated energy use. If the energy use of the building is not mitigated in the first instance, on-site renewable energy generation will likely not be sufficient to deliver a net zero building.

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' 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 to be hit should be promoted and integrated into local plans.

Overheating

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

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

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

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:

A. **Net zero (regulated operational carbon) new build residential development**

B. **Net zero (regulated operational carbon) new build non-residential development**

C. **Overheating in new buildings**

D. **Embodied carbon**

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

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

Please note that a separate appendix also provides a summary table directly linking each policy component directly to the corresponding rationale, alignment with national policy, evidence on feasibility, and evidence on viability. This is separated into an appendix in order to avoid making the main report policy recommendations section too lengthy and unwieldy with excess detail.

A. Net zero operational carbon new build residential development

All new build dwellings (use class C3 and C4) are required to meet the following requirements:	
A1.1. Part L % improvement	≥63% improvement (reduction) on Part L 2021 TER (Target Emissions Rate), from energy efficiency measures. Heat pumps are to be calculated as an energy efficiency measure, rather than a renewable energy measure. As a measure in aid of this TER target, achieve an improvement (reduction) on Part L 2021 TFEE (Target Fabric Energy Efficiency) as follows: • End terrace: ≥12% • Mid terrace: ≥16% • Semi detached with room in roof: ≥15% • Detached: ≥17% • Bungalow: ≥9% • Flats / apartments: ≥24% (weighted average, whole block). All of the above should be calculated using SAP10.2 or later version (or the Home Energy Model, HEM, once it is implemented).
A1.2 Energy metrics guidelines	Positive weight will be given to applicants who can demonstrate the following absolute energy metrics: • Total Energy Use: 35 kWh/m^2/year • Space heating demand: 15 kWh/m^2/year Performance in these targets must be evidenced using a methodology that accurately predicts buildings' operational energy use. Suitable methodologies include PHPP. Where a building achieves Passivhaus certification, it will be deemed to have complied with these targets.
A2. No fossil fuels	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 (in kWh) at least equal to the predicted annual total **regulated and unregulated** energy use (residual energy use in kWh *after* A1 has been achieved, *plus* unregulated energy use). Where an on-site net zero regulated and unregulated energy balance is not possible[20], it should be demonstrated that the amount of on-site renewable energy generation equates to **>114.9 kWh/m^{2}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 carbon 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. Regulated and unregulated energy use can both be calculated with Part L SAP or BREDEM, but a more accurate method such as PHPP is advised. Any other proposed methods are subject to Council confirmation of acceptability. The annual renewable energy generation and the annual energy use are whole-building figures, not per-m^2 figures. Renewable energy output should be calculated in line with MCS guidance for the relevant technology (expected to be PV in most cases).
A4. Energy offsetting	Only in exceptional circumstances and as a last resort where it is demonstrably unfeasible to achieve an on-site net zero regulated and unregulated energy balance, any shortfall in on-site renewable energy generation that does not match energy use is to be offset via **S106 financial contribution,** reflecting the cost of the solar PV that will need to be delivered off-site. The energy offset price is set as £2.15/kWh, based on cost of solar PV data from the Department for Energy Security and Net Zero. The price should be revised annually. This is set as a one-off payment, where the annual shortfall in on-site renewable energy generation is multiplied by the energy offset price. This amount does not need to be multiplied by any number of years.
A5. Reduced performance gap	An assured performance method must be implemented throughout all phases of construction to ensure operational energy in practice performs to predicted levels at the design stage.
A6. Smart energy systems	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.

[20] 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.

	Where the on-site renewable energy generation peak is not expected to coincide with sufficient regulated 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	Large-scale development (50 units or more) is to monitor and report total energy use and renewable energy generation values on an annual basis. An outline plan for the implementation of this should be submitted with the planning application. The monitored in-use data are to be reported to the local planning authority for 5 years upon occupation.

Supporting text and notes

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, which should include associated output reports from energy modelling software (e.g. SAP, BREDEM, PHPP, or HEM when available for general use).

About the non-mandatory energy targets in Policy A1.2

Achievement of these energy efficiency performance levels will reduce the amount of solar PV required under A3 for an on-site net zero balance. This can save the applicant costs in renewable energy provision and/or energy offsetting.

Performance against these non-mandatory targets would need to be calculated using a method that accurately predicts energy use. SAP is not suitable for this due to its poor predictive accuracy. PHPP is a suitable methodology. The Council may subsequently take a view on whether the incoming Home Energy Model (HEM) may be suitable, when HEM's final form is known.

Steps to calculating and narrating amount of renewable energy provision

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

- First calculate the total predicted annual energy use in kWh for all proposed new buildings (whole buildings, regulated and unregulated, after all the measures proposed in the application towards compliance with Policy A1).
    - This can be modelled using SAP, BREDEM (the methodology on which SAP is based), or PHPP. PHPP is the preferred model due to its accuracy, to avoid SAP's inaccuracies at predicting actual energy use in operation (SAP underestimates space heat demand, overestimates unregulated energy, and may overestimate hot water use). The Council may later take a view on whether the incoming Home Energy Model (HEM) is a suitable method for energy use prediction when the final form of HEM is available.
- Then calculate the annual renewable energy generation for whole site in accordance with the MCS guidance for the relevant renewable energy technology (anticipated to be solar PV in most cases as this is typically the most suitable technology in an urban setting). This does not have to be exclusively on the buildings themselves, and can include provision of new standalone renewable energy installations within the site. The figure does not include renewable heat delivered by heat pumps, as that would count instead towards Policy A1.
- Deduct the annual renewable generation from the annual energy use. The result should be zero or less.
- If the result is not zero or less, explore how to provide more on-site renewable energy (for example through an adjustment to roof orientation, and ensuring PV area provision has been explored up to at least equivalent of 70% of projected building footprint including roof overhangs and with reasonably efficient panels available on the market).
- If it proves unfeasible to increase renewable energy generation on-site to result in an annual balance of energy generation with energy use, then divide the total annual renewable energy generation by the building footprint. This result should be at least 114.9kWh. If this is impossible, provide evidence as to why this is not possible even with a PV area equivalent to 70% of projected building footprint and reasonably efficient panels available on the market.
- Calculate the residual energy demand (whole building, not per m^2) for all proposed new buildings after all measures proposed towards policies A1 and A3, then proceed to use this figure to calculate the required amount of offsetting provision in policy A4.

About the offsetting calculation

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

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

About assured performance methods

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

Applicability to outline applications

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

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

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

Scope for future improvements

Policies A1 and A2 could be improved by introducing mandatory target values for Energy Use Intensity and space heating demand, as per Option 3, if found to be feasible and viable in subsequent local plan iterations.

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.

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.

In the context of the 2023 WMS, explored in detail in a previous section, the A-suite of policies are fully compliant with the perceived constraints it poses. The WMS only applies to energy efficiency standards, where it states that any standards that exceed Building Regulations must be done so using the TER metric. A1 is the only policy recommendation that relates to the energy efficiency perceived constraints of the 2023 WMS and remains within its bounds through the use of TER % reduction as the primary metric. The TFEE target is not additional to, but is a step towards, that TER target.

The 63% reduction target on Part L 2021 TER is set to align with national policy in that it is in line with the Future Homes Standard (as Government has stated that the FHS TER will be a ~75% reduction on the Part L 2013 TER, and that the Part L 2021 TER is a 31% reduction on the 2013 TER. This ~75% figure has remained constant through both rounds of FHS consultation to date (2019-21 and 2023/24). Correspondingly, the TFEE target is set to align with the performance of a home that achieves that TER target via the indicative FHS specification set out by Government in the 2019-21 FHS consultation. This is necessary in order to reduce the space heat demand (which is necessary for the achievement of the UK's carbon budgets). It is also necessary in order to protect the resident from excessive energy bills and potential fuel poverty, as the latest FHS consultation indicated that the FHS carbon target could be achieved just with a heat pump and no fabric improvements, resulting in heating bills approximately double those of a current new build home. See previous citations for FHS consultations throughout this report, and/or see separate summary appendix of evidence sources.

A2 is aligned to the Government's direction of travel indicated by both the options proposed in the Future Home Standard 2023 consultation, in that no fossil fuel heating systems are proposed. A3 and A4 are not impacted because they address renewable energy, which is out of scope of the 2023 WMS.

Implementation considerations

To support these policies, it is vital that supplementary guidance is provided for the benefit of Development Management officers and the development industry. This is particularly important for 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 (this could explore in more detail the suitable methodologies outlined within the suggested policy text above).

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

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

Industry capability

Assuming Coventry undertakes appropriate engagement with developers operating in the area throughout the local plan process, the local development industry should be well prepared to deliver on these policies. The policies require 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 achieve A1 are aligned to those set out in the indicative specification for the Future Homes Standard (FHS). Therefore, the development industry should be well prepared to deliver on these policies, particularly as the Coventry Local Plan and the FHS are both likely to be introduced in 2025.

The target of 114.9kWh/m^2 building footprint/year was selected as follows: Several other local plans' energy modelling evidence (Central Lincolnshire[Error! Bookmark not defined.], Essex[Error! Bookmark not defined.], South Oxfordshire & Vale of White Horse[Error! Bookmark not defined.]) has evidenced that a target of 120kWh/m^2/year in those locations with a PV area approximately equivalent to 60-70% of building footprint area using current typical PV panels (and the area required will reduce as PV technology improves in future). Noting that annual sunlight differs by geographical location and that this affects the output of PV panels, an average was taken of the average solar irradiance in the locations that the energy models applied to, and the figure of 120kWh was scaled down in proportion to the slightly lower amount of annual solar irradiance that Coventry receives. The result was 114.9kWh. For citations, please see appendix summary of evidence by policy component.

Development Management capability

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

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

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

Costs and feasibility

Policies A1 and A2 are aligned with the Future Homes Standard 2023 consultation Option 2, and with the Future Homes Hub Contender Specification "CS1" and "CS2" detailed in their Ready for Net Zero report (and associated Appendix F). The TFEE improvements are aligned with the Government's previously indicated FHS specification (released in 2021) as evidenced through the Future Homes Hub report cited above (see scenario 'Ref25' within that report). The 63% TER reduction on Part L 2021 is equivalent to a 75% reduction on Part L 2013 and is proven to be feasible through fabric and energy efficiency standards, and installation of a heat pump – i.e. no solar PV is required to achieve the % TER reduction.

In practice, these requirements have been demonstrably feasible in Warwick through local case study Gallows Hill council housing scheme (77-80% reduction on Part L 2013). This development by Vistry Partnership did include some contribution from solar PV, but the Future Homes Hub evidence cited above shows that the same reduction could still be achieved without solar PV given further fabric and energy efficiency improvements.

In the Future Homes Hub Ready for Net Zero report cited above, the following TER reductions on Part L were shown to be feasible with the least ambitious of the specifications tested in that report:

Type of home	% reduction on Part L 2013 TER (Future Homes Hub *Fig. 115; p154*)	% reduction on Part L 2021 TER (derived from Future Homes Hub appendix F)
End terrace	**78%**	67%
Mid terrace	**77%**	66%
Semi-detached	**76%**	67%
Large detached	**75%**	66%
Bungalow	**76%**	58%
Low-rise flat	**76%**	66%
High-rise flat	**76%**	69%

All of the above except 'Bungalow' exceed the requirement set by the draft Coventry policy. These reductions were modelled to be achieved by a building with equal or slightly worse fabric than today's Part L 2021, but have an air-source heat pump instead of a gas boiler[21].

The feasibility of Policies A1.1 and A2 is further evident through the tested archetype scenarios in the Future Homes Hub Report and the promotion of very similar standards in the 2023 FHS consultation.

However, the draft Coventry policy includes an element of fabric improvements, to ensure that residents are not subject to a doubling of energy costs that the Future Homes Standard consultation has conceded would occur if this %TER reduction is achieved solely through the addition of a heat pump. This is still feasible (as demonstrated through the Future Homes Hub report cited above) but costs will be different from if the %TER reduction were achieved solely through electric heat. Therefore, it is proposed to test cost uplift estimates that include an element of fabric improvement as a step towards the %TER reduction. Using averages of costs estimated in various different sources (see Appendix 2 of the current report), the cost uplift over a Part L 2021 baseline for **Policies A1 and A2** for **houses** is estimated to be 0.78% for fabric measures and 1.59% for the heat pump installation, combining together to result in a **2.37% cost uplift** – this aligns with the 2% stated for CS1 in the Ready for Net Zero report. For **flats**, the estimated cost uplift for **Policies A1 and A2** is estimated to be **3.7%.**

Policy A3 is estimated to bring an **additional 2.5% cost uplift** over Part L 2021, for **houses**. This is a minimal cost uplift because the Part L 2021 baseline specification already includes 40% of roof space covered by solar PV (which has been estimated in the evidence base of South Oxfordshire & Vale of White Horse[cxxviii] to match approximately 60% of the total energy use of a house that meets the Future Homes Standard version released by Government in 2021, as previously cited). Therefore, only a small additional amount of PV is required in order to fulfil the policy.

For **flats**, the equivalent % uplift for on-site PV will vary by height of the block (more floor space for more storeys equals more energy use, but without increasing the roof space available for PV). This means that the taller the building, the higher the amount of energy use not met by the onsite PV. However: For a 4-storey block of 16 flats of Coventry's average new build flat size, plus circulation space, the PV cost (assuming 70% of footprint area) is estimated to be between 0.9-1.2%, plus a pessimistic[22] estimated further 2.5-3.6% for offset payments (the range of figures stated here depends on how the floor space is calculated). Combined cost for **policy A3** in flats is estimated at circa **4.2%**.

The **overall cost uplift** for A-suite policies for houses is therefore reasonably estimated to be **4.87% in houses** or **7.9% in flats.** This could be rounded up to 5% (houses) or 8% (flats) to give headroom to any site-specific constraints that hinder a development's ability to meet the policy requirements. For flats, this figure will vary more as it depends strongly on the height of the building,.

Please see separate cost summary appendix of this report for more detail on this cost calculation.

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

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

Finally, it is feasible to calculate total energy use. Developers are familiar with providing SAP calculations for the purpose of legally complying with Part L of building regulations. Part L SAP is mainly focussed on the *regulated* part of energy use, but can also give a figure for *unregulated* energy, albeit SAP overestimates this as it is based on outdated appliance efficiency rates (see 2021 evidence of Cornwall local plan). Therefore, if SAP is used to calculate the unregulated energy, it will overstate the amount of PV needed to meet it. This may be solved in HEM, the incoming replacement for SAP. Meanwhile, other more accurate tools for modelling total energy are available including PHPP.

The full range of total energy consumption calculated using SAP10.2 in the Future Homes Hub Ready for Zero report, for a home that meets the Policy A1 requirements[23], is 42 to 60kWh/m^2/year depending on the type of home. This is not dissimilar to the 69kWh/m2/year EUI estimated for a home meeting the same specification modelled using PHPP in the South Oxfordshire and Vale of White Horse evidence base referenced above. That South Oxfordshire evidence also showed that the home with that 69kWh EUI could meet about 60% of its own energy use with onsite PV of an area equivalent to about 40% of the home's footprint. Translating this up to 100% of energy use would therefore be feasible using an area of PV equivalent to about 69% of the house's footprint. The home can therefore more than meet its own energy demand on site if the PV provision is equivalent to 70% of building footprint. This equates to an output of only 108 kWh/m^2 building footprint/year. Houses are therefore not expected to need to match the Policy A3 alternative target of 120kWh/m^2/year, as they can already feasibly match their own energy use (becoming net zero operational energy) with a lower proportion of PV.

Due to the 2023 WMS constraints, particularly the discouragement of the use of absolute energy metrics – Energy Use Intensity and space heating demand – the policy recommendations above do not directly limit energy use, which would have assisted developers to design towards an on-site net

[21] This is what the Future Homes Hub termed "contender specification 1" or 'CS1'. This is very similar to the "FHS Option 2" specification that Government recently consulted upon in their Future Homes Consultation 2023-2024.
[22] The pessimistic assumptions were that shared/circulation area has the same energy demand per m^2 as the dwellings (resulting in a higher-than-realistic energy demand) and a further pessimistic assumption that none of the panels face directly south (resulting in a lower-than-optimal solar PV output, resulting in a need for more offsetting). This resulted in a larger-than-likely offset payment required – which is more expensive per kWh than on-site PV provision, because the offset price includes a 10% margin to allow administration of the fund and implementation of the offsite PV provision. Additionally, it used total energy use estimations published by the Future Homes Hub that were modelled in SAP, which overestimates unregulated energy demand because it is based on outdated appliance efficiencies.
[23] Several different "contender specifications" were modelled in the cited Future Homes Hub 'Ready for Zero' report. The one we assume to meet the Policy A1+A2 specifications is "Ref25", which represents the FHS indicative specification published by Government in 2021, as previously cited.

zero regulated balance because the amount of solar PV would be matched to the clearly stated energy use limit. However, even in the absence of these effective best-practice metrics, reducing energy use should be the main priority of the developer to best enable feasibility of sufficient solar PV to match regulated energy use. Reducing energy use directly benefits the subsequent building occupant but also the developer, as shown by a comparison of costs below.

To compare the cost differential between prioritising energy use reduction or relying on solar PV to achieve a net zero balance, we look at two scenarios for a semi-detached house:

1. On-site net zero building with energy use of **69 kWh/m²/year** (as modelled[cxxxii] in a semi-detached home that meets the FHS indicative specification released by Government in 2021**)**
2. On-site net zero building with energy use of **32 kWh/m²/year** (as modelled[cxxxii] to be feasible in a semi-detached home using best-practice fabric and heat pump).

For scenario 1 to achieve on-site net zero status, it would have to install over double the amount of rooftop solar PV than scenario 2. Scenario 2 achieves its lower energy use through better specification of U-values and improved air tightness of scenario 1. There are higher costs associated with specifying higher performance fabric values for scenario 2 compared to the inefficient energy use of scenario 1. However, the same argument applies to higher solar PV costs to achieve net zero on-site for scenario 1. Interestingly, the cost uplifts over Part L 2021 for both scenarios are extremely close at 4.8% (scenario 1) or 4.6% (scenario 2). The capital costs of scenarios 1 and 2 are respectively **£161,248 and £160,987**, in the Oxfordshire context, inferred from the South Oxfordshire and Vale of White Horse 2023 costs evidence base[cxxxiii].

It is evident that both scenarios are feasible and effectively equal in cost, although the best practice scenario 2 is in fact less costly. Therefore, developers have a clear incentive to design new buildings to best practice energy standards that maximise all opportunities for energy use reduction. It is the responsibility of the developer to reduce energy use to levels that are known to be feasible to enable a regulated net zero building. This shows that although the Coventry policy is expressed as % TER reduction (so as to appease the WMS2023), developers can instead make smarter choices to achieve the policy's overarching 'net zero' standard by making smarter choices to design according to EUI targets, rather than purely by designing for % TER reductions.

Local authorities, including Coventry, feel constrained to the perceived boundaries of the 2023 WMS and have therefore not decided to select a policy approach that uses fixed metrics that would specifically limit energy use to absolute targets (such as EUI and space heat demand). However, above we have demonstrated that reducing energy use to best practice levels can in fact result in a lower cost uplift in achieving a net zero building than if energy use reduction was neglected. Notwithstanding, a plethora of co-benefits further than just costs comes with reducing energy use, such as:

- **Reduced local grid stress**
- **Improved occupant comfort**
- **Reduced occupant bills**
- **Efficient material use and lower embodied carbon**

No additional cost uplift is assumed for A5 because the offset price is set as to the exact cost of solar PV that was assumed for the A3 cost uplift. Therefore, no change in cost is evident between installing the sufficient amount of solar PV on-site or off-site.

See separate appendix document on costs and evidence for discussion of the cost uplifts that can be assumed for other parts of the policy.

Value uplift

There is evidence that increased energy efficiency in homes, as sought by policies A1-A2, delivers a value uplift which could be offset against the cost uplift to aid the viability of the scheme. This was evidenced in a 2021 study by Lloyds/Halifax[cxxxiv], which looked at actual home sale value across all regions of England and Wales, not just surveys of willingness to pay. It expressed the sale value uplift in terms of the % difference between EPC bands. The increase is greater between EPC bands at the lower end (for example a 3.8% value increase from EPC G to EPC F) but there is still an uplift between higher bands (an uplift of 2% from EPC C to EPC B, and an uplift of 1.8% from EPC B to EPC A). All of these values are the average across England and Wales; however, the study confirms that the uplift was evident in all regions and therefore should be reasonably applicable to Coventry.

Please note that increased sale value does not necessarily translate proportionally into increased cost of owning and running a home, thanks to the running cost savings on energy bills that can be achieved via the improved energy efficiency (draft policy A1.1 and A1.2) and the on-site solar generation (draft policy A3).

B. Net zero (regulated operational carbon) new build non-domestic development

All new build non-domestic development is required to be net zero carbon in operation (regulated energy) through the following requirements:

B1.1. Part L % improvement	% improvement on Part L 2021TER (or equivalent reduction on future Part L updates), through on-site measures as follows: • Offices: ≥25% • Schools: ≥35% • Industrial buildings: ≥45% • Hotels (C2, C5) and residential institutions (C2, C2a): ≥10% • Other non-residential buildings: ≥35%
B1.2 Energy metrics guidelines	Positive weight will be given to applicants who can demonstrate the following absolute energy metrics: • Total Energy Use: 65 kWh/m^2/year • Space heating demand: 15 kWh/m^2/year Employing absolute energy metrics reduces the amount of solar PV required under B3 for an on-site net zero balance of regulated energy. Applicable methodologies to calculate this include CIBSETM54 and the Passivhaus Planning Package. At present, the Part L calculation method (SBEM) is not considered suitable as it is does not provide accurate predictions of a building's actual energy use.
B2. No fossil fuels	The use of fossil fuels and connection to the gas grid will not be considered acceptable.
B3. On-site renewable energy	On-site annual renewable energy generation capacity to at least equal predicted annual total **regulated** energy use (residual energy use after B1.1 has been achieved). In buildings subject to Part L's requirement for energy forecasting, that forecasting should be the source of the 'annual total regulated energy' figure. Where an on-site net zero regulated energy balance is not possible[24], it should be demonstrated that the amount of on-site renewable energy generation equates to **>114.9 kWh/m^{2}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 carbon offsetting (A4) is considered.
	Large-scale development (5000 m^2 floorspace) 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.
B4. Energy offsetting	Only in exceptional circumstances and as a last resort where it is demonstrably unfeasible to achieve an on-site net zero regulated energy balance, any shortfall in on-site renewable energy generation that does not match regulated energy use is to be offset via **S106 financial contribution,** reflecting the cost of the solar PV delivered off-site. The energy offset price is set as £2.15/kWh. This price is based on cost of solar PV data from the Department for Energy Security and Net Zero, and includes inflation and a 10% margin to enable administration of the offset fund to deliver off-site solar PV by the Council or its appointed partners. The price should be revised annually. This is set as a one-off payment, where the shortfall in annual on-site renewable energy generation is multiplied by the energy offset price.
B5. Reduced performance gap	An assured performance method must be implemented throughout all phases of construction to ensure operational energy in practice performs to predicted levels at the design stage.
B6. Smart energy systems	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 peak onsite 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 goal is 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 carbon- and energy-saving benefits and minimise the need for grid reinforcements.

[24] 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.

	This may include smart local grids, energy sharing, energy storage, demand-side response, or solutions combining elements of the above.
B7. Post-occupancy evaluation	Large-scale development (over 5000 m^2 floorspace) is to monitor and report total energy use and renewable energy generation values on an annual basis. An outline plan for the implementation of this should be submitted with the planning application. The monitored in-use data are to be reported to the local planning authority for 5 years upon occupation.

Supporting text and notes

Policy elements B1, B2 and B3 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. SBEM).

About compliance with Policy B1.1 TER reductions

Please note that these %TER reduction targets are not limited to be solely delivered through energy efficiency measures. Therefore, there could be an element of clean energy supply or renewable energy measures included in these. However, please note that further renewable energy will be needed to subsequently meet the requirement of Policy B3, therefore applicants are advised to pursue energy efficiency measures as far as feasible in the first instance in pursuit of Policy B1.1, so that the subsequent Policy B3 renewable energy requirements (to match 100% of regulated energy use) are not rendered excessively expensive or unfeasible. Designing to use less energy in the first place reduces the amount of renewable energy needed to match this, and/or the amount of carbon offset payment needed.

Applicants and Council development management officers should be aware that in the current Part L for non-domestic buildings, the type of heating system in the 'notional' building (from which the TER is derived) is the same as the type of heating system in the actual proposed building. Therefore, no TER gains will be made by switching from a gas or oil boiler to a heat pump or other all-electric or otherwise low-carbon heat system. However, TER improvements *can* be made through selecting a heating system that is *more efficient than Part L 2021's notional efficiency for that heating type*.

About Assured Performance Processes for energy performance

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

About offsetting

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

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

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

Scope for future improvements

Policies B1 and B2 could be improved by introducing target values for Energy Use Intensity and space heating demand, as per Option 3, if found to be feasible and viable in subsequent local plan iterations.

Alignment with national policy

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

Therefore, new buildings today should not have 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 improving energy efficiency, which mandate a heating technology similarly efficient to a heat pump (which a fossil boiler cannot meet).

It is not yet completely clear whether the missives of the 2023 WMS are relevant to non-residential development. The WMS uses the term 'local energy efficiency standards for buildings', which could be taken to mean all buildings. But on the other hand the WMS asks for the standards to be expressed in terms of SAP, which is a methodology that only applies to residential. Also, the concern that the WMS purports to address is that "multiple local standards [may] add further costs to building new *homes* ... [and therefore] the impact on *housing supply* and *affordability* [must be] considered in accordance with the National Planning Policy Framework". The NPPF only discusses affordability in relation only to homes, not any other buildings. Nevertheless, even if the WMS2023 is interpreted to apply to non-residential development too, the B-suite policies remain consistent with the 2023 WMS' stipulations,

given that the metric for B1 is a % reduction on TER (to be calculated with SBEM, which is the non-residential equivalent of SAP).

B2 is aligned to the Government's direction of travel indicated by both the options proposed in the Future Home Standard 2023 consultation, in that no fossil fuel heating systems are proposed. B3 and B4 are not impacted because they address renewable energy, which is out of scope of the 2023 WMS.

Implementation considerations

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

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

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

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

Industry capability

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

Development Management capability

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

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

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

Feasibility

Part L 2021 operates differently between residential and non-residential buildings, primarily due to the different Part L energy modelling calculation methodologies: SAP for domestic buildings and NCM/SBEM for non-domestic buildings. It is therefore recommended that different levels of on-site carbon performance for individual non-residential typologies are required as per B1. It is important to note that achieving a 100% reduction – a net zero building under Building Regulations framework including only regulated energy – in SBEM and SAP is more difficult than in more sophisticated modelling tools such as PHPP. Therefore, offsetting is more likely to play a significant role in Building Regulations framed policies.

The % TER reductions selected for Policy B1.1 are reflective of the recommended targets for 18 London Boroughs based on very recent modelling[cxxxvii] of what is feasible using various different solutions in various different types of non-domestic building. There is no technical reason why these should be any less feasible in Coventry than they are in London (in fact they may be more feasible, given that Coventry's development is likely to be lower-rise and less complex). There will however be a need to assess whether the Coventry market can carry the cost uplifts associated with these (discussed below, and in more detail in the costs summary appendix that accompanies the current report). The difference in target % values for on-site TER reduction for B1 is due to differences in building shape and use. For example, offices tend to have higher energy demand than schools, whilst typically having less roof space relative to the internal floor area. Therefore, due to the typically higher energy demand but typically less available relative roof space to achieve an on-site net zero balance, a higher on-site % reduction value for the office is typically less feasible than for a school. Similarly, hotels tend to have very high and sudden hot water loads which result in an unavoidably high energy use intensity and peaks in demand that may not be easy to meet with the lowest-carbon, lowest-cost, highest-efficiency technologies. These differences are reflected in the typology-specific target % reductions given in B1.

Feasibility of the overall approach of B1 – B4 is also supported by the evidence base of West of England authorities[cxxxv], in which the policy approach titled 'Approach 1' achieves net zero *regulated* emissions, which assumed fabric and energy efficiency levels based on the indicative Future Buildings Standard specification. The policy scenario in the West of England report achieves net zero regulated emissions by following the fabric first hierarchy, maximising rooftop solar PV and offsetting as a last resort, aligning with the overall approach of the policy recommendations above. However, it is clear that the net zero regulated emissions can feasibly be achieved without excessive offsetting. The costs associated with Approach 1 stated in the West of England report were as follows:

- 0.9 – 1.2% uplift on Part L 2021 baseline
- 1.6 – 2.4% uplift on Part L 2013 baseline

For the office archetype tested in the West of England, only 0.1% of the cost uplift was associated with offsetting, whilst the school archetype did not use offsetting to achieve net zero regulated emissions, as per B1 – B4 policy recommendations.

Precedents for policies structured similarly to B1 and B3 include London Plan and Milton Keynes Local Plan policies, both implemented from 2019. The London Plan requires a 35% on-site reduction on Part L 2013, as demonstrated to be feasible since 2013 in an analysis of planning applications throughout London boroughs – this on-site % reduction is also adopted by Reading Council. The Milton Keynes policy requires that a 19% reduction on Part L 2013 is achieved on-site *before* a further 20% from

renewable energy, therefore presumably the first 19% is through energy efficiency measures. This Milton Keynes target was also supported by a local analysis of Building Regulations compliance data. The authority stated that it does "not anticipate that the requirement to exceed the TER by 19% will be unduly onerous for developers, as our analysis of BRUKL 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". We note that while these precedents are originally from a baseline of Part L 2013 (rather than Coventry's Part L 2021 baseline), London has since updated its guidance[cxxxvi] to clarify that the 35% reduction should now be achieved from the new Part L 2021 baseline. Additionally, the success of these policies evidences that developers are able to understand and work with policy requirements that are structured in this way.

The feasibility of the annual PV generation target figure for 114.9kWh/m^2 floorspace is as described for the identical residential figure. It is based on 120kWh/m^{2}footprint targets demonstrated to be feasible with 70% of building footprint in other energy modelling evidence bases cited elsewhere in this report, adjusted downwards to recognise the slightly reduced amount of annual sunlight in Coventry compared to the geographic locations where the cited energy modelling was focussed.

Estimating costs to test for viability

The requirement for a percentage of the TER reduction to be met through on-site measures acts as a backstop target to ensure that offsetting is not excessively and avoidably used. The % value is supported by Part L modelling undertaken for the Delivering Net Zero report[cxxxvii]. The cost uplifts stated in that report range from as little as 0.4 – 1.1% for offices and schools, but rise to 5.5% for the industrial buildings % target.

A certain amount of PV is already included in the cost uplifts stated in the 'Delivering Net Zero' report (cited above) to reach the TER % reduction targets echoed in Coventry draft policy B1.1. That amount of PV provision already accounted for varies by archetype. To find the cost of installing further PV (or offsetting) to match the remaining *regulated* energy use, we here calculate this based on the regulated-only portion of the energy use modelled in that report, and convert this to a kWp size, then multiply this by a nationally endorsed cost per kWp (as used for the 'residential – flats' costs discussed previously), minus the cost of PV that would already be int the Part L 2021 baseline. Converted to a % uplift on the Part L 2021 baseline stated in the 'Delivering Net Zero' report cited above, the PV/offsetting cost for Coventry draft Policy B3 is estimated as follows:

- Offices: 1.5% uplift
- Schools: 0.3% uplift
- Industrial buildings: 2.5% uplift
- Hotels (C2, C5) and residential institutions (C2, C2a): 6.3% uplift
- Other non-residential buildings (average of the above, excluding hotel as an outlier): 1.4%.

Adding this PV/offsetting cost to the median costs of achieving the fabric/services improvements for the required onsite TER reductions in the respective building types, **a total reasonable cost uplift for policies B1 – B4 is estimated as follows:**

- **Offices: 1.9%**
- **Schools: 1.4%**
- **Industrial buildings: 8%**
- **Hotels (C2, C5) and residential institutions (C2, C2a): 6.8%**
- **Other non-residential buildings: 3.3%.**

For more detail on how these costs were arrived at, please see the separate appendix document to the current Coventry report. That also contains discussion of the cost uplifts that could reasonably be assumed for other parts of the policy.

Notes on feasibility and cost of excelling beyond Coventry draft non-domestic policies

It is clear that the standards of B1 – B4 can be feasibly achieved. Further to this, it is therefore also enlightening to explore what level of performance can be demonstrated feasible in non-residential buildings according to industry best practice approaches (going further than the draft Coventry policies to instead use fixed energy efficiency targets measured by non-Building Regulations methods which some local authorities do not feel confident pursuing due to the disruptive perceived constraints of the 2023 WMS). The previously referenced South Oxfordshire & Vale of White Horse evidence base presents information on level of performance feasible in non-residential buildings, where energy use reduction is directly assessed and subsequently limited before determining solar PV output to achieve net zero status.

To achieve on-site net zero status (**including unregulated energy, which is in fact out of scope** for the draft Coventry B-suite policies), the following cost uplifts over Part L 2021 are found in the South Oxfordshire & Vale of White Horse reports cited above:

- Office: 6.1%
- School: 4.3%
- Warehouse: 0%
- Retail: 1.2%

The cost uplift in the Oxfordshire study, which is sometimes higher and sometimes lower than those of Coventry draft policies B1-B4, can be attributed to higher costs for better performance fabric and energy efficiency, alongside installing more solar PV to match *unregulated* energy use as well as *regulated*. Additionally, the modelled buildings in the Oxfordshire study not identical to those in the 'Delivering net zero' London study that was previously cited to derive the estimated costs for B1-B4. However, it shows that even exceeding the policy requirements of B1–B4 does not result in an excessive cost uplift. In the context of the % uplifts assumed for B–B4, there is therefore a clear incentive for developers to deliver industry best practice development that exceeds B1 – B4 at a capital cost that is not dissimilar to those of the draft policies – at least for some types of non-domestic building. Near equivalency in cost is associated with more favourable modelling tools (e.g. PHPP or TM54) to demonstrate a net zero balance, higher fabric costs but significantly lower solar PV costs.

Value uplift

We also note that there is **evidence that improved energy performance increases the sale value** in non-residential. For example, research by Knight Frank[cxxxviii] found a sale value uplift of 8%-18% for buildings with a 'green' rating. This uplift was 10.1%-10.5% for BREEAM (a holistic sustainability rating covering many topics) or 8.3%-17.9% for NABERS depending on how high the NABERS score is (NABERS is an energy-only rating that originated in Australia but is now available for offices in the UK).

Noting that this study's UK evidence was of prime offices in the London market[cxxxix], these uplifts should not be assumed to directly apply to all non-residential buildings in Coventry. However, they do provide a strong rationale for the viability assessment to assume some degree of sale value uplift for the draft policies described here (which would be likely to translate to a high NABERS rating).

C. Overheating in new buildings

All new build residential and non-residential buildings must meet the following requirements:

C1. Cooling hierarchy	Demonstrate that overheating risk measures have been incorporated in accordance with the cooling hierarchy: 1. Minimise internal heat generation through energy efficient design. 2. Reduce the amount of heat entering the building in summer using: a. Building orientation b. Shading c. Albedo d. Fenestration e. Insulation. 3. Manage heat within the building through exposed internal thermal mass and high ceilings. 4. Passive ventilation. 5. Mechanical ventilation. 6. Active cooling measures.
C2. Overheating assessment	Residential development should complete **CIBSE TM59** overheating assessment as their route to compliance with Building Regulations Part O. The simplified Part O route will not be considered acceptable. Non-residential development should complete **CIBSE TM52** overheating assessment

Supporting text and notes

Compliance with C1 and C2 should be demonstrated within an energy statement at planning application stage, with supporting output reports from CIBSE assessments.

Scope for future improvements

None as numerical targets are not given.

Alignment with national policy

Part O of Building Regulations requires overheating assessments to be undertaken in residential development, with CIBSE TM59 provided as one route to compliance for residential buildings. Therefore, C1 and C2 are aligned with national policy approaches.

However, Part O does not require that TM59 is completed, as the Simplified Method can be alternatively used. Additionally, CIBSE TM52 is not referenced because Part O does not relate to non-residential buildings.

The Housing Update Written Ministerial Statement (15 December 2021) states that there is no need for local policy to duplicate Part O policy. The cooling hierarchy (C1) is not referenced in Part O and CIBSE assessment are not *required*, therefore C2 neither is a duplicate.

The extensively referenced 2023 WMS does not impact C1 – C2 as the scope of the WMS only impacts energy efficiency standards.

Implementation considerations

Specific information on overheating assessments should be set out in supplementary policy guidance.

Although mechanical ventilation is listed down the cooling hierarchy as part of C1, the use of mechanical ventilation with heat recovery (MVHR) should not be viewed negatively as this may assist compliance with operational energy policies. However, MVHR should have the ability to bypass the heat recovery function in periods of warmer weather in order to support the overheating risk mitigation goal.

Industry capability

Overheating assessments are a requirement of Building Regulations Part O (for residential), and is a common measure performed in the design of good-quality non-residential new buildings especially where a BREEAM rating is sought. Therefore, it should not inflict any significant additional burden on the development industry to deliver on C1 and C2.

Development Management capability

The cooling hierarchy is simple to follow and assess to grant policy compliance, assuming some officers have had training carried out and have guidance to refer to. CIBSE overheating assessments (referred to in Policy C2) give results in terms of passing or failing certain criteria (or percentage of rooms in the building that pass or fail the criteria). Those criteria vary by type of building or room. Guidance on how to assess CIBSE overheating assessments will make policy compliance simple to grant or not.

Costs and feasibility

No evidence of costs available. Feasibility is evidenced in that Part O of Building Regulations essentially includes the TM59 process and will require some buildings to undertake that assessment even in the absence of the policy (Coventry is unlikely to be categorised as a 'high risk location', but TM59 is still triggered in Part O where a building exceeds certain glazing ratios). There does not seem to have been a national impact assessment covering costs for Part O in the same way there was for Part L. Therefore, presumably national government does not envision costs significant enough to inhibit viability.

D. Embodied carbon and waste

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

D1. Embodied carbon reporting	All major new residential (10 dwellings or more) and non-residential (1000 m^2 floorspace or more) developments are required to complete a whole-life carbon assessment in accordance with **RICS Whole Life Carbon Assessment** guidance.
D2. Limiting embodied carbon	All large-scale major development (50 dwellings or more; 5000 m^2 non-residential floor space or more) is required to limit embodied carbon (RICS/BS 15978 modules A1 – A5) to **600 $kgCO_2e/m^2$ GIA**.
D3. Building end-of-life	All new buildings are to be designed to enable easy material re-use and disassembly, subsequently reducing the need for end-of-life demolition.
D4. 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).
D5. Narrative on embodied carbon in minor development	Proposals for new development of 1 or more homes or ≥100m2 non-domestic floor space, but below the size thresholds for embodied carbon reporting and targets as noted above, should include general narrative on options considered (and where possible, decisions made) to minimise embodied carbon of the proposed development.

Supporting text and notes

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

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

- Reuse of existing features and materials on site, where present
- Design for material efficiency (reducing the amount of material needed) such as through structural design or use of space and layouts to avoid unnecessary material use
- Substitution of low-embodied-carbon materials (such as timber) in place of higher-carbon materials (such as steel, aluminium, and unadulterated Portland cement)
- Material sourcing for reduced 'product miles' or from manufacturers with low-carbon manufacturing credentials
- Construction processes that reduce the typical rates of material wastage.

Scope for future improvements

There is significant scope for future improvements for embodied carbon and waste policies. In particular, standards set for D2 should be lowered in future local plan reviews as embodied carbon policy becomes integrated into local and national policy. As policy is implemented on embodied carbon, industry will become better placed to deliver on ambitious policy requirements and move towards net zero embodied carbon emissions.

Alignment with national policy

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

The industry proposal of Part Z, as an additional document to Building Regulations, has been going through the parliamentary process and could be integrated before the adoption of this local plan. This would require that whole-life carbon reporting is implemented in Building Regulations and that emissions limits are set from 2027. It is aligned with the RICS Whole Life Carbon method, the same as specified in the draft Coventry policies above. An amendment to the Levelling Up & Regeneration Act was proposed by one of the Lords in 2023, (amendment 484) which would have required Government to include embodied carbon into Building Regulations according to the same British Standard on which the RICS method is based, but the amendment was not moved[cxl] (not debated when called, therefore neither accepted, rejected or withdrawn). More recently in early 2024, a further coalition of respected industry standard-setting bodies has released a policy paper pressuring the next Government once more to introduce Part Z or similar between 6 months to 2 years of taking office after the next election (which is due by early 2025 but is widely expected to take place in the second half of 2024).

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

The previously referenced 2023 WMS is not relevant to policy D1 – D4, as the scope of that WMS only impacts energy efficiency standards.

Implementation considerations

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

Similarly, acceptable methodologies (i.e. RICS Whole-Life Carbon Assessments guidance) to comply with D1 and D2 should be set out in guidance.

Industry capability

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

The expectation set by point D4 (demonstrating ease of future building disassembly for future reuse) and D5 (pre-demolition or pre-redevelopment audit) are both within the industry's current capability in that they are part of the most common environmental certification system used across the industry (BREEAM), with widespread take-up (especially within the non-domestic sector):

- Pre-demolition or pre-redevelopment audits are not uncommon in the development sector, as they are one of the actions that developers often choose to take in order to gain certain credits within the very widespread BREEAM certification (relevant credit: BREEEAM 'Wst 01'[cxli]). 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[cxlii].
- BREEAM credit (Wst 06) requires the applicant to produce "a study to explore the ease of disassembly and the functional adaptation potential" of several different design options, and from that study to "develop recommendations or solutions … during or prior to concept design, that aim to enable and facilitate disassembly and functional adaptation". This would be relevant to the recommended policy point D4. Also, any industry body that is also active within London will also have gained exposure to this concept through the GLA's requirement for circular economy statements, whose guidance[cxliii] 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[cxliv] and UKGBC[cxlv,cxlvi].

Development Management capability

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

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

Costs and feasibility

For Policy D1: No robust industry-wide evidence is available about the costs of the embodied carbon assessment, but please see the associated appendix to the current report for an estimated anecdotal cost that could be applicable depending on the expert judgement of the viability consultant.

Alongside testing the feasibility of operational energy policy requirements, the South Oxfordshire and Vale of White Horse evidence base also explored the feasibility and costs of embodied carbon emissions limits on the tested residential and non-residential archetypes. The limit set out under D2 has been shown to be feasible for all archetypes, as modelled under a Part L 2021 scenario. Using typical materials required to comply with Part L 2021 (i.e. current industry standard), no archetype exceeded 559 $kgCO_2/m^2$ GIA. Therefore, this can be considered a cost neutral limit since the Part L 2021 scenario represents business-as-usual. The only costs therefore associated with D1 and D2 only arise from the cost of an embodied carbon assessment, which generally comes at a cost of no more than £15,000. Given that D1 only applies to large-scale development, the relative cost uplift of an embodied carbon assessment is negligible.

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

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

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

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

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

Policy implementation and monitoring

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

Policy compliance

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

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

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

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

In cases where standards fall below required levels at the post-completion stage, it is important to have enforcement mechanisms in place to 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. Coventry 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. Coventry could look to distribute this standardised reporting form to neighbouring authorities to form a regional understanding of policy implementation. Examples of suggested monitoring indicators for new buildings and also renewable energy include:

Indicator	Source	Policy link
Average in-use Energy Use Intensity of new buildings	Development data	A1.2 and B1.2
Average on-site renewable energy generation per m^2 building footprint (kWh)	Development data	A3 and B3
MW capacity of solar PV installed on buildings (kWp)	Planning portal or MCS data	A3 and B3
MW capacity of solar PV installed as standalone scheme (above 1MW)	DESNZ Renewable Energy Planning Database (REPD) data	Other renewable energy policies (out of scope)
MW capacity of wind turbine installed as standalone scheme (above 1MW)	DESNZ REPD data	Other renewable energy policies (out of scope)
MW capacity of battery storage installed	DESNZ REPD data	Other renewable energy policies (out of scope)
Annual CO_2 emissions of new build development (split into regulated and unregulated) and %TER reduction for the regulated portion	Development data	A1, A3, B1 and B3
Average TER % reduction delivered through energy efficiency measures	Development data	A1, B1
£ contribution to renewable energy offsetting fund, £spent, and kWh generation delivered via the fund	Local Authority's own S106 records	A4 and B4
Number of heat pumps installed	Planning portal or MCS data	A1 and B1
Average embodied carbon of new development	Development data	D1 and D2

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

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

Mitigating the performance gap

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

Often the first point of failure of below-par operational energy performance is at the modelling stage, which in the UK is led by use of inaccurate compliance tools for Building Regulations, SAP and SBEM. However, in order to appease the 2023 WMS thus reducing risks to policy adoption at examination, Coventry has selected a policy option that uses SAP (rather than PHPP).

If local policy is to more effectively deliver net zero buildings, alternative methodologies should be used to gain an understanding of building energy performance at the design stage. Proven alternatives are available for both residential and non-residential buildings:

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

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

Coventry's policy implementation will be more effective where applicants are enticed or encouraged to use these (rather than SAP or SBEM) for compliance, especially with policies A1.2, A3, A4, A5, B1.2, B3, B4 and B5. A new residential energy modelling tool for building regulations Part L is current in development nationally: the Home Energy Model, HEM. Although efforts are being made to remedy the inaccuracies of SAP within HEM, the final form and in-practice effectiveness of HEM is not yet known. The Council is encouraged to return to this topic once HEM is well-established and its accuracy evidenced, to consider whether this would be a suitable step within efforts to reduce the performance gap and/or comply with the optional energy performance targets of A1.2 and B1.2.

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

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

Third party verification

The use of accurate assessment and modelling tools is essential to the eventual performance of 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. These are procedural toolkits that are designed to deliver a reduction in the performance gap through following optimal steps during design and construction to make assumptions and modelling more accurate and then to deliver correctly on what was designed. Building Control at local authorities firstly do not have control over all development sites and even at those where the authority does, regular on-site checks are not always carried out. Management systems to ensure high levels of construction quality are necessary to deliver energy performance standards as predicted.

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

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

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

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