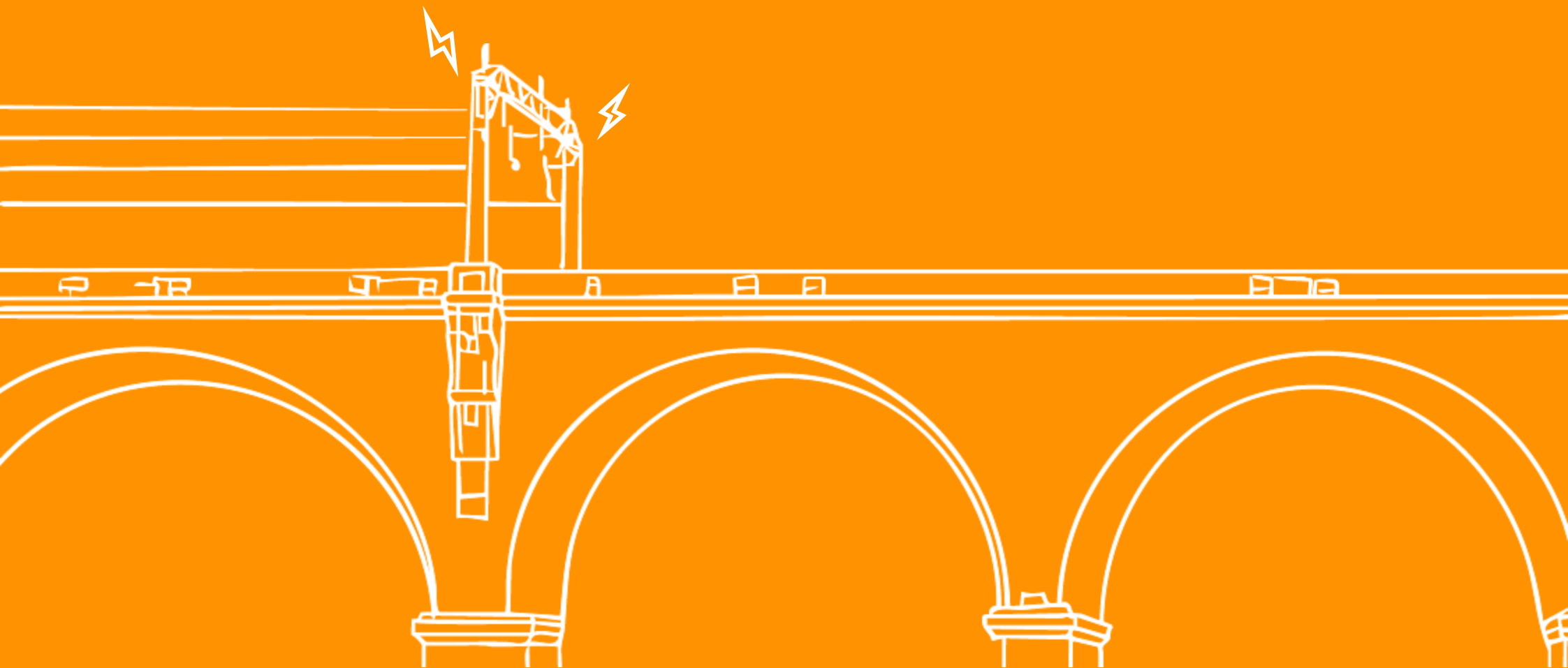




Stockport Net Zero Operational Energy Policy Study

A technical evidence base for planning policy

June 2026

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People.Design



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Technical summary – About this evidence base

The purpose of this study

The purpose of this Operational Energy Policy Study is to provide the technical and cost evidence to support the development of planning policy for reducing operational energy use and increase renewable energy generation for new developments in Stockport.

Addressing operational energy through planning policy is important to meet local and national climate targets. Stockport Council has also simultaneously commissioned an embodied carbon evidence base, to complement this operational energy study.

What is operational energy?

Operational energy is the total energy used by a building to operate annually, including heating/cooling, domestic hot water, ventilation systems, lighting, appliances and plug loads. A full glossary of terms can be found in [Appendix 7.1](#).

The evidence-base provides wider context for the recommendation of operational energy policies in Stockport. It provides a technical evidence base for the introduction of energy-based metrics and targets (space heating demand, energy use intensity and on-site renewable energy) for both new residential and non-residential developments. In addition, commentary is provided on the potential introduction of a low-carbon heating policy approach and an energy offsetting mechanism. Lastly, it provides information on the opportunities to streamline planning submission requirements while maintaining consistency, accuracy and quality across all planning submissions for new developments in Stockport.

Who the study is aimed at

This study was prepared primarily for Stockport Council to inform the development of their energy policy. It builds on an existing body of evidence and was also prepared for members of the public, the Planning Inspectorate, planning officers, the development industry and others interested in how to reduce operational energy in new development.

Two interconnected technical and cost evidence bases used to develop planning policy in Stockport:

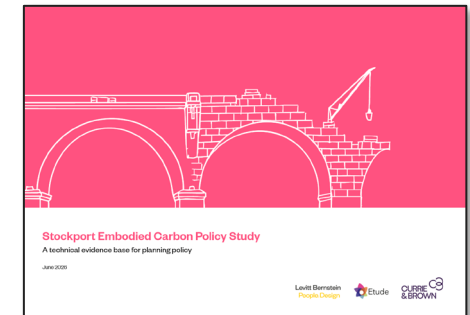


This study – A technical and cost evidence base for operational energy planning policy. The operational energy policy study looks at how to reduce new buildings' energy use and increase on-site renewable energy.

Operational energy is the energy used by the building during its operation and that can be measured by the building's energy meters.

Aim of the operational energy policies:

To go above and beyond the legal minimum set out in building regulations to make homes and buildings lower carbon on a day-to-day basis, and more affordable to run.



Complementary study – A technical and cost evidence base for embodied carbon planning policy. The embodied carbon policy study looks at how to reduce the emissions generated by the manufacture, transport, and use of materials in the construction of buildings.

Embodied carbon is the carbon associated with the manufacture, transport, and use of materials in buildings.

Aim of the embodied carbon policies:

To reduce the carbon intensity linked to buildings during their construction through design, and to support the development of lower carbon buildings through sustainable materials and construction techniques.

Technical summary – The need for an operational energy policy for new buildings in Stockport

There is a climate emergency

There is overwhelming scientific consensus that climate change is happening. The latest Intergovernmental Panel on Climate Change (IPCC) report highlights the urgency for action and has generated a high level of interest in society. The Climate Change Committee (CCC) have highlighted the emergency in their Seventh Carbon Budget, setting out where our greatest emissions lie in the UK.

New buildings can be compliant with our climate targets

New buildings that meet current building regulations (Part L 2021) still produce significant operational carbon emissions. These new buildings are not energy efficient enough, continue to rely on fossil fuels for heating, and generate little renewable energy. However, with existing skills, technologies and affordable methods already in-use, new buildings can be designed today to meet climate commitments, as shown by successful net zero carbon projects. Updates to building regulations (Part L 2026) will move some way towards this, but do not go far enough.

The Climate Change Committee advises that new homes should not add to emissions or require early retrofit. They should be affordable to run, minimise embodied carbon through construction and materials, use as little energy as possible, and help residents benefit from flexible energy pricing to reduce fuel poverty.

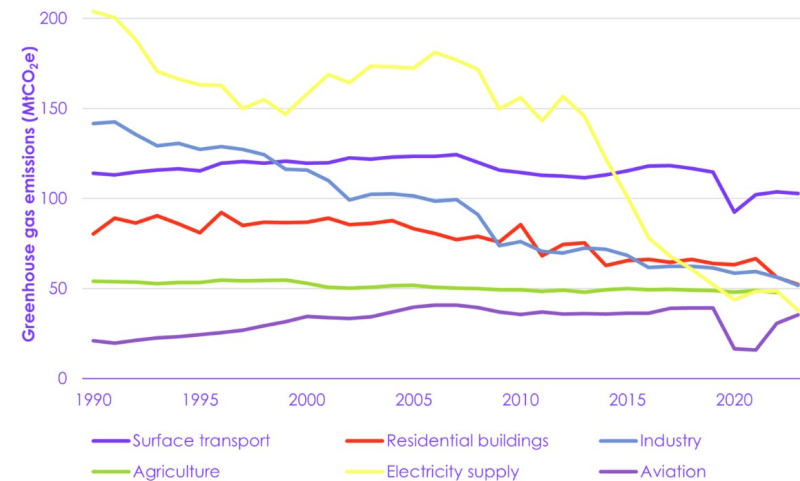
Stockport Climate Emergency commitments

Stockport Council formally declared a climate emergency in March 2019 and since then it has set two main targets: to be operationally net zero by 2030 and carbon neutral by 2038. The Climate and Nature (CAN) Strategy sets out key objectives on which planning policies should be based on – including improving energy efficiency of buildings and creating healthier environment for residents.

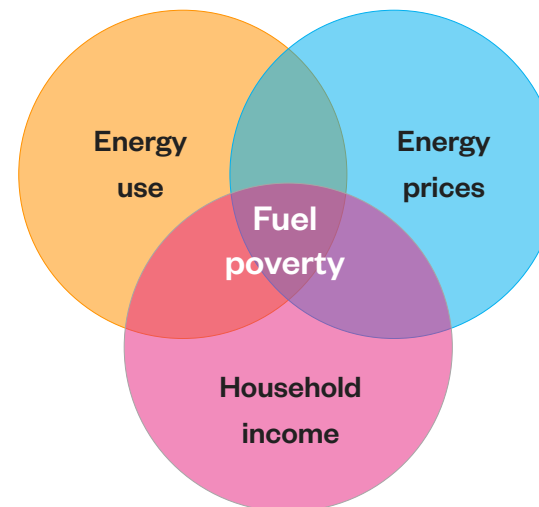
Stockport Council has duties and powers to mitigate climate change

The National Planning Policy Framework 2023 recognises that the Climate Change Act 2008 duties are relevant to planning for climate change. Paragraph 158 requires that local plans should “take a proactive approach to mitigating and adapting to climate change”. Section 19 of the Planning and Compulsory Purchase Act 2004 requires that development plan documents must include policies designed to secure that development and use of land “contribute to mitigation of, and adaptation to, climate change”.

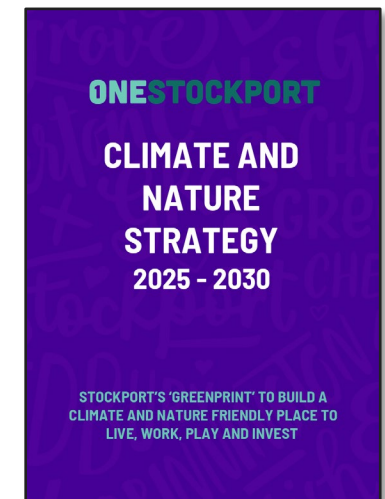
(a) Today's six highest-emitting sectors



Climate Change Committee – Seventh Carbon Budget – The residential building sector has been the second highest emitter of greenhouse gas emissions by sector since 2017. The emissions from these buildings are closely linked to their operational energy use, which relies on the building systems and fabric to be effective. The use of heat pumps in new homes is projected to significantly contribute to emissions reductions.



The dwelling's energy use is one of the three key factors contributing to fuel poverty.



[Stockport Council's - Climate and Nature \(CAN\) Strategy 2025-2030](#)

Technical summary – A crucial move towards energy-based metrics and predictive energy modelling

As part of this study key UK approaches to assess and reduce operational energy in buildings, including national building regulations (Part L), industry standards (e.g. UK Net Zero Carbon Building Standard) and local planning policies have been reviewed to identify the most suitable ones for Stockport's operational energy planning policies.

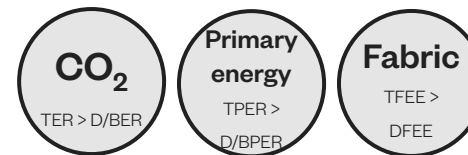
Why should the new Stockport Local Plan go further than Building regulations Part L?

This evidence-base focuses on operational energy approaches that go beyond current building regulations because current standards do not achieve the level of energy and carbon reduction needed to meet climate targets (e.g. fossil fuel heating is still allowed and minimum fabric specifications perform poorly). Part L 2021 uses a set of relative metrics combined with the SAP/SBEM compliance tools that do not accurately predict or encourage design strategies to effectively minimise energy use. The recently released residential Part L 2026 encourages low carbon heating systems and renewable energy generation, but the fabric and ventilation uses the same assessment approach and similar fabric specifications to Part L 2021. A new compliance tool called the Home Energy Model (HEM) is expected to improve prediction accuracy, however, its performance cannot be fully tested until its launch.

Energy-based metrics and predictive energy modelling supported by the industry and over 30 adopted/ emerging local plans

Industry guidance and over 30 local authorities in England support the use of three absolute energy-based metrics to assess and improve the operational energy of buildings; **space heating demand**, **energy use intensity** and **on-site renewable energy generation**. Unlike Part L relative metrics, energy-based approaches measure predicted energy use, support better environmental design and reduce the performance gap between design and completed buildings. Industry guidance also supports the use of predictive energy modelling, such as Passivhaus Planning Package (PHPP), to provide more accurate estimates of in-use energy performance and support better building design outcomes. Examples of key industry organisations and adopted local plans in support of these energy-based metrics include: Climate Change Committee (CCC), the Royal Institute of British Architects (RIBA), the UK Net Zero Carbon Building Standard (NZCBS), Places for Everyone Joint Development Plan (Greater Manchester Combined Authority), Cornwall's and Bath and North East Somerset's Local Plans.

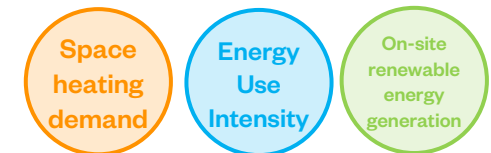
Approved Document Part L 2021 relative metrics (%)



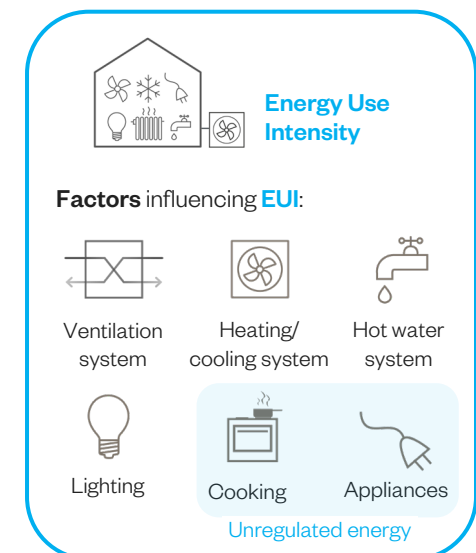
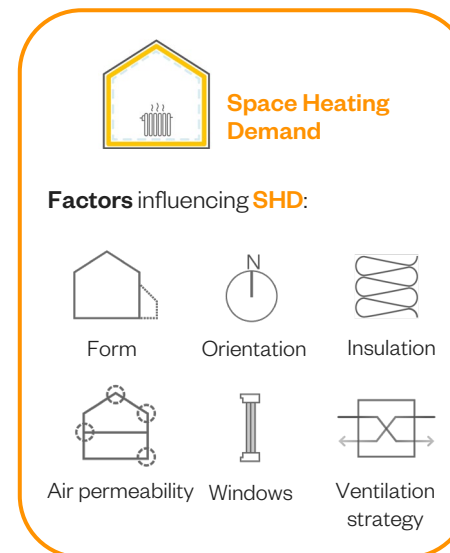
Summary of Approved Document Part L1 and 2 metrics (% reductions over a set of 'notional' building specifications)

Relative metrics: The use of relative metrics by Part L is problematic as it only tells the applicant how much better their proposed building is compared to a fictional version of their building with a standardised specification for fabric and systems. Relative metrics do not appraise the design of a building (whether it could have been better orientated, have a more efficient building form, and better design for heat loss and gain from the sun), nor do they relate to the predicted energy consumption of a building in-use.

Proposed policy energy-based absolute metrics (kWh/m²GIA/yr)



Absolute metrics: Energy based metrics are measured in kilo Watt hours, per square metre of the gross internal area of a new development, on an annual basis (kWh/m²GIA/yr). These demonstrate the building's performance taking into account the environmental design and ultimately predicting the energy consumption of a building in-use. For which this could be compared to the meter readings in-use.



Factors influencing space heating demand and energy use intensity metrics.

Technical summary – An approach consistent with other local plans and industry guidance

Targets, limits and benchmarks

A growing number of net zero policies that use energy-based metrics have been found sound and justified by Planning Inspectors through the examination process.

Evidence submitted as part of Local Plan examinations has demonstrated that local energy efficiency standards going beyond the minimum Building Regulations are viable where proportionate and supported by appropriate technical feasibility and viability work.

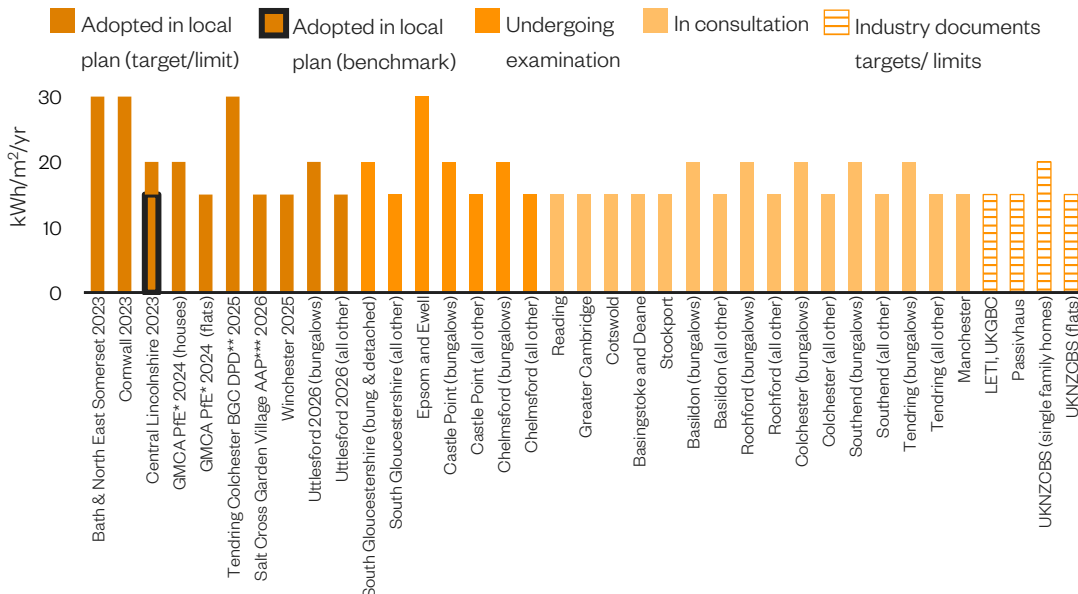
In a study carried out in 2026 by the Low Energy Transformation Initiative (LETI) for the NPPF consultation- the Ministry of Housing, Communities and Local Government (MHCLG) data demonstrated that local net zero energy policies introduced by Bath & North East Somerset Council and Cornwall Council in 2023 did not stifle planning and development in these areas. There has been no evidence that net zero policies make the planning process too complex or that they constrain housing delivery.

In addition, viability has been proven across 16 different local planning authorities. Policy examination reports frequently state that there are no viability issues found with local policies adopting energy-based metrics with similar space heating demand and energy use intensity limits and targets as those tested in this evidence base.

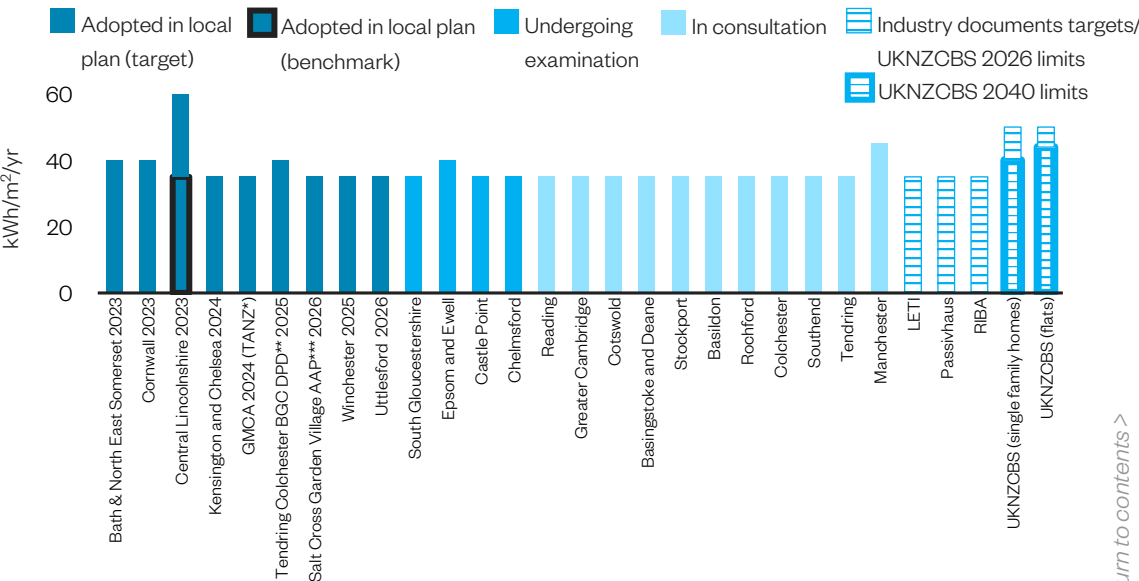
Net Zero Carbon Building Standard – well evidenced targets

The Net Zero Carbon Building Standard (NZOBS) represents the biggest cross industry working group that has looked at a net zero definition. The research is a comprehensive review of previous guidance and targets. As part of this, limits (energy use and embodied carbon) have been set using case study data submitted by the industry and correlated with technical feasibility and the national carbon budget. Following the release of Version 1, projects are now able to verify that they conform to the as-built/in-use metrics in the Standard.

This sets the bar for what is possible and achievable for new developments.



Residential space heating demand (SHD) targets and limits from local plans and industry



Residential energy use intensity (EUI) targets and limits from various sources. The UK NZOBS limits are based on in-use energy data. Passivhaus does not have an EUI limit, however Passivhaus homes broadly meet an EUI of 35 kWh/m²/yr.

Technical summary – The development of two performance levels for residential developments

Performance levels methodology

Clear quantitative targets are needed for each energy-based metric to ensure planning policies deliver measurable reductions in operational energy use and renewable energy generation. Two performance level options, including targets for space heating demand (SHD), energy use intensity (EUI) and on-site renewables generation, have been developed to test their technical feasibility and viability in the Stockport area for new residential developments.

- **Level 1** (SHD 30 kWh/m²GIA/yr , EUI 40 kWh/m²GIA/yr and 40% PV footprint coverage) represents an intermediate performance step between Part L 2026 and best practice.
- **Level 2** (SHD 20 houses/ 15 flats kWh/m²GIA/yr , EUI 35 kWh/m²GIA/yr and 40% PV footprint coverage) represents best practice, aligning with the GMCA Places for Everyone Joint Development Plan (PfE) targets.

Both levels support good fabric and energy efficiency. A single renewable energy target of minimum 40% PV roof coverage is also proposed under both levels, aligning (broadly) with both Part L 2026 and Places for Everyone target.

How performance levels compare to others

The options for SHD and EUI performance and levels align with adopted and emerging local plans, industry guidance, and the UK NZCBS, supporting their technical feasibility and deliverability. The targets fall within the range commonly used across operational energy policies in local plans in England and reflect differences in climate, viability and building typology. For Level 2, the evidence supports different SHD best practice targets for houses and flats due to variations in building form and heat losses, with houses typically being more challenging than flats.

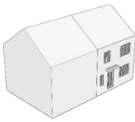
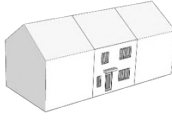
Energy modelling and cost assessment of performance levels across five residential building typologies

The modelling of five residential building typologies (detached, semi-detached and terrace houses and low-rise and mid-rise block of flats) demonstrated the technical feasibility of both performance level options using a range of fabric and system specifications. A cost assessment identified the capital cost uplifts and running cost savings of Level 1 and 2 compared with current Part L 2021 and anticipated Part L 2026 notional specification requirements.

See [Appendix 7.2](#) for the full set of specifications tested.

	Level 1 <i>Intermediary</i>	Level 2 <i>Aligns with 'Best Practice' and PfE</i>	
Space heating demand (SHD) (kWh/m ² GIA/yr)	30	20 (houses)	15 (block of flats)
Energy use intensity (EUI) (kWh/m ² GIA/yr)	40	35	
On-site renewable energy generation (% of the building's footprint covered by PVs)	40	40	

Performance level 1 and level 2 options developed for residential developments to understand their technical feasibility and viability.

	 Detached	 Semi-detached	 Terraced	 Low-rise	 Mid-rise
Gross Internal Area (m ²)	142	93	93	641	3202
Form factor	2.8	2.6	2.0	2.0	1.1

Graphical representation of the residential typologies modelled and their general information.

Technical summary - Operational energy modelling and cost analysis results for houses

Space heating demand (SHD) results

Part L 2021 and 2026 notional specification scenarios deliver similar SHD due to broadly comparable fabric standards, with only minor airtightness improvements. Levels 1 and 2 have SHD around three times lower than Part L 2021 and 2026. Level 1 and Level 2 SHD targets significantly improve comfort and performance, and are technically feasible across all housing typologies.

Energy use intensity (EUI) results

Part L 2021 shows the highest EUI, averaging around three times that of Part L 2026 and Levels 1 and 2 scenarios, largely due to permitted gas boilers. Level 1 and 2 deliver a 10-20% reduction in EUI when compared to Part L 2026. It is demonstrated that for all three housing typologies both Level 1 and Level 2 SHD targets are technically achievable.

On-site renewable energy generation results

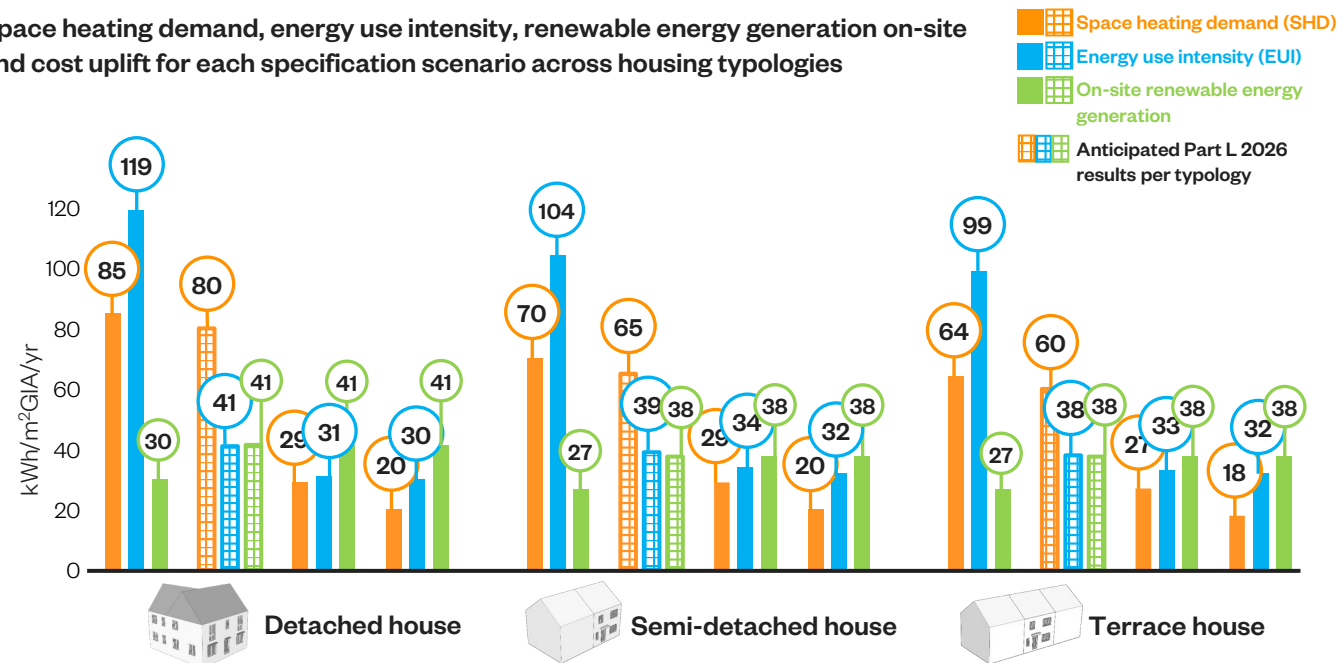
The use of on-site renewable energy generation at 40% of building's footprint meets or exceeds the amount of energy consumed by the homes annually for Levels 1 and 2, generally achieving an annual [energy balance](#) between energy use and generation across all housing typologies.

Capital and running cost analysis

The **capital cost** uplift of Level 1 and 2 from Part L 2021 ranges from **5.2–7.8%**, dependent on the housing typology. This is largely due to better fabric specifications, heat pumps and renewables underpinning the Level 1 and 2 scenarios. Compared to Part L 2026, the **capital cost** uplift ranges fall to **1.5–4.9%**, due to the Part L 2026 scenario already incorporating a low-carbon heating system and renewables.

Running cost savings are expected to be **42-61%** cheaper than Part L 2021 and **17-43%** cheaper than Part L 2026.

Space heating demand, energy use intensity, renewable energy generation on-site and cost uplift for each specification scenario across housing typologies



Specification scenarios	Part L 2021 (notional building spec.)	Part L 2026 (notional building spec.)	Level 1 (SHD 30, EUI 40, PVs 40%)	Level 2 (SHD 20, EUI 35, PVs 40%)	Part L 2021 (notional building spec.)	Part L 2026 (notional building spec.)	Level 1 (SHD 30, EUI 40, PVs 40%)	Level 2 (SHD 20, EUI 35, PVs 40%)	Part L 2021 (notional building spec.)	Part L 2026 (notional building spec.)	Level 1 (SHD 30, EUI 40, PVs 40%)	Level 2 (SHD 20, EUI 35, PVs 40%)
Capital cost uplift from Part L 2021 notional spec. scenario	Baseline	+2.8%	+6.6%	+7.8%	Baseline	+3.7%	+6.4%	+7.7%	Baseline	+3.7%	+5.2%	+7.2%
Capital cost uplift from Part L 2026 notional spec. scenario	-	Baseline	+3.8%	+4.9%	-	Baseline	+2.6%	+3.8%	-	Baseline	+1.5%	+3.4%
Running cost savings from Part L 2021 notional spec. scenario	Baseline	32%	58%	61%	Baseline	30%	42%	46%	Baseline	30%	43%	44%
Running cost savings from Part L 2026 notional spec. scenario	-	Baseline	39%	43%	-	Baseline	17%	23%	-	Baseline	18%	20%

Technical summary - Operational energy modelling and cost analysis results for flats

Space heating demand (SHD) results

Part L 2021 and 2026 notional specification scenarios deliver similar SHD due to broadly comparable fabric standards, with only minor airtightness improvements. Level 1 has a SHD around two times lower than Part L 2021 and 2026 and Level 2 four times lower. Level 1 and Level 2 SHD targets significantly improve comfort and performance, and are technically feasible across all housing typologies.

Energy use intensity (EUI) results

Part L 2021 delivers the highest EUI, averaging around three times higher than Part L 2026 and Levels 1 and 2. Part L 2026 reduces EUI to roughly one-third of Part L 2021 through the use of low-carbon heat pumps. Level 1 and 2 deliver a 10-20% reduction in EUI when compared to Part L 2026. Both Level 1 and Level 2 EUI targets are proven to be technically achievable for both block of flats typologies.

On-site renewable energy generation results

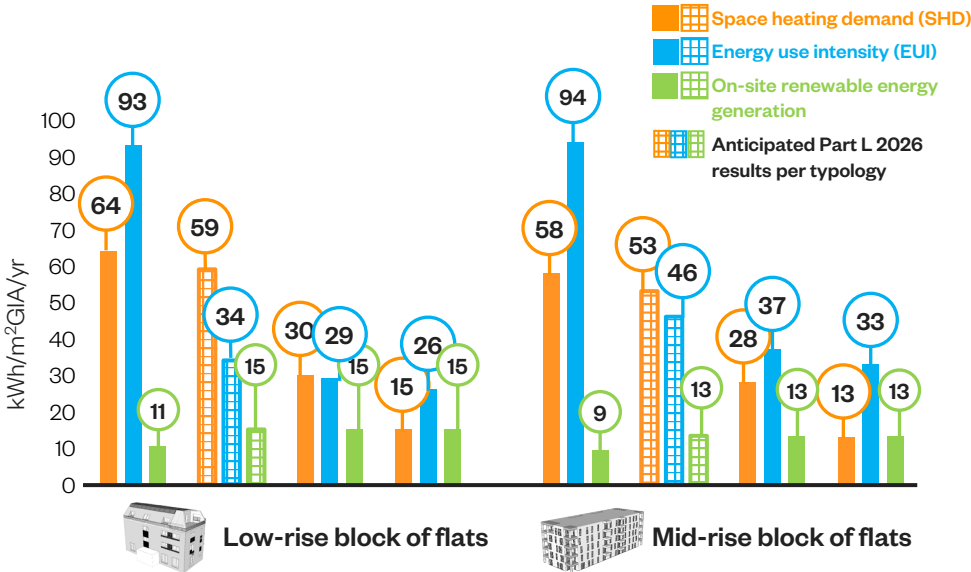
Part L 2021 renewables provision supplies under 10% of energy demand for both block-of-flats typologies. Level 1 and Level 2 generate close to half of total energy use, although no scenarios achieve [energy balance](#). Maximising roof-mounted PV beyond minimum target of 40% of building's footprint could achieve an energy balance for these typologies.

Capital and running (price cap) cost analysis

The **capital cost** uplift of Level 1 and 2 from Part L 2021 ranges from **2.8–7.0%** dependent on the typology. This is largely due to better fabric specs, heat pumps and PVs within Level 1 and 2 scenarios. Compared to Part L 2026, the **capital cost** uplift is **0.9–3.9%**, due to the Part L 2026 scenario already incorporating an efficient low-carbon heating system and the 40% renewables target.

Running cost savings are expected to be **10-38%** cheaper than Part L 2021 and **19-34%** cheaper than Part L 2026.

Space heating demand, energy use intensity, renewable energy generation on-site and cost uplift for each specification scenario across block of flats typologies



Specification scenarios	Part L 2021 (notional building spec.)	Part L 2026 (notional building spec.)	Level 1 (SHD 30, EUI 40, PVs 40%)	Level 2 (SHD 20, EUI 35, PVs 40%)	Part L 2021 (notional building spec.)	Part L 2026 (notional building spec.)	Level 1 (SHD 30, EUI 40, PVs 40%)	Level 2 (SHD 20, EUI 35, PVs 40%)
Capital cost uplift from Part L 2021 notional spec. scenario	Baseline	+3.0%	+5.4%	+7.0%	Baseline	+1.3%	+2.8%	+4.7%
Capital cost uplift from Part L 2026 notional spec. scenario	-	Baseline	+1.8%	+3.9%	-	Baseline	+0.9%	+3.4%
Running cost savings from Part L 2021 notional spec. scenario	Baseline	13%	29%	38%	Baseline	-17%	10%	23%
Running cost savings from Part L 2026 notional spec. scenario	-	Baseline	19%	29%	-	Baseline	23%	34%

Technical summary – Operational energy policy evidence-base for non-residential developments

Building on existing evidence for non-residential buildings

In general, there is a large variation in operational and energy use patterns across non-residential building typologies. Therefore, existing evidence bases, modelled data and industry standards have been analysed to draw conclusions on recommended targets for policy.

Space heating demand (SHD)

There are three types of non-residential buildings which would benefit from a low space heating demand:

1. Buildings not classified as use class C3 'dwellinghouses', but with a similar energy use as residential: this mainly applies to planning class use C2 : **residential care homes, student/boarder accommodation, some non-specialist nursing homes**, but not hospitals or nursing homes.
2. Primary and secondary **schools** generally have a large building envelope and need to achieve high levels of comfort and air quality: limiting space heating demand can help achieve this while ensuring low energy bills.
3. Other buildings (e.g., **offices** and **heated industrial buildings**) as they are likely to benefit from a good envelope and low energy bills.

Energy use intensity (EUI)

Offices, schools and Industrial tend to be the three non-residential building types that have the most consistent EUIs.

A review of limits based on modelling or benchmarks from industry standards and existing evidence bases highlighted commonality in target setting that could be used by Stockport Council.

However, industrial use classes tend to be more challenging to set a target on depending if they are heated or unheated, and the bespoke nature of their uses.

On-site renewable energy generation

All development would benefit from the inclusion of on-site renewable energy generation, with non-domestic buildings holding the greatest opportunity to include renewable technologies on expansive roof areas.

	Offices	Schools	Industrial
Space heating demand (SHD) (kWh/m ² GIA/yr)	20	20	20
Energy use intensity (EUI) (kWh/m ² GIA/yr)	70	65	35-50
On-site renewable energy generation (% of the building's footprint covered by PVs)	40	40	40

Performance level suggestions for non-residential developments

Technical summary - Low carbon heat

Important considerations for Stockport Local Plan

The new Stockport Local Plan can ensure planning decisions positively influence the choice of heating systems. These systems should be affordable to run, financially viable, aligned with Stockport's Net Zero Carbon ambitions and compatible with local infrastructure development plans.

Rather than prescribing specific technologies, the Local Plan should provide a clear decision-making framework that translates these ambitions into practical requirements for applicants.

The heating revolution has started

Fifteen years ago, decarbonising heat focused on preventing gas boilers in new homes, as they would lock in fossil fuel use and high emissions for decades. At the time, communal low-carbon heating and heat networks were seen as essential. Since then, and largely due to the decarbonisation of the electricity grid, with a wider range of development-scale electric systems now able to deliver low-carbon heat using low-carbon electricity.

Focusing on outcomes: heat should be low carbon and affordable

In order to ensure that the system selected by the applicant does indeed provide low carbon and affordable heat to the residents, it is recommended that a **'low carbon heat appraisal' is required for all major planning applications.**

Potential future Stockport Town Centre low carbon heat network

Assuming that the Stockport Town Centre heat network is constructed, that it is low carbon and that it is the most economic low carbon heating solution available, new developments should be able to connect to it.

We recommend an additional **10kWh/m²GIA/yr** policy allowance on the EUI is applied for connection to district heat networks. This accounts for the conversion of metered heat (which includes the total energy consumed by the district heating system and any distribution losses), ensuring connected buildings are not disadvantaged compared to buildings using individual or on-site communal low-carbon heating systems.

Stockport objective	Key considerations
Affordability of heat for Stockport residents	• Cost of heat (per kWh) • Maintenance costs • Replacement costs • Consumer protection (e.g. energy price cap) • Access to flexible/lower tariffs
Viability for applicants	• Impact on construction costs
Consistency with Net Zero and environmental ambitions for Stockport	• Consistency with climate change mitigation objectives • Impact on local pollution (e.g. air quality, noise) • Impact on public health (e.g. overheating risk)
Consistency with Stockport's strategic infrastructure development	• Electricity infrastructure • Delivering low carbon heating for neighbourhoods

Framework for choosing the most appropriate heating/ hot water systems – low carbon heat appraisal.

Technical summary – Implementation

Streamlining planning submission requirements will save the applicant and Stockport Council time and resource. A simpler submission process will divert time away from the submission and back towards the quality of the analysis underpinning the submission. To ensure transparency and delivery against the intent of policy, applicants should be required to submit predictive energy and carbon data (as a summary) with an explanation of how new development has achieved the level of performance (in a standardised way).

Achieving quality

A well-thought through submission process can replace the need for vast amounts of data and onerous verification in the quest for quality. To achieve quality submissions and outcomes Stockport Council should consider:

- Providing updated guidance and tools
- Carrying out spot checks on energy calculations which require more detail to be shared with third parties for analysis
- Building an expert Stockport energy and carbon panel

Simplified submission process

In order to make a submission process more simple and effective, it could follow similar guidance to GMCA and be split into two parts:

- **Energy and Carbon Proforma** - A summary Excel tool for applicants to complete and submit as part of outline and full planning applications with final results. The data entered into the proforma would be expected to be backed by further detail included in an Energy and Carbon Statement.
- **Energy and Carbon Statement** - An Energy and Carbon Statement using a standardised contents list to describe how a development meets the energy and carbon policies.

Bringing proportionality to policy and planning submissions

The scale of submission requirements should be proportionate to the scale of the development (minor/major/referable). Submission requirements should also vary depending on the stage/type of application (outline planning application or full/reserved matters application), and by sector.

Pre-app	Description	• Summary of efforts made to reduce space heating demand through environmental design and specification, reduce energy use intensity through provision and selection of low carbon heating, and increase the provision of renewable technologies.
	Format	• Short presentation at pre-app against a checklist of topics.
	Governance	• Unless a pre-app is made mandatory for all major projects then this will remain optional.
Planning submission	Description	Outline, full and reserved matters applications: • Predictive energy modelling carried out for a sample set • Operational energy limits set in planning to be met • Compliance with the 'passive design test' (full), or commitment to comply (outline).
	Format	Outline applications: • Commitment to achieve operational energy limits and use of predictive energy modelling. Demonstration of environmental design and how it will contribute to meeting operational limits. Full and reserved matters applications: • Energy and carbon proforma that collates and summarises the predictive energy modelling results. • Supplementary energy and carbon statement describing how a reduction in operational energy has been achieved, with appendices for detailed results from modelling. This should include a low carbon heat appraisal and outcomes of the cooling passive design test.
	Governance	• Refusal of permission if limits are not met.
Discharge of pre-commencement condition, required again as part of Discharge of pre-occupation	Description	• Updated predictive energy modelling carried out for all buildings. Confirmation that the SHD, EUI limits and Renewable energy targets submitted at planning have been followed through during construction.
	Format	• Resubmission of energy and carbon proforma • Confirmation statement of any amendments made since planning permission was granted.
	Governance	• Officer discretion with regards to actions to be taken in relation to compliance with policy or non-alignment with original planning application.

1

The justification for operational energy policies

The need for operational energy policy to support global and national commitments

Global climate emergency

There is overwhelming scientific consensus that significant climate change is happening. This is evidenced in the latest assessment of the Intergovernmental Panel on Climate Change (IPCC AR6). The IPCC Synthesis Report, published in 2023, summarises five years of reports on global temperature rises, fossil fuel emissions and climate impacts. To keep within the 1.5°C limit, emissions need to be reduced by at least 43% by 2030 compared to 2019 levels, and at least 60% by 2035. This is the decisive decade to make that happen.

National commitment

The UK's national commitment is set through the Climate Change Act 2008, which was updated in 2019. It legislates that the UK must be net zero carbon by 2050 and sets a system of carbon budgets to ensure that the UK does not emit more than its allowance in the next 27 years. This legal requirement is underpinned by the Climate Change Committee's (CCC) report 'Net Zero: The UK's Contribution to Stopping Global Warming'. Net Zero is not only about a destination: a very significant and fast decarbonisation pathway is needed. The Climate Change Committee's Seventh Carbon Budget (Feb 2025) sets a Balanced Pathway to Net Zero and highlights that residential buildings are the second highest greenhouse gas emitting sector.

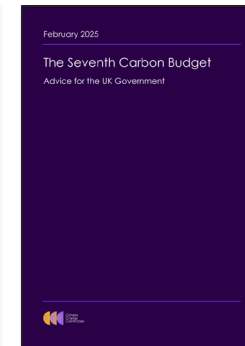
By 2040, offshore wind is projected to grow six-fold from 15 GW of capacity in 2023 to 88 GW by 2040. Onshore wind capacity will double to 32 GW by 2040 and solar capacity will increase to 82 GW. Alongside renewables, storable forms of energy will ensure a reliable supply of electricity even in adverse weather years. These technologies will need to be accompanied by rapidly expanding the transmission grid, upgrading the distribution network, and speeding up the grid connection process.

By 2040, half of existing homes in the UK will need to be heated using a heat pump, this would be up from around 1% in 2023. This requires the annual rate of heat pump installations in existing residential properties to rise from 60,000 in 2023 to nearly 450,000 by 2030 and around 1.5 million by 2035, a rate of increase in line with that seen in other European countries.

To ensure the UK can continue on the projected decarbonisation pathway, new residential buildings should not be contributing further to emissions, or be left in a position to require retrofit shortly after being built. New homes must therefore be built with low carbon heat sources such as heat pumps, with a fabric performance to support higher efficiencies, and solar generation to ease local pressures on the transmission grid.



Net Zero: The UK's Contribution to Stopping Global Warming
(Source: [CCC, 2019](#))

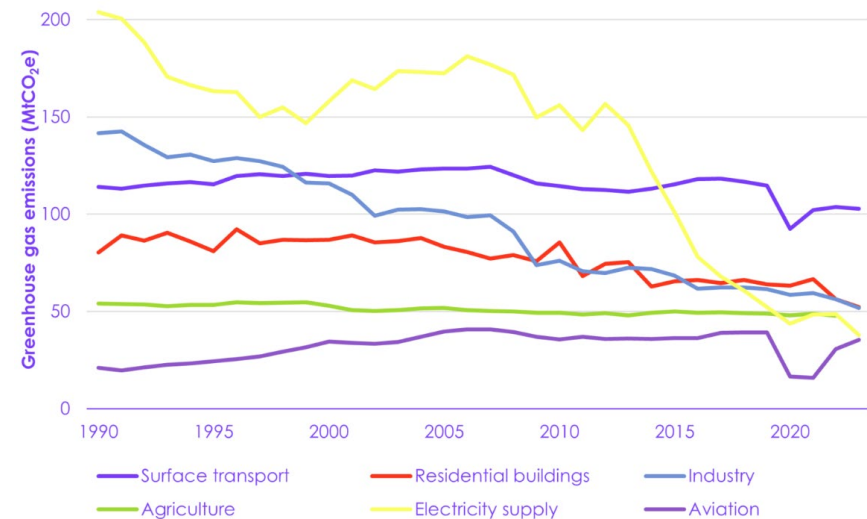


The seventh carbon budget
(Source: [CCC, 2025](#))

The UK's path to Net Zero

"By the middle of the Seventh Carbon Budget, on our pathway, emissions in the UK will be only a quarter of the level they are today, and 87% lower than levels in 1990".

(a) Today's six highest-emitting sectors



Climate Change Committee – Seventh Carbon Budget – The residential building sector has been the second highest emitter of greenhouse gas emissions by sector since 2017. The emissions from these buildings are closely linked to their operational energy use, which relies on the building systems and fabric to be effective. The use of heat pumps in new homes is projected to significantly contribute to emissions reductions.

Stockport Council's climate change commitments

Stockport Climate Emergency commitments

Stockport Council declared a climate emergency in March 2019 and has set two key targets:

- To be operationally net zero emissions by 2030 in their own activities
- To be carbon neutral by 2038, also in line with the commitments made in the 2025 [5-year Environmental Plan for Greater Manchester](#);

Climate and Nature Strategy 2025-2030

The Climate and Nature (CAN) Strategy, formerly known as the Climate Action Now Plan, was developed in 2025 by the council and local partners to tackle climate change, protect biodiversity and create a healthier environment for residents. It sets out a long-term vision to achieve carbon neutrality by 2038 and net zero council emissions by 2030, while improving green spaces, supporting wildlife, and promoting sustainable development and transport. It is also part of the broader [One Stockport: One Future plan](#).

The CAN Strategy sets out key objectives for Stockport's built environment:

- Improve energy efficiency to reduce energy demand and fuel poverty;
- Design and build high quality buildings for good internal thermal comfort, air quality and resilience against extreme weather events;
- Maximise opportunities for renewable energy generation, and
- Implement nature-based solutions to improve biodiversity

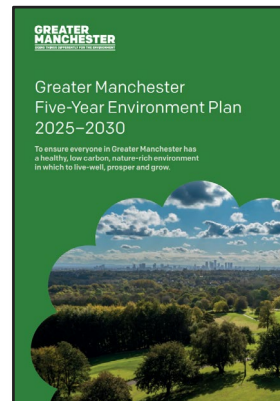
Greater Manchester Five-Year Environment Plan 2025-2030

Greater Manchester's Five Year Environmental Plan aims to create a sustainable, low-carbon region while supporting economic growth. As the building sector accounts for 42% of emissions, key priorities include:

- **Improving efficiency:** Reducing energy demand for heating and cooling buildings to meet carbon-neutral goals by 2038.
- **Housing:** Supporting the "Housing First" standards to ensure all residents have access to safe, affordable, and sustainable homes.
- **Net-Zero Development:** Delivering operational net-zero new builds in line with Places for Everyone and national standards, alongside the development of "Truly Affordable Net-Zero Housing" (TANZ).
- **Environmental Planning:** Incorporating the assessment of embodied carbon into the regional planning system.



[The Climate and Nature \(CAN\) Strategy 2025-2030](#) document (above and right).



[The Greater Manchester Five Year Environment Plan 2025-2030](#)

OUR GREENPRINT

for a climate and nature friendly Stockport

Stockport will be a climate and nature-friendly place to live, work, play and invest. Every child will grow up in a healthy environment with good jobs, homes, and services. There will be clean, green transport and accessible parks and areas for nature. Stockport will be ready for whatever changes and opportunities will come in the future; and will be prepared for the impacts of extreme weather events. People across Stockport will collaborate and contribute to climate and nature actions.

Stockport CAN

The council will work alongside residents, schools, businesses and organisations to achieve carbon neutrality for everything that happens in Stockport by 2038.

Council CAN

We will reduce Stockport Council's greenhouse gas emissions to meet our target to be operationally net zero by 2030 and will enhance biodiversity on our sites and buildings. We can do this by increasing energy efficiency, generating more clean and secure energy locally, and looking after nature.

Low Carbon Buildings

Homes will be affordable to heat, damp free, stay cool in summer and have good air quality. A sustainable construction and green tech sector will create great jobs for Stockport residents and boost our economy.

Renewable Energy

Our communities will be protected from global shocks because we will produce more energy locally. All the heating and power we need will come from clean, renewable energy.

Sustainable Transport

Reduced car pollution on our roads will improve our health and help our children to thrive. People will be able to choose the most sustainable travel options for their journeys—easily and affordably.

Nature based solutions

Nature in our parks and outside spaces will help to lessen the impacts of extreme weather - providing shade during heatwaves and lowering the risk of flooding.

Nature Recovery

Our communities will enjoy and benefit from spending time in nature; whether it's playing in the park, taking a walk, or enjoying some time gardening. A wide variety of plants, animals and insects will thrive in Stockport.

Adaptation & Resilience

People will be safe and supported during and after extreme weather events. Thriving neighbourhoods will help people in Stockport to take community action to support each other.

The need for action in new buildings and the impact on energy bills

New buildings must not add to the problem

Operational carbon emissions associated with new buildings are still very significant. These new buildings are not energy efficient enough, some of them continue to have fossil fuels for heating and hot water (e.g. gas boilers) installed, and they generate very small amounts of renewable energy. This depletes the carbon budget, putting more pressure on existing buildings to decarbonise.

It costs five times more to achieve the same carbon reduction in existing buildings through retrofit than applying improvements to new buildings.

New buildings can be compliant with climate change commitments

New buildings designed and built, today, with available and affordable skills, techniques and technologies can be compliant with climate change commitments. In their *UK housing: Fit for the future?* Report the Climate Change Committee provides clear guidance on what should be expected from new buildings from now on and in particular:

- an ultra-low level of energy use (i.e. 15-20 kWh/m²/yr space heating)
- a low carbon heating system (such as a heat pump)

Running costs are a growing concern

Energy costs have always been a concern for those affected by fuel poverty and it is now a major issue for many.

There are three factors contributing to fuel poverty: energy prices (set by the market and vulnerable to global politics), the household income and the dwelling's energy consumption. New buildings should use as little energy as possible and enable residents to make the most of flexible energy prices.

- An energy efficient dwelling will help to reduce energy consumption which in turn will reduce energy bills.
- It will also make the temperature more stable, enabling a 'smart' heating system to make the most of flexible dynamic electricity prices. If electricity is used for heating and cooling, this benefit could be much more substantial with the use of 'Time of Use' tariffs.

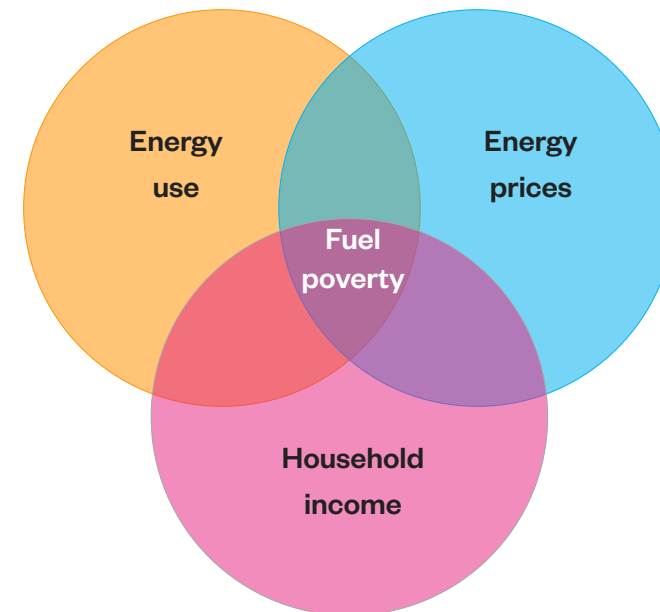
The positive role of renewable energy generation on bills

PV generation can and should benefit residents. A solar PV system can generate significant cost savings when electricity is used by residents on-site, and some revenues through the export of electricity to the grid.



"New homes should deliver ultra-high levels of energy efficiency as soon as possible and by 2025 at the latest, consistent with a space heat demand of 15-20 kWh/m²/yr. Designing in these features from the start is around one-fifth of the cost of retrofitting to the same quality and standard."

Extract from UK [Housing: Fit for the Future?](#) Committee on Climate Change, 2019.



The dwelling's energy use is one of the three key factors contributing to fuel poverty. Delivering benefits for residents is key to ensure a 'just' energy transition.

There is a performance gap leading to additional carbon emissions and energy costs

There is significant industry evidence¹ to suggest that buildings do not perform as well when they are completed as was anticipated when they were being designed. The difference between anticipated and actual performance is known as the performance gap, this leads to increased energy bills for occupants and carbon emissions.

Factors contributing to the performance gap

Studies have suggested that in-use energy consumption can be 5 to 10 times higher than design calculations. Factors contributing to this include:

- A lack of monitoring and feedback following occupancy.
- Design assumptions and compliance models do not reflect the in-use performance of buildings.
- Calculations for regulatory compliance do not account for all energy uses in buildings (regulated emissions only).
- Unregulated sources of energy consumption (such as small power loads, server rooms, fume cupboards and external lighting) are rarely considered at the design stage. Yet these can account for a significant amount of energy consumption.
- There are discrepancies between design specifications and the specification and quality of works as-built.
- There are rarely any consequences for developers, designers, contractors and suppliers when energy consumption exceeds predictions.
- Site practices that may have been acceptable in the past, no longer meet the required standards for net zero carbon (e.g. airtightness).
- The design, installation and commissioning of building services is poor and there is a lack of smart metering.

¹ Reports on the performance gap include: [Closing the gap between design and as-built performance, evidence review report \(Zero Carbon Hub\)](#), [Building Performance Evaluation Programme: Findings from domestic projects \(Innovate UK\)](#) and [Closing the gap: Lessons learned on realising the potential of low carbon building design \(The Carbon Trust\)](#).

Typical causes of the performance gap	Potential solution	Can this be resolved through planning system?
Predictive energy model (PHPP, TM54) was not carried out at stage 3, only a part L compliance model was carried out (excluding unregulated energy or poor prediction)	Require predictive modelling as part of the planning submission	✓ Planning policy
Predictive energy model (PHPP, TM54) was not updated at stages 4,5/6. Only Part L EPC produced	Require predictive modelling on completion, prior to handover	✓ Planning condition
Build quality is inconsistent and/or low quality – lack of supervision on site	Require use of an assurance scheme (e.g. Passivhaus)	✓ Planning policy (policy setting and monitoring & building control)
Differences in design specification and as-built specification	Improved ERs, performance specifications	✗ Client/contractor/ design team issue
Design assumptions not reflective of building in use, e.g. data not available to ensure a good prediction, skills of modelling team	Better data and guidance in industry	✗ Design team challenge
Commissioning of systems not carried out, detailed or effective	Regulation, requirement for performance in-use	? Regulation challenge
Lack of smart metering	Requirement for smart metering	✓ Planning policy
Occupant influence – Controls complicated for residents leading to increased energy consumption	Improved ERs, performance specifications	✗ Client/contractor/ design team issue
Occupant influence – lifestyle leading to use of more/less energy than expected	None	✗ Outside of planning and client/design team/ contractor control
No consequence for performance of building, little incentive to get it right, no requirement to get it right	Regulation or planning consequence	✓ Positively incentivise through planning

The powers and duties of local authorities to address climate change

The role of local authorities

Both operational and embodied carbon must be reduced to address the climate crisis. By setting operational energy policies in Local Plans, authorities would be responding appropriately to the below statutes. Local authorities have primary powers to act on their duty to mitigate climate change.

A Local Plan would be expected to address:

- **Section 19(1A) of the Planning and Compulsory Purchase Act 2004**, which requires local planning authorities to include in their Local Plans *“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”*.
- The **Climate Change Act 2008**, which establishes a legally binding target to reduce the UK’s greenhouse gas emissions by 100% in 2050 from 1990 levels. To drive progress and set the UK on a pathway towards this target, the Act introduced a system of carbon budgets.
- The **Planning and Energy Act 2008**, which empowers local planning authorities to include policies in their development plans that impose “reasonable requirements” for energy efficiency and generation.
- The **National Planning Policy Framework (NPPF)**, updated December 2024, states that one of three main objectives of the planning system is environmental, and that *“using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy”* form part of this objective (Para 8). Paragraph 20 sets an expectation that *“strategic policies ... make sufficient provision for” “conservation and enhancement of the natural, built and historic environment including landscapes and green infrastructure...to address climate change mitigation and adaptation”* Footnote 61, para 162 also requires local plans’ approach to climate change to be in line with the objectives and targets of the Climate Change Act 2008.

The Dec 2025 NPPF Consultation proposed to remove the powers of local authorities to set their own energy efficiency standards through PM13, particularly if they were already covered by regulation. However, this proposal lacked justification and evidence, risking an increase in residents energy bills. Determination on the updates to the NPPF are pending at the time of writing this evidence base.

There is [a growing number of local authorities requiring operational energy policy](#).



Planning and Compulsory Purchase Act 2004

2004 CHAPTER 5

An Act to make provision relating to spatial development and town and country planning; and the compulsory acquisition of land.

[13th May 2004]



Climate Change Act 2008

2008 CHAPTER 27

An Act to set a target for the year 2050 for the reduction of targeted greenhouse gas emissions; to provide for a system of carbon budgeting; to establish a Committee on Climate Change; to confer powers to establish trading schemes for the purpose of limiting greenhouse gas emissions or encouraging activities that reduce such emissions or remove greenhouse gas from the atmosphere; to make provision about adaptation to climate change; to confer powers to make schemes for providing financial incentives to produce less domestic waste and to recycle more of what is produced; to make provision about the collection of household waste; to confer powers to make provision about charging for single use carrier bags; to amend the provisions of the Energy Act 2004 about renewable transport fuel obligations; to make provision about carbon emissions reduction targets; to make other provision about climate change; and for connected purposes. 9

[26th November 2008]



Department for Levelling Up,
Housing & Communities

National Planning Policy Framework

Relevant statutes and guidance for planning policy.

Why the 2023 WMS should not represent a barrier to the proposed policies

The 2023 Written Ministerial Statement (WMS)

In December 2023, the Government issued a Written Ministerial Statement on energy efficiency standards in planning. It states that local planning policies should not set requirements above national Building Regulations (Part L 2021) unless there is a clear and well-evidenced justification demonstrating that development remains viable and that any impact on housing supply and affordability has been properly considered in line with national policy.

Reaction to the 2023 WMS

Essex County Council [published the written legal advice](#) provided to them by Estelle Dehon KC. The written advice concludes that the WMS should not prevent local authorities from exercising their statutory powers and duties to set policy.

A judicial review of the 2023 WMS was also undertaken. The [judgment by Mrs Justice Lieven \(published on 2 July 2024\)](#) rejects the three grounds which formed the basis of the judicial review. It highlights that Government “has chosen to put considerable weight on the impact that might have on the supply of new housing, over the potential benefits of imposing higher standards. This is a policy choice for the Minister and is explained in the assessment, and does not disclose any error of law. Experts might disagree on the issue, but that is a matter for policy makers and not the Court”.

In July 2025, the Court of Appeal concluded that even though the WMS remains valid, it does not become a legal barrier for local authorities setting higher energy standards, as long as they are proven to be deliverable, do not undermine housing supply, and are supported by robust viability evidence.

Recent local plan examinations for South Gloucestershire and Uttlesford District Council have provided case examples of where energy based metrics and targets have been found both sound and justified. These examinations were held after the release of the 2023 Written Ministerial Statement and therefore hold weight.

Stockport’s Approach

As a result, Stockport has taken a clear, evidence-led approach to the proposed energy policies, drawing on a technical evidence base and experience from at least 9 examined local plans with similar policies.

A separate viability assessment of the Local Plan will be carried out to determine what level of energy efficiency can be achieved, alongside other policy requirements, without compromising housing delivery.

Planning - Local Energy Efficiency Standards Update

Statement made on 13 December 2023

*“Any planning policies that propose local energy efficiency standards for buildings that go beyond current or planned buildings regulation should be rejected at examination **if they do not 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.*
- The additional requirement is expressed as a percentage uplift of a dwelling’s Target Emissions Rate (TER) calculated using a specified version of the Standard Assessment Procedure (SAP).”*

Key extract of the WMS statement - The 2023 Written Ministerial Statement on Planning – Local Energy Efficiency Standards Update can be found at <https://questions-statements.parliament.uk/written-statements/detail/2023-12-13/hlws120>

IN THE MATTER OF THE BUILDING REGULATIONS, PART L 2021 AND THE PLANNING AND ENERGY ACT 2008

Re: Ability of local planning authorities to set local plan policies that require development to achieve energy efficiency standards above Building Regulations

UPDATED OPEN ADVICE

INTRODUCTION AND SUMMARY

1. I am asked to advise Essex County Council (“**the Council**”) and the Essex Climate Action Commission (“**ECAC**”) on the ability of local planning authorities (“**LPAs**”) to set local plan policies mandating energy efficiency standards for new buildings which exceed those in the Building Regulations, Part L. I initially advised in April 2023, but was asked to update the advice in early 2024. This advice supersedes and replaces my previous advice.

Written legal advice provided to Essex County Council

2

Review of operational energy approaches

Current regulations, local plans and guidance on operational energy

The table opposite summarises key sources that define existing approaches to reducing operational energy of buildings in the UK. The sources are categorised into three main areas:

- National building regulations;
- industry guidance and standards ;
- and adopted and emerging local plans.

They set the bar for what is mandated, possible and achievable for residential and non-residential developments when assessing operational energy. The pages that follow expand on the most relevant key concepts from these documents.

National building regulations set the minimum standard for the operational energy performance of buildings in England. The methodology and performance levels differ from what the industry supports as sufficient to meet our climate commitments.



Approved document L 2021:

Conservation of fuel and power
Vol 1 & Vol 2

Approved document L 2026: Energy and

greenhouse gas emissions Vol 1 & Vol 2 –
due to come into force in 2027

Industry documents support energy-based metrics for assessing operational energy in buildings.



Climate Change
Committee: [UK
Housing Fit for
the Future?](#)

LETI: [Climate
emergency
design guide](#)

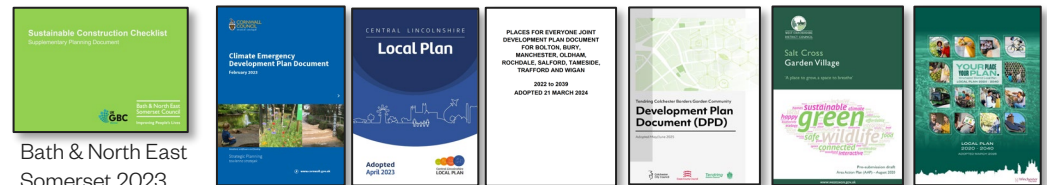
UKGBC [Net
zero carbon
buildings
framework](#)

RIBA [2030
Climate
Challenge](#)

[UK Net Zero
Carbon
Buildings
Standard](#)

UK NZCBs
[Using the
Standard in
Planning Policy](#)

Example adopted local plans supporting energy-based metrics. There also are more than 20 emerging local plans that use energy-based metrics.



Bath & North East
Somerset 2023

Cornwall
2023

Central
Lincolnshire
2023

GMCA, Places
for Everyone
Plan 2024

Tending
Colchester
Borders
Garden
Community
2025

Salt Cross
Garden
Village
2020

Winchester
2026

Uttlesford 2024

Why should the new Stockport local plan go further than Buildings Regulations Part L?

Current Part L 2021 minimum standard

Although the new Approved Document Part L 2026 (Future Homes and Buildings Standard) was published on 24 March 2026, it will not replace Part L 2021 until 2027/2028. As a result, Part L 2021 remains the current regulatory standard for energy and carbon in buildings. As it stands, Part L 2021 is not achieving the level of carbon reduction required to meet national climate commitments for the following reasons:

- The use of relative metrics, based on 'notional building' specifications, together with the SAP/SBEM compliance modelling tools, do not report or limit meaningful energy and carbon reductions.
- The 'notional' specification' not mandate the levels of energy efficiency recommended by the Committee on Climate Change.
- Gas boilers will be permitted until the new Part L 2026 is implemented in 2027/2028.
- Solar PVs are not always necessary to comply with Part L 2021, and when they are, a small amount is often sufficient. It is a missed opportunity to generate much needed renewable energy and displace gas consumption from power stations.

Part L 2026 – Future Home and Building Standard

An initial review of the new Approved Document Part L 2026 found:

- The continued use of the relative metrics, compared against updated 'notional building' specifications. This approach continues to make it difficult to verify as-built performance against design intent.
- Temporary replacement of SAP 10.2 with SAP 10.3, which is planned to later be permanently replaced by the new Home Energy Modelling (HEM). SAP 10.3 is expected to behave similarly to SAP 10.2, meaning it is not suitable for accurately predicting energy use. HEM has not yet undergone full testing, therefore it is too early to comment on its accuracy. To date, there is no planned update to poorly performing SBEM modelling tool for non-domestic buildings.
- The same fabric specifications have been retained as Part L 2021, with the only improvement being a reduction in air permeability from 5 to 4 m³/(m²h) in the 'notional' specification for domestic buildings.
- Low-carbon heating systems such as heat pumps (essentially preventing the use of gas boilers in the majority of cases) and minimum PV areas (including some exemptions for higher risk buildings) have been included in the 'notional' specification.



Approved document L 2021: Conservation of fuel and power Vol 1 (domestic) & Vol 2 (non-domestic)

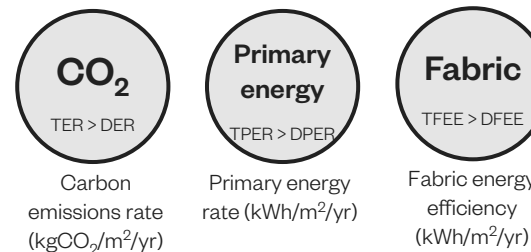


Approved document L 2026: Energy and greenhouse gas emissions Vol 1 (domestic) & Vol 2 (non-domestic) – *due to come into force in 2027/2028.*

Summary of Approved Document Part L1 and 2 metrics:

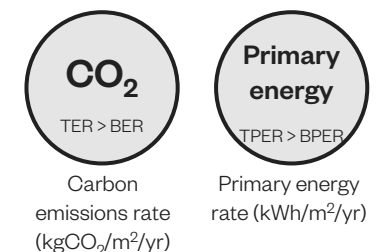
Domestic buildings

The Part L model generates a set of 'notional' building Targets, for which the designed Dwelling needs to be better than



Non-domestic buildings

The Part L model generates a set of 'notional' building Targets, for which the designed Building needs to be better than



Part L metrics use 'relative' % reductions over a set of 'notional' building specifications

Relative metrics: The use of relative metrics by Part L is problematic as it only tells the applicant how much better their proposed building is compared to a fictional target version of their building (with a standardised specification for fabric and systems). Relative metrics do not appraise the design of a building (whether it could have been better orientated, have a more efficient building form, and better design for heat loss and gain from the sun), nor do they relate to the predicted energy consumption of a building in-use.

[Further explanation](#) of the difference between relative and absolute energy metrics has been provided.

Operational energy metrics supported by the industry and some local plans

A suite of energy-based metrics supported by the industry

Industry-led standards and guidance have been developed to define and push the ambition of low energy buildings. This includes the work undertaken and published by the Climate Change Committee (CCC), the Royal Institute of British Architects (RIBA), the Chartered Institute of Building Services (CIBSE), the UK Green Building Council (UKGBC), the Better Buildings Partnership (BBP), the Passivhaus Trust, and the Low Energy Transformation Initiative (LETI).

This work has led to the development of three key operational energy metrics:

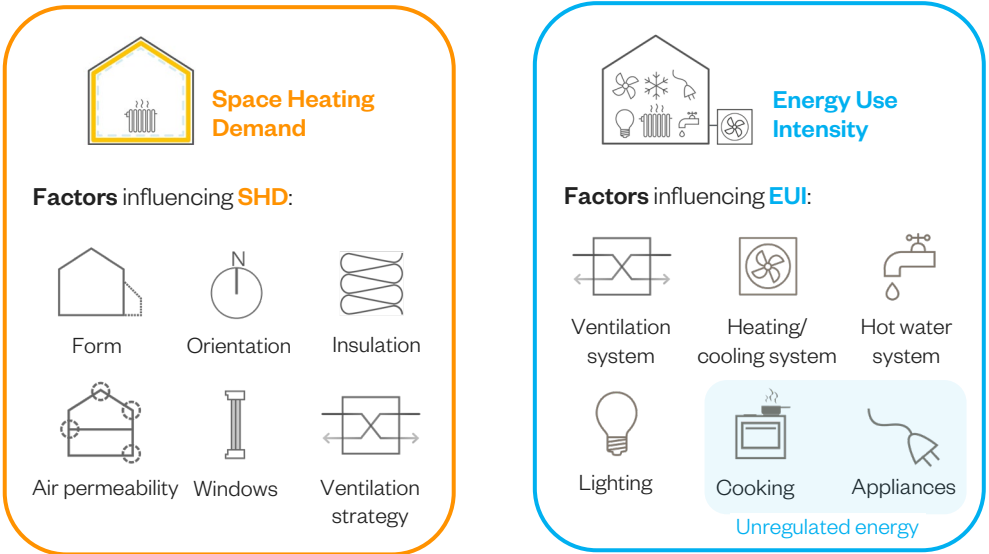
- **Space heating demand:** assesses fabric and ventilation efficiency, reducing energy bills and fuel poverty, while improving thermal comfort and local air quality. It is measured in kilo Watt hours, per square metre of the gross internal area of a new development, on an annual basis (kWh/m²GIA/yr).
- **Energy use intensity:** captures and minimises the energy consumption of the building. It combines the energy efficiency of the fabric with the efficiency of the systems used in the building and it is measured in kWh/m²GIA/yr.
- **On-site renewable energy generation:** encourages the installation of on-site renewables to minimise reliance on grid electricity and lower operational carbon emissions and energy bills. It can be defined using metrics such as kWh/m²footprint/year, or the percentage of building footprint covered by PVs. This evidence base adopts the % of footprint approach, in line with building regulations Part L 2026 and GMCA' Places for Everyone Joint Plan.

Having a dedicated metric per key objective helps to deliver a minimum or threshold performance. This avoids 'trading' between the different objectives and recognises each as being essential components of low energy buildings.

The importance of predictive energy modelling

The Climate Change Committee's UK Housing: Fit for the Future? advises that urgent changes are needed to close the performance gap between predicted and as built energy performance. Recognising that meaningful reductions in operational energy of buildings will only truly be achieved when the predictions of energy consumption in buildings more closely match the delivered outcomes.

There is a clear industry consensus that to accurately assess how a building is likely to perform in operation, including its expected energy consumption and associated running costs, predictive energy modelling must be used (e.g. Passivhaus Planning Package (PHPP)). It gives more accurate predictions of performance, while better influencing early design to ensure the thermal envelope and systems are optimised.



Absolute metrics: These demonstrate the buildings performance taking into account the environmental design and ultimately predicting the energy consumption of a building in-use. For which this could be compared to the meter readings in-use.

					
	CCC UK housing: Fit for future?	LETI Climate Emergency Design Guide	UK Net Zero Carbon Building Standard*	RIBA 2030 Climate Challenge V2	UKGBC Net Zero Whole life Carbon Roadmap
Space heating demand (SHD)	✓	✓	✓		✓
Energy use intensity (EUI)		✓	✓	✓	✓
On-site renewables		✓	✓	✓	✓

Industry documents supporting SHD, EUI and on-site renewable energy generation metrics.

A crucial move towards absolute energy-based metrics and predictive energy modelling (1/2)

Achieving meaningful reductions in operational energy requires approaches beyond minimum regulatory compliance. This page and the next compare Part L compliance methods with industry-supported energy metrics and predictive modelling, highlighting the limitations of the current Part L relative metrics and the benefits of energy-based approaches for holistic performance assessment.

Incentivising good design

Part L's carbon-based metric aggregates the influence of fabric and ventilation specifications as well as the heating system and on-site renewable energy generation. Therefore, one parameter may compensate for another, e.g. a poorly performing heating system can be compensated by a large PV array. Having a dedicated metric per objective (fabric efficiency, energy efficiency and on-site renewable energy generation) helps to deliver a minimum performance for each objective and avoids 'trading' between them.

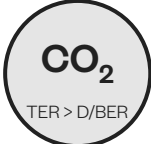
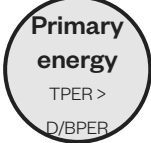
Beyond building regulations metrics to capture total energy impact

Building regulations Part L metrics only cover regulated energy use and exclude energy use from appliances, cooking and equipment. In addition, energy is converted into carbon using carbon factors, which decouples our understanding of how the building is performing.

Whereas, an energy use intensity metric accounts for regulated and unregulated energy use and reports usage as it would be at the meter of a building – the total energy consumption.

Supporting environmental design and understanding running costs

As the grid decarbonises, there is a risk that only considering carbon emissions will dilute the differences between buildings. A move towards energy-based metrics would ensure the ability to distinguish and support good environmental building design. In addition, carbon-based metrics influenced by carbon factors do not provide a reliable proxy for energy costs, whereas energy use intensity can be directly related to energy cost.

	Approved Document Part L 2021 relative metrics (%)	Proposed policy energy-based absolute metrics (kWh/m ² GIA/yr)
		
		
		
Outcomes		
Helps deliver energy use reductions		
Can be measured in-use and therefore reduce the performance gap		
Help delivers Net Zero according to industry's definition		
Used by industry experts, progressive local authority policy and developers		
Can be used to assess resident energy costs		
Robustness of evidence base (especially on viability) and meeting timelines of project		
Accuracy of calculation methodology	SAP/ SBEM Compliance tool	Predictive energy modelling (e.g. PHPP)

Approaches for assessing operational energy in buildings: Part L relative metrics VS industry supported energy –based metrics.

A crucial move towards absolute energy-based metrics and predictive energy modelling (2/2)

Predictive modelling is needed to better predict energy use

Current regulatory calculation methodologies - the Standard Assessment Procedure for residential developments (SAP) and the Simplified Building Energy Model (SBEM) for non-residential developments - used to check compliance with the carbon metric were not developed to predict energy use. They are generally low in accuracy and therefore increase the performance gap between design and completion. By contrast, predictive energy modelling, such as Passivhaus Planning Package (PHPP) and dynamic modelling using CIBSE TM54 methodology, assess energy use more accurately and provide absolute energy-based outputs.

Appropriate predictive energy modelling per building typology

Predictive energy modelling can be used to reliably estimate energy use and drive suitable design and construction decisions, thereby helping to reduce the performance gap:

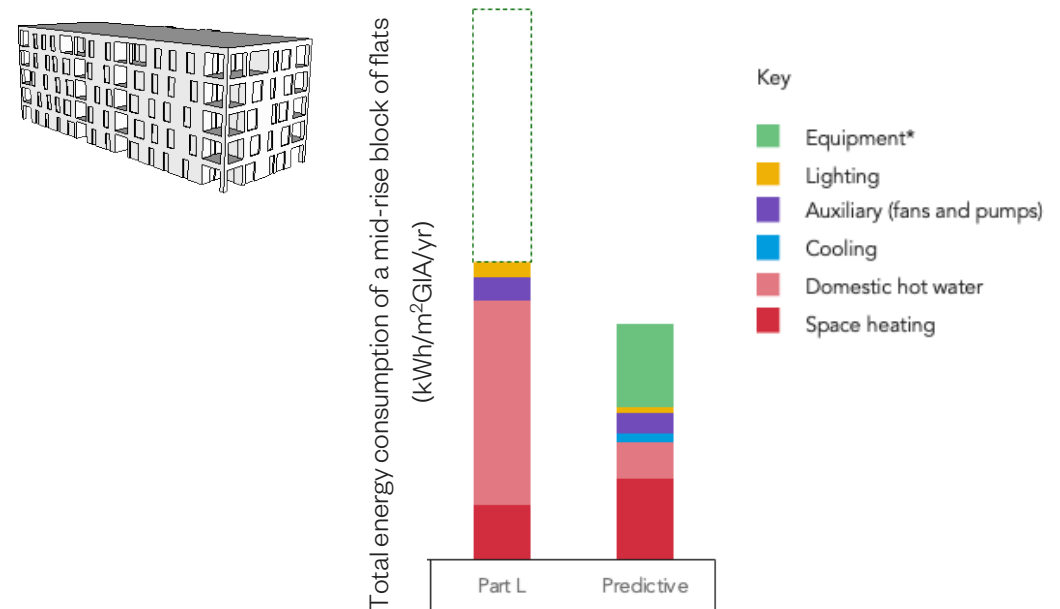
- For domestic buildings, the PHPP modelling tool has been shown to predict energy use much more accurately than the current version of SAP.
- For non domestic buildings, predictive energy modelling using the methodology set out in CIBSE Technical Memorandum 54 (TM54) allows estimation of the operational energy for all end uses of a building. IESVE, TAS and PHPP are three energy modelling packages that can be used to carry out TM54 assessments.

Predictive modelling is routinely carried out by many design professionals and it is an increasing requirement by local authorities in their Local Plans.

The future of regulatory calculations

SAP is soon to be replaced with the Home Energy Model (HEM), a new compliance model for residential buildings which is due to be released with the new Part L Vol.1 (dwellings) 2026. Part L 2026 still relies on the comparison to a notional building, however, the new regulatory tool HEM is likely to be more accurate than SAP at predicting SHD and EUI. However, this can only be verified after HEM is released and tested.

To date, there is no planned update for the energy modelling tool used for non-residential buildings, therefore, only predictive modelling can fill this gap.



This graph compares the energy consumption (energy use intensity) of a modelled mid-rise block of flats using the Part L 2021 compliance tool (SAP) and PHPP predictive energy modelling, which should be used to demonstrate an accurate picture of a building's energy performance.

From this study it is evident that SAP doesn't account for unregulated emissions, over estimates hot water energy consumption, while under-estimating space heating.

The same study has found that SBEM doesn't account for unregulated emissions, and grossly under estimates energy consumption, especially related to improvements to the building fabric.

Source: Delivering Net Zero Study, 2023

Industry standard - UK Net Zero Carbon Building Standard limit recommendations

UK Net Zero Carbon Building Standard (UK NZCBS) – well evidenced targets

The most current and relevant industry standard is the UK Net Zero Carbon Building Standard.

Following a pilot testing period the UK NZCBS Version 1 was released in March 2026. It is a science-based standard, aligned with the 1.5 degree Paris Agreement and achieving Net Zero in the UK by 2050. It was developed collaboratively by prominent industry bodies to form a single agreed definition of Net Zero Carbon and conclude a Standard for demonstrating whether it has been met.

As part of this, limits have been set against the industry-supported energy-based metrics – space heating delivered and energy use intensity - using case study data submitted by the industry and correlated with technical feasibility and the national carbon budget. Following the release of Version 1, projects are now able to verify that they conform to the as-built/in-use metrics in the Standard.

The UK NZCBS sets limits for operational energy in-use from 2025 to 2050 for new build and retrofit projects across a range of sectors. For new build residential schemes, the limits between now and 2050 are set out opposite.

The Standard's limits have been created to be achievable but ambitious, particularly for new buildings, informed by the required pathway for the UK built environment to stay within its energy and carbon budgets by 2050.

In comparison to the EUI performance levels considered in this study (level 1 at 40 kWh/m²GIA/yr and level 2 at 35 kWh/m²GIA/yr), the EUI limits opposite are deemed to be less ambitious for use in planning policy. This is due to the need to meet them in-use for compliance with the Standard.

Use of the Standard in policy

In January 2026, the UK NZCBS published a note regarding use of the Standard in Planning Policy, it noted that “the Standard may provide a useful reference point that policy officers can compare against” but that “it is not yet appropriate for policy to state that buildings need to be verified to meet the Standard” because it “is based on in-use performance [after 12 months], which sits outside the time period currently considered at Planning stage”.



UK Net Zero Carbon Building Standard (UK NZCBS) (Source: [NZCbuildings](#)) developed collaboratively by Better Buildings Partnership, Building Research Establishment (BRE), Carbon Trust, Chartered Institute of Building Services Engineers (CIBSE), Low Energy Transformation Initiative (LETI), Royal Institute of British Architects (RIBA), Royal Institute of Chartered Surveyors (RICS), Institute of Structural Engineers (IstructE), and UK Green Building Council (UKGBC).



Using the UK NZCBS in Planning Policy (Source: [NZCbuildings](#))

UK NZCBS as-built/in-use limits used when complying with ‘The Standard’:

	Space heating delivered (kWh/m ² GIA/yr) limits
Single family homes	20
Flats	15

The ‘space heating delivered’ metric and limits set under the Net Zero Carbon Building Standard for homes. This limit does not change over time.

Date of commencement	Energy use-intensity (kWh/m ² GIA/yr) limits						
	2025	2026	2027	2028	2029	2030	2050
Single family homes	50	50	49	48	48	47	40
Flats	50	50	50	49	49	48	44

The ‘energy use intensity’ metric and limits set under the Net Zero Carbon Building Standard for homes. The limits change over time, with a limit for every year, to allow for improvement and a tightening of standards between 2025 and 2050.

Over 30 local authorities in England support energy-based metrics through their local plans

Recently adopted and emerging local policies across at least 30 Local Authorities use consistent energy metrics and measurement approaches, aligning with industry recommendations - SHD, EUI, and on-site renewable energy generation metrics.

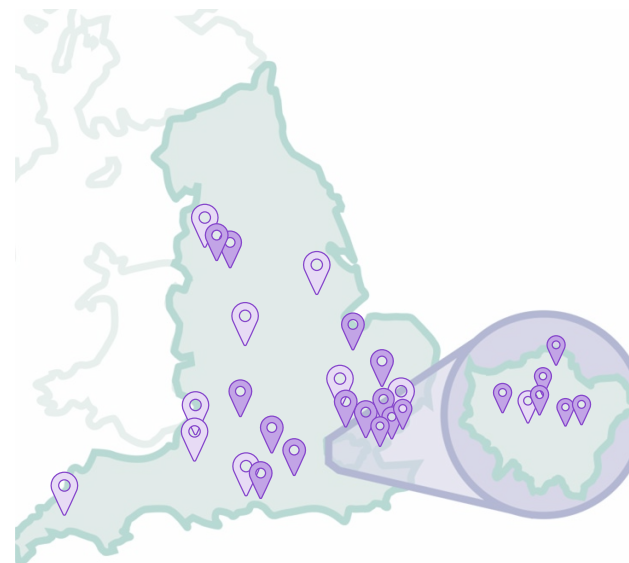
The Places for Everyone Joint Development Plan Document, which uses energy metrics, has been adopted by the other nine local authorities across Greater Manchester: Bolton, Bury, Manchester City, Oldham, Rochdale, Salford, Tameside, Trafford and Wigan.

Planning and viability impacts of local operational energy policies

Data from the Ministry of Housing, Communities and Local Government (MHCLG) shows that the introduction of local net zero energy policies by Bath & North East Somerset Council and Cornwall Council in 2023 has successfully supported planning and development activity in these areas. The evidence indicates that operational energy-based metric policies can be integrated into the planning process without adding unnecessary complexity or hindering housing delivery. See graph opposite.

Furthermore, development viability has been robustly demonstrated across 16 local planning authorities nationally. Policy examination reports consistently confirm that local plans adopting energy-based metrics have not identified any viability concerns.

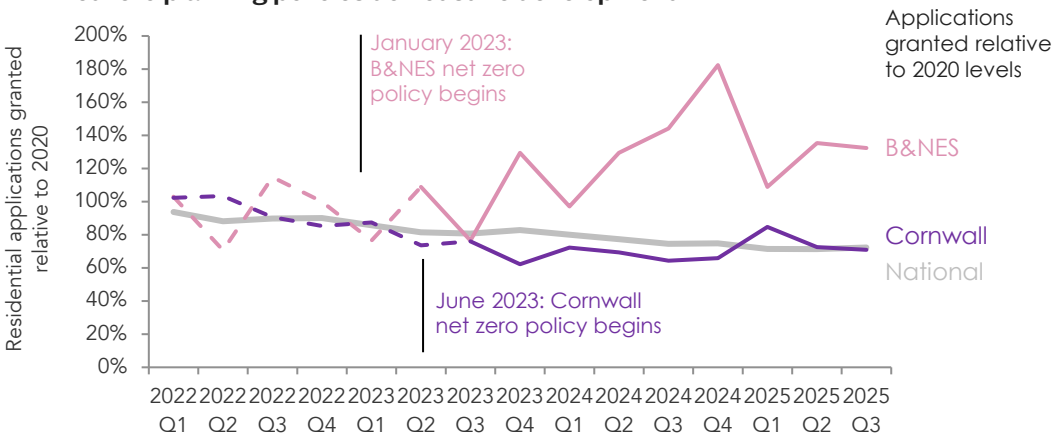
Therefore, this evidence base supports the use of energy-based metrics as a clear, measurable and deliverable approach for assessing operational energy performance in buildings.



More than 30 local authorities support energy based metrics.
Source LETI, [NPPF consultation supporting evidence](#)

- Adopted in local plans:**
Bath and North East Somerset, Central Lincolnshire, Cornwall, Kensington and Chelsea, Places for Everyone Joint Development Plan Document, Salt Cross Garden Village Area Action Plan, Tendring Colchester Borders Garden Community which is an adopted development plan document (DPD), Uttlesford and Winchester.
- Emerging/ draft local plans:**
Basildon, Basingstoke and Deane, Camden, Castle Point, Colchester Cotswold, Chelmsford, Ealing, Enfield, Epsom Ewell, Greater Cambridge, Haringey, Manchester City, Newham , Reading, Rochford, Southend, South Downs National Park, South Gloucestershire, Tendring, Tower Hamlets and Trafford.

Net zero planning policies do not stifle development



Ministry of Housing, Communities and Local Government (MHCLG) data demonstrates that local net zero energy policies introduced by Bath & North East Somerset Council and Cornwall Council in 2023 did not stifle planning and development in these areas. There has been no evidence that net zero policies make the planning process too complex or that they constrain housing delivery. The above chart is based on MHCLG reference table 2 (PS2) data for district planning applications, showing applications granted for major and minor dwellings. This shows applications granted relative to 2020 levels in each area. (Source: LETI [NPPF consultation response 2026](#))

Areas of influence for Stockport's operational energy planning policy for new buildings

A number of operational energy metrics and an embodied carbon metric should be combined to ensure a holistic approach in planning policy and that Stockport will be carbon neutral by 2038.

Embodied carbon has been addressed in a separate document.

This page outlines the policy areas that can have the greatest effect on the design, construction and performance of a new building:

Operational energy metrics

1 Energy efficient fabric and ventilation

Space heating demand (kWh/m²GIA/yr)

The building should achieve an ultra-low level of space heating demand.

2 Low total energy use

Energy Use Intensity (EUI) (kWh/m²GIA/yr)

The predicted level of total energy use of the building (regulated and unregulated) should be less than a limit.

See also the [definition of EUI](#)

3 On-site renewable energy generation

% of building footprint covered by PVs

The building should seek to generate on-site renewable energy generation by covering a percentage of the building's roof with Photovoltaic panels (PVs).

4 Fossil fuel free

Yes/No

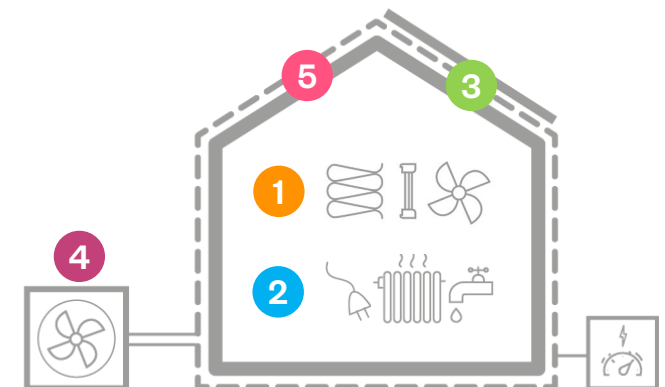
The building must not connect to the gas network or, more generally, use fossil fuels on-site. It must use a low carbon heating system (e.g. heat pump).

Embodied carbon metric

5 Upfront carbon

Upfront embodied carbon limit (kgCO₂e/m²GIA)

Building design should also minimise embodied carbon in materials throughout their lifecycle.



3

Operational energy technical and cost evidence base

3.1

Residential developments

Residential performance levels – Energy and cost modelling purpose and buildings typologies

Purpose of energy and cost modelling

Energy and cost modelling constitutes the core of this technical evidence base. Its purpose is to investigate how different residential building typologies would perform against the defined performance levels, using different combination of fabric and systems specifications. This analysis enables a robust understanding of the technical feasibility of each performance level option for different residential building typologies, aiming to inform the process of target setting, and constitute the evidence that the associated policies are technically achievable.

Finally, the cost modelling has been carried out to identify the additional cost of these policies above minimum building regulations compliance (Part L 2021 notional specifications) and the anticipated Part L 2026 notional specifications.

Building typology selection

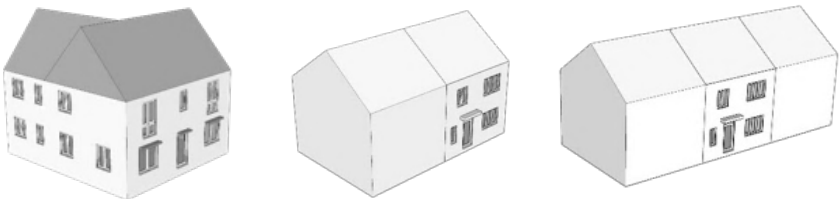
A total of five residential building typologies have been modelled. These have been identified as being relevant locally in Stockport:

- Detached house
- Semi-detached house
- Terrace house
- Low-block of flats
- Mid-rise block of flats

The residential buildings modelled are illustrated opposite, and they have been chosen as representatives of each typology. While a set of five buildings has been modelled, it is reasonable to assume that the findings for each building can be extrapolated to other types building designs within the same archetype.

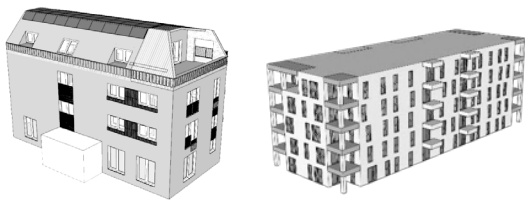
Modelling methodology and results

The results demonstrated in this report are based on modelling carried out using predictive operational energy modelling tools: PHPP (10). PHPP models have been adjusted for local weather data to ensure they are representative for Stockport. The costing assessment methodology (capital and running costs) has also been presented for each scenario tested.



	Detached	Semi-detached	Terraced
Dwelling size	4B7P (single dwelling)	3B5P (single dwelling)	3B5P (single dwelling)
Gross Internal Area (m²)	142	93	93
Form factor	2.8	2.6	2.0

Graphical representation of the three houses modelled and their general information.



	Low-rise	Mid-rise
Dwelling size	1B2P, 2B4P & 3B5P (7 number of flats)	1B2P, 2B3P & 3B4P (40 number of flats)
Gross Internal Area (m²)	641	3,202
Form factor	2.0	1.1

Graphical representation of the two block of flats modelled and their general information.

Residential performance levels – Scenarios modelled

Four specification scenarios modelled

For each of these residential buildings, four scenarios were modelled, combining different specifications in terms of fabric and ventilation, heating and hot water systems. Two of the four scenarios focus on current and anticipated national regulations (Part L 2021 and Part L 2026), while the other two consist of **Level 1** and **Level 2** performance levels tested as feasible policy target/limit options for Stockport's new operational energy policy.

The specification scenarios modelled are described below:

- **Building regulations Part L 2021 – notional building specifications:** The minimum level of performance currently required by National Building Regulations (Part L 2021). This creates a baseline reference point from which improvements of the enhanced specification scenarios in SHD, EUI and on-site PVs can be measured and costed.
- **Building regulations Part L 2026 –** A set of notional building specifications from the recently released Part L 2026. This creates an alternative and more recent baseline reference point to Part L 2021. However, the new SAP 10.3 tool and HEM associated with the FHS was not available for use at the time of modelling, and therefore testing has been based on assumptions on the consultation notional specification.
- **Level 1:** This represents an intermediate performance level between a Part L 2026 notional building and best practice Places for Everyone (PfE) fabric and systems specifications. A set of specifications designed to achieve a SHD of 30 kWh/m²GIA/yr, an EUI of 40 kWh/m²GIA/yr and 40% of the building's footprint covered by PVs.
- **Level 2:** This represents an ultra-low energy fabric, broadly aligned with industry definitions of net zero operational energy targets and it provides the lowest running costs for residents. It aligns with the SHD and EUI targets recommended by the GMCA Places for Everyone (PfE) Joint Development Plant and Truly Affordable Net Zero (TANZ) homes. A set of specifications designed to achieve a SHD of 20 for homes/ 15 for flats kWh/m²GIA/yr and an EUI of 35 kWh/m²GIA/yr and 40% of the building's footprint covered by PVs.

See [Appendix 7.2](#) for the full set of specifications tested.

Specification scenarios		Part L 2021 (notional building spec.)	Part L 2026 (notional building spec.)	Level 1 (SHD 30, EUI 40, PVs 40%)	Level 2 (SHD 20 houses, 15 block of flats , EUI 35, PVs 40%)
Building fabric and ventilation strategy	Walls Floor Roof (U-values W/m ² K)	0.18 0.13 0.11	0.18 0.13 0.11	0.14-0.18 0.09-0.13 0.10-0.11	0.10 0.09 0.10
	Windows	Double-glazing	Double-glazing	Double-glazing	Triple-glazing
	Air permeability (m ³ /m ² h)	5	4	1-2	0.48-1
	Ventilation strategy	Centralised Mechanical Extract Ventilation (cMEV)	cMEV	Mechanical ventilation with heat recovery (MVHR)	MVHR
Heating, hot water systems	Heating and hot water system	Gas boiler	Air-source heat pumps	Air-source heat pumps	Air-source heat pumps
	Waste water heat recovery	Yes	Yes	No	No
On-site renewable energy generation	% of the building's footprint covered by PVs	Part L 2021 notional specification (40% ground floor area divided by 6.5)	Part L 2026 notional specification (40% ground floor area divided by 4.5)	Same as Part L 2026 notional spec.	Same as Part L 2026 notional spec.

Key technical specifications of the four modelled scenarios. Where ranges are presented (e.g. wall, floor and roof u-values) these reflect variation across different residential building typologies. The full set of specifications tested are provided in [Appendix 7.2](#).

Space heating demand & Energy use intensity residential – Testing performance levels

The importance of defining policy targets/ limits

It is essential for a Local Plan to establish quantitative operational energy performance targets or limits for building typologies against which planning applications can be assessed, together with a clear implementation methodology. Without them, policies risk failing to deliver meaningful reductions in operational energy emissions.

Development of SHD and EUI performance levels

To understand the technical feasibility and viability of residential SHD and EUI targets or limits that could be set in policy, **two performance levels** have been developed and provided as options for Stockport Council to select from **Level 1** and **Level 2**.

Both the SHD and EUI are included within each performance level because they represent interrelated but distinct aspects of operational energy performance. SHD depends on its form, orientation, window area, thermal performance, airtightness, ventilation system. Whereas EUI focuses on heating and hot water system types and efficiencies while taking into account the fabric performance.

Both levels encourage low energy consumption and the adoption of low carbon heating and hot water systems, moving away from fossil fuels.

A single on-site renewable energy generation performance level

This evidence base explores an on-site renewable energy generation target to align with Part L 2026 and PfE, which set a target of minimum 40% of the building’s footprint covered by photovoltaic panels (PVs).

	Level 1 <i>Intermediary step</i>	Level 2 <i>Aligns with ‘Best Practice’ and PfE</i>	
Space heating demand (SHD) (kWh/m ² GIA/yr)	30	20 (houses)	15 (block of flats)
Energy use intensity (EUI) (kWh/m ² GIA/yr)	40	35	
On-site renewable energy generation (% of the building’s footprint covered by PVs)	40	40	

Performance level 1 and level 2 options developed for residential developments to understand their technical feasibility and viability.

Why a different SHD is proposed for houses and block of flats under Level 2?

Houses have a greater exposed surface area relative to their volume, leading to higher heat losses compared a block of flats. Therefore, achieving a SHD lower than 20 kWh/m²GIA/yr for houses is more challenging to achieve compared to more compact and thermally efficient form of block of flats, which can more readily achieve a SHD of as low as 15 kWh/m²GIA/yr.

Space heating demand residential - How performance levels compare to others

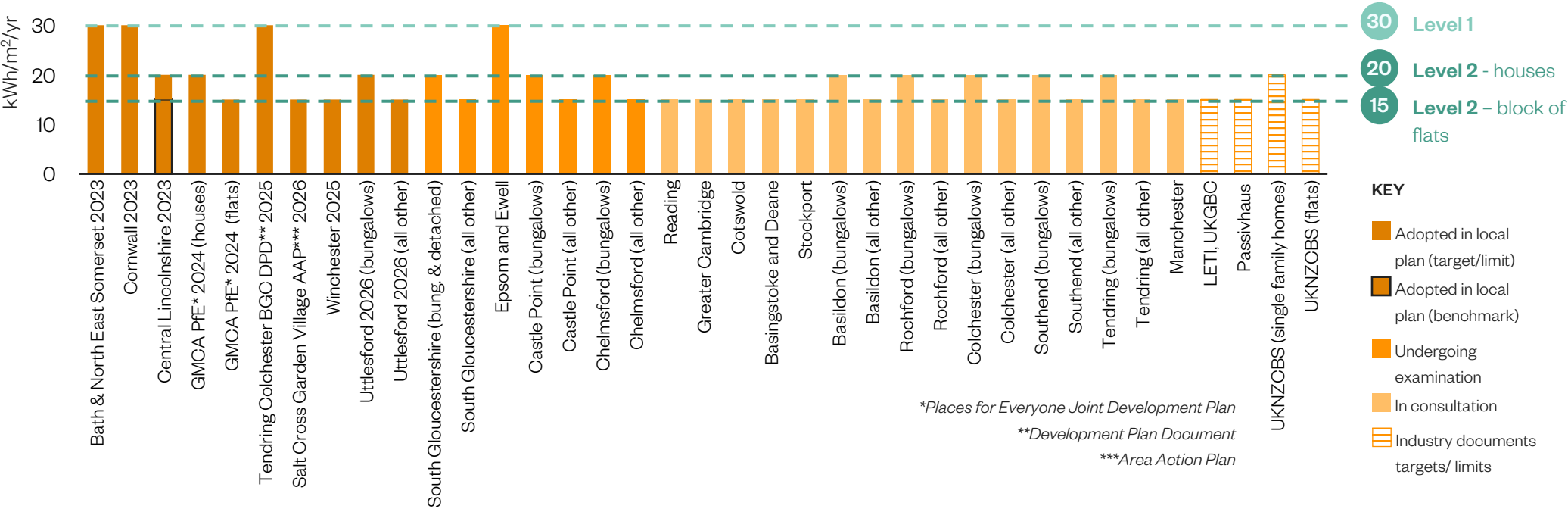


Space Heating Demand (SHD) is a commonly used metric and is used in existing, draft and emerging local plans and industry standards/guidance . The graph highlights that both optional levels for residential **SHD** are supported by a range of sources, demonstrating their technical feasibility and viability.

- There is broad consensus of the level of performance between industry standards/guidance and local plan policies, with some variation (range from 15-30 kWh/m²/yr) due to the local context, e.g. climate variations, viability, building typology. This range aligns with the performance levels introduced for Stockport.
- **Level 1** for SHD of 30 kWh/m²GIA/yr, aligns with Bath and North-East Somerset and Cornwall's adopted local plans,Tendring Colchester Borders DPD, and Epsom and Ewell's emerging local plan policy targets.
- **Level 2** for SHD of 15/20 kWh/m²GIA/yr, aligns with the vast majority of adopted and emerging local plans and the GMOA PfE Joint Plan.
- Typically, higher SHD targets are set for bungalows and detached houses than any other residential typology. This is due to a higher exposed surface area relative to their floor area, which leads to greater heat loss. This aligns with **Level 2** methodology, which introduces different best practice SHD performance level for houses and block of flats.
- For context, a typical new home built to current regulatory standards (Part L 2021) would have a space heating demand 2-3 times higher than meeting Level 1 or Level 2 targets. Homes built to Level 1 or Level 2 will need less heating to stay comfortable in winter, be more resilient to energy price changes and heating system failures.

Note: While not exhaustive, the local plans listed below represent a substantial proportion of those who support SHD targets in England. The UK Net Zero Carbon Building Standard (UKNZOBS) sets targets slightly higher as it uses in-use data, which accounts for the performance gap between predicted and actual use.

Adopted and emerging SHD targets/limits in planning policy in England



Energy Use Intensity residential - How performance levels compare to others

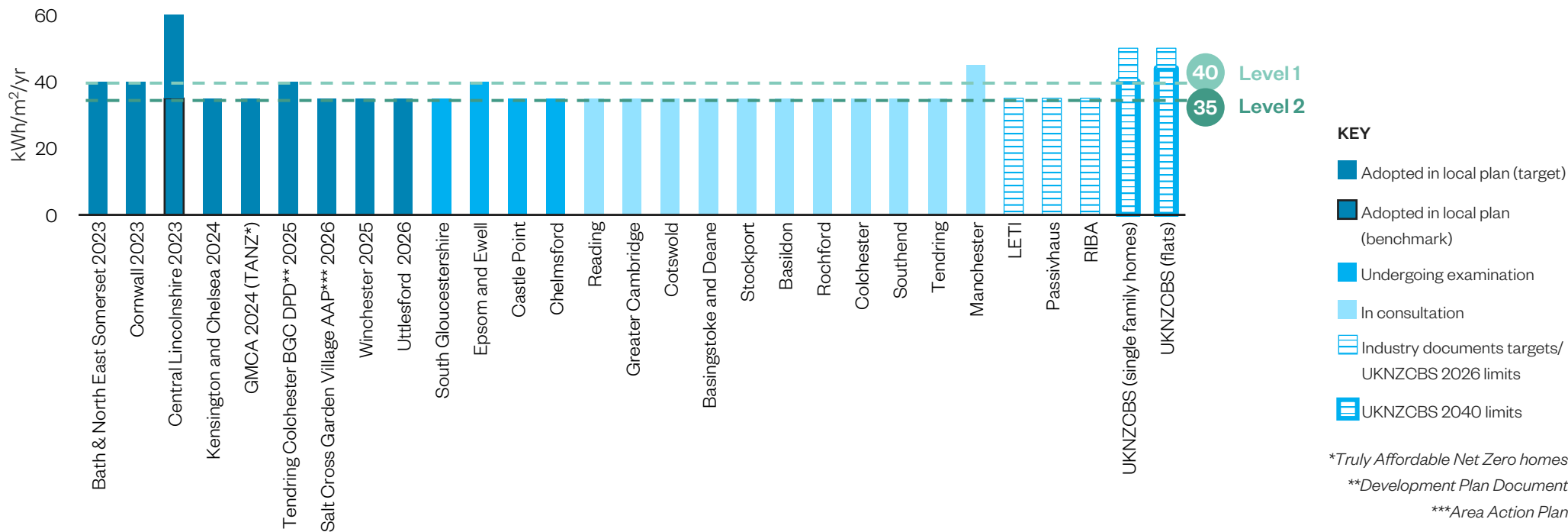


Energy Use Intensity (EUI) is also a commonly used metric and is used in existing, draft and emerging local plans and industry standards/guidance . The graph highlights that both level options for residential **EUI** are supported by a range of sources demonstrating their technical feasibility and viability.

- There is broad consensus of the level of performance between industry documents and local plan policies, with some variation (range from 35-60 kWh/m²/yr) due to the local context, e.g. climate variations, viability, building typology. This range overall aligns with the performance levels introduced.
- **Level 1** for EUI of 40 kWh/m²GIA/yr aligns with Bath and North-East Somerset and Cornwall's adopted local plans, Tendring Colchester Borders DPD, and Epsom and Ewell's emerging local plan policy, UKNZCBS 2040 single family homes limit and it is slightly lower than the flats as-built limit.
- **Level 2** for EUI of 35 kWh/m²GIA/yr aligns with a vast number of local plan targets including TANZ, except Central Linchonsire and Manchester which have set higher targets of 60 and 45 respectively. It also aligns with what LETI, Passivhaus and RIBA recommend as best-practice EUI for residential developments.
- UKNZCBS has set higher 2026 as-built limits for both single family homes and flats. However, these are as-built limits so account for a performance gap between design and as-built.
- For context, a typical new home built to current regulatory standards (Part L 2021) would have an energy use intensity approximately 3 times higher than meeting Level 1 or Level 2 targets. Homes built to Level 1 or Level 2 will result in lower energy bills for residents.

Note: Although not exhaustive, the local plans listed below represent a substantial proportion of those who support EUI targets in England.

Adopted and emerging EUI targets/limits in planning policy in England



Residential performance levels – Energy modelling results for houses



The following results have been generated from predictive energy modelling of the houses across a range of specifications [previously described](#).

Space Heating Demand results for houses

Findings include:

- Part L 2021 and Part L 2026 notional specification scenarios result in similar SHD for each typology. This is due to their similar fabric specifications, with the only difference being a slight improvement in air permeability from 5 m³/m²h to 4 m³/m²h.
- Part L 2021 and Part L 2026 scenarios have a SHD approximately three times higher than Level 1 and Level 2 scenarios. As a consequence, Level 1 and Level 2 scenarios will result in homes with improved thermal comfort, reduced risk of damp and mould, heating consumption and carbon emissions and avoids the need for future retrofit.

Both SHD Level 1 (30 kWh/m²GIA/yr) and Level 2 (20 kWh/m²GIA/yr) are proven to be technically feasible for all three housing typologies.

- Level 2 (20 kWh/m²GIA/yr) aligns with the Net Zero Carbon Building Standard limit.

Energy Use Intensity results for houses

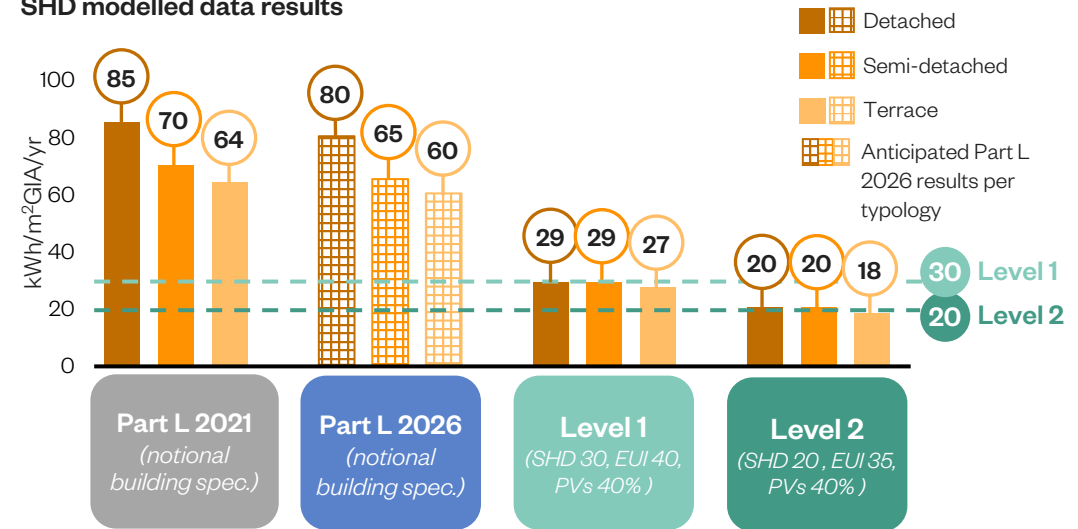
Findings include:

- Part L 2021 notional building specification scenario results to the highest EUI by an average of three times higher than Part L 2026, Level 1 and Level 2 scenarios. This is due to the use of a less efficient fossil fuel-based heating and hot water system (gas boiler) currently allowed by Part L 2021.
- Level 1 and 2 deliver a 10-20% reduction in EUI when compared to Part L 2026. This will directly correlate with lower running costs for residents.

Both EUI Level 1 (40 kWh/m²GIA/yr) and Level 2 (35 kWh/m²GIA/yr) are proven to be technically feasible by all three housing typologies.

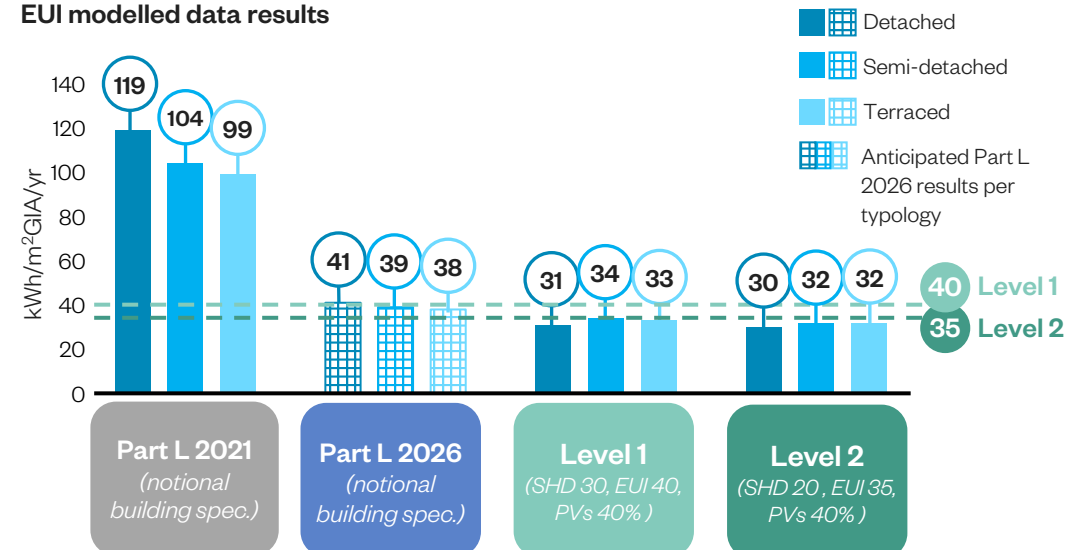
- Level 1 (40 kWh/m²GIA/yr) aligns with the Net Zero Carbon Building Standard limit for 2050.

SHD modelled data results



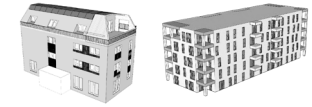
Annual space heating demand in kWh/m²GIA per performance scenario for each housing typology tested.

EUI modelled data results



Annual energy use intensity in kWh/m²GIA per performance scenario for each housing typology tested.

Residential performance levels – Energy modelling results for flats



Space Heating Demand results for block of flats

Findings include:

- Part L 2021 and Part L 2026 notional specification scenarios result in similar SHD for each typology. This is due to their similar fabric specifications, with the only difference being a slight improvement in air permeability from 5 m³/m²h to 4 m³/m²h.
- Part L 2021 and Part L 2026 scenarios have a SHD approximately two times higher than Level 1 and four times higher than Level 2 scenarios. As a consequence, Level 1 and Level 2 scenarios will result in homes with improved thermal comfort, reduced risk of damp and mould, heating consumption and carbon emissions and avoids the need for future retrofit.

Both SHD Level 1 (30 kWh/m²GIA/yr) and Level 2 (15 kWh/m²GIA/yr) are proven to be technically feasible by all three housing typologies.

- Level 2 (15 kWh/m²GIA/yr) aligns with the Net Zero Carbon Building Standard limit.

Energy Use Intensity results for block of flats

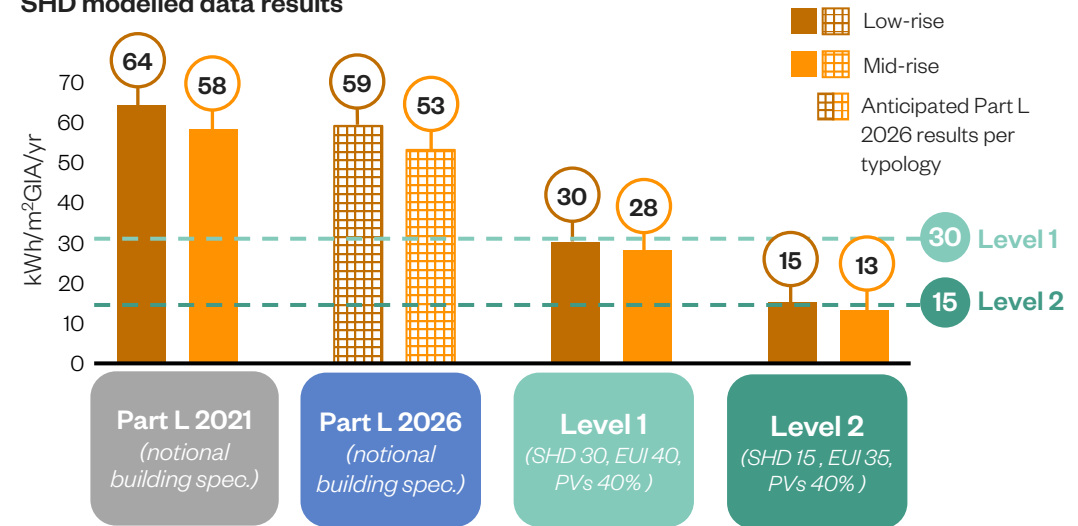
Findings include:

- Part L 2021 notional building specification scenario results in the highest EUI by an average of three times higher than Part L 2026, Level 1 and Level 2 scenarios.
- Level 1 and 2 deliver a 10-20% reduction in EUI when compared to Part L 2026. This will directly correlate with lower running costs for residents.
- Under all four scenarios, the mid-rise block of flats has a higher EUI, even though its SHD is always lower than that of low-rise's. This is due to the use of communal ASHPs, which are generally less efficient (incl. distribution losses from central plant and extended pipework) than individual ASHPs used in the low-rise block of flats.

Both EUI Level 1 (40 kWh/m²GIA/yr) and Level 2 (35 kWh/m²GIA/yr) are proven to be technically feasible by both block of flats typologies.

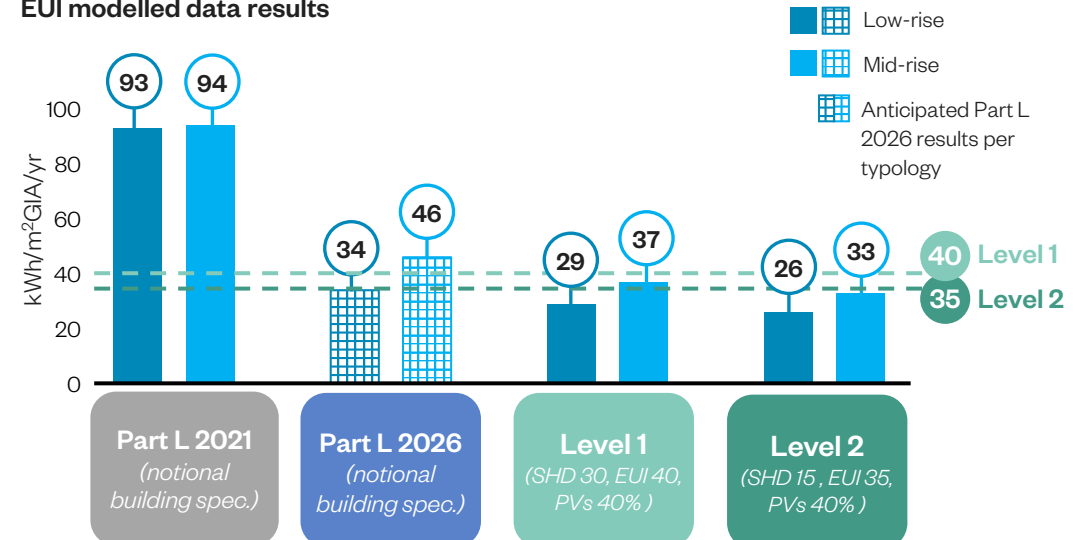
- Level 1 (40 kWh/m²GIA/yr) aligns with the Net Zero Carbon Building Standard limit for 2050.

SHD modelled data results



Annual space heating demand in kWh/m²GIA per performance scenario for each block of flats typology tested.

EUI modelled data results



Annual energy use intensity in kWh/m²GIA per performance scenario for each block of flats typology tested.

Residential performance levels - EUI vs renewable energy generation for houses

Renewable generation - photovoltaic (PV) calculations for houses

For each house type, the required solar photovoltaic (PV) capacity (kWp) has been calculated in accordance with the relevant compliance pathway. For the Part L 2021 scenario, sizing is based on the formula $40\% \times \text{Ground Footprint Area (GFA)} \div 6.5$, as specified in the Notional Building definition under Approved Document L 2021.

For the Part L 2026 scenario, the formula is updated to $40\% \times \text{GFA} \div 4.5$, reflecting the more stringent requirements introduced under the new Part L 2026 notional specifications. The enhanced performance tiers (Level 1 and 2 scenarios) adopt the same methodology as the Part L 2026 scenario, applying the $40\% \times \text{GFA} \div 4.5$ formula accordingly.

Once the required capacity had been established, the number of PV panels has been determined assuming modules of 605 Watts each (see table opposite).

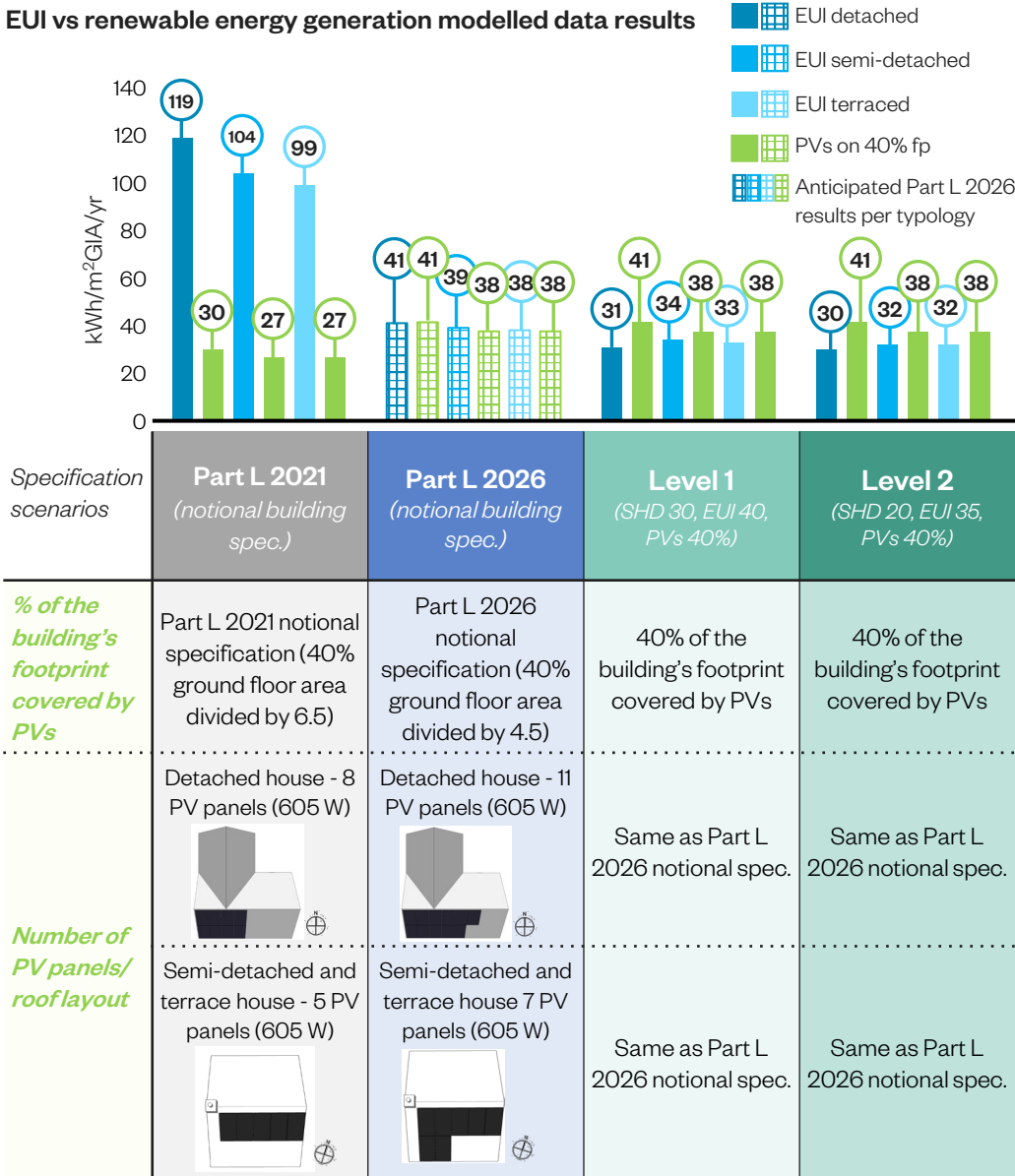
Results analysis for houses

The on-site renewable energy generation results per specification scenario illustrated on the graph opposite have been compared against its equivalent energy use intensity across the housing typologies. Where the renewable energy generated matches or exceeds the EUI, an [energy balance](#) is achieved.

Findings include:

- Part L 2021 scenario includes the amount of PV included in the notional specification, which results in less than 30% of the total energy use for all housing typologies being generated by PV annually.
- Part L 2026 scenario results in the renewable energy being produced annually meeting the total energy consumption (EUI) of almost all housing typologies.
- Level 1 and Level 2 scenarios exceed the energy balance as their on-site renewable energy generation exceeds their EUI in all housing typologies tested. This is attributed to Level 1 and Level 2 having smaller EUIs to balance against, compared to Part L 2026, where on-site renewable energy generation is the same across all three scenarios.
- For the housing typologies, the more energy efficient the building, the less renewable energy is required to achieve an annual energy balance, provided that PVs have been designed efficiently and with maximum renewable energy generation in mind. This is without the inclusion of energy storage (e.g. battery).

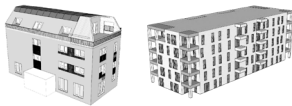
EUI vs renewable energy generation modelled data results



Graph – EUI per performance scenario for each housing typology tested compared against its annual on-site renewable energy generation in kWh/m²GIA.

Table – Renewable energy technical specifications per performance scenario for each of the housing typologies tested. The full set of specifications tested are provided in [Appendix 7.2](#).

Residential performance levels - EUI vs renewable energy generation for flats



PV calculations for block of flats

For the low-rise and mid-rise block of flats, the same methodology has been followed as for the houses under the Part L 2021, Part L 2026, Level 1 and Level 2 scenarios, except for the module power, which has been assumed to be 475 Watts for each PV panel.

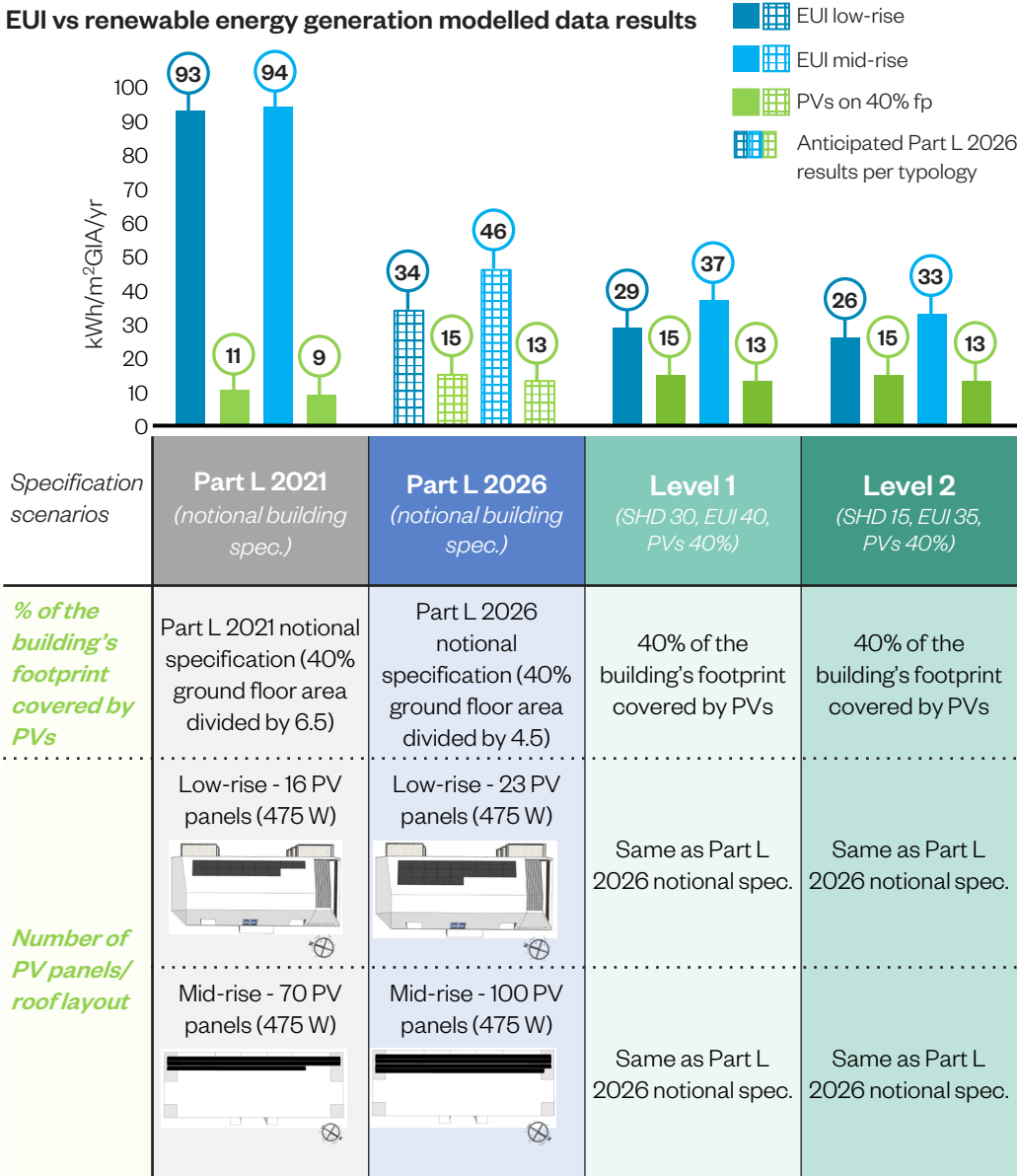
Results analysis for block of flats

The on-site renewable energy generation results per specification scenario illustrated on the graph opposite have been compared against its equivalent energy use intensity across the block of flats typologies.

Findings include:

- Part L 2021 scenario includes the amount of PV included in the notional specification, which results in less than 10% of the total energy use for both block of flats typologies being generated by PV annually.
- For Part L 2026, Level 1 and Level 2 scenarios renewable energy generation results in almost half their total energy use for both block of flats typologies – except for the mid-rise under the Part L 2026 scenario which has a higher EUI.
- None of the scenarios modelled for the block of flats typologies currently achieve an [energy balance](#).
- If PV installation across the available roof space were maximised (beyond the minimum 40% of building’s footprint covered by PVs requirement), the energy balance could be achieved for these specific blocks. See [Appendix 7.3](#) where a 60% of building’s footprint and a maximised roof area scenario have been tested for all residential typologies under Level 1 and Level 2 scenario.

EUI vs renewable energy generation modelled data results



Graph – EUI per performance scenario for each block of flats tested compared against its annual on-site renewable energy generation in kWh/m²GIA.

Table – Renewable energy technical specifications per performance scenario for each of the block of flats typologies tested. The full set of specifications tested are provided in [Appendix 7.2](#).

Residential performance levels – Capital costs assessment results for houses



Methodology

The capital cost analysis of the scenarios has been conducted for all five building typologies (detached house, semi-detached house, terrace house, low-rise and mid-rise block of apartments).

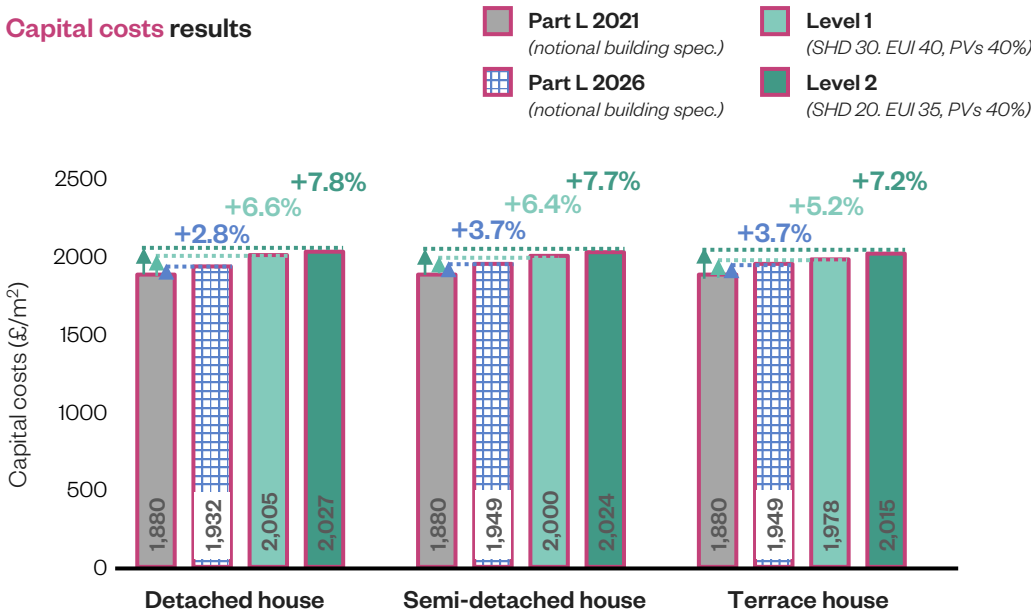
The cost analysis is based on the Currie & Brown cost-uplift database, rebased to Q1 2026 using the BCIS Index (410) and localised for the Stockport area (Index 102). The energy and carbon-related elements were costed in detail; all other construction costs are captured through the baseline build-cost £/m² allowance. The reference baseline build costs were derived from the BCIS mean rate over the past 5 years, with an uplift applied to reflect Part L 2021 requirements. The specifications costed are shown in [Appendix 7.2](#).

Capital costs results for houses

Findings from the capital costs results for the three housing typologies across four performance scenarios include:

- All three typologies tested show an incremental increase in construction cost as the performance of the building improves.
- When compared to the Part L 2021 notional specification scenario, the cost uplift for Level 1 and 2 ranges from 5.2-7.8% dependant on the housing typology.
- Much of the uplift in cost between the Part L 2021 and the Part L 2026 notional specification can be attributed to the inclusion of heat pumps (in place of gas boilers) and additional PV area.
- When the Level 1 and 2 are compared to the anticipated Part L 2026 notional scenario, the cost uplift ranges from 1.5-4.9% dependant on the housing typology. This is almost half to the uplift range when compared to the Part L 2021 notional scenario. The difference in specifications can be broadly attributed to the introduction of an MVHR, additional insulation, triple glazing windows, and increased airtightness, all of which improve the space heating demand significantly, as well as running costs.

Capital costs results

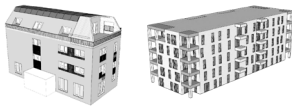


Capital costs for the four performance scenarios on the three housing typologies tested. Relative costs (%) of Level 1 and Level 2 compared to the baseline cost (Part L 2021 notional scenario).

	Detached	Semi-detached	Terrace
Indicative all in construction cost – Part L 2021 notional spec.	£1,880/m ²	£1,880/m ²	£1,880/m ²
Level 1 (SHD 30, EUI 40, PVs 40%)	+6.6% (+£125/m ²)	+6.4% (+£120/m ²)	+5.2% (+£98/m ²)
Level 2 (SHD 20, EUI 35, PVs 40%)	+7.8% (+£147/m ²)	+7.7% (+£144/m ²)	+7.2% (+£135/m ²)
Indicative all in construction cost Part L 2026 notional spec.	£1,932/m ²	£1,949/m ²	£1,949/m ²
Level 1 (SHD 30, EUI 40, PVs 40%)	+3.8% (+£73/m ²)	+2.6% (+£51/m ²)	+1.5% (+£29/m ²)
Level 2 (SHD 20, EUI 35, PVs 40%)	+4.9% (+£95/m ²)	+3.8% (+£75/m ²)	+3.4% (+£67/m ²)

Uplift capital costs (% and £/m²) of Level 1 and Level 2 for the three housing typologies from two different scenarios: Part L 2021 notional and Part L 2026 notional.

Residential performance levels – Capital costs assessment results for flats



Capital costs results for block of flats

- Findings from the capital costs results for the two block of flats typologies across four performance scenarios include:
- Both typologies tested show an incremental increase in construction cost as the performance of the building improves.
 - When compared to the Part L 2021 notional specification scenario, the cost uplift for Level 1 and 2 ranges from 2.8-7.0% dependant on the block of flats typology.
 - Much of the uplift in cost between the Part L 2021 and Part L 2026 notional specification can be attributed to the inclusion of heat pumps (in place of gas boilers) and additional PV area.
 - When the Level 1 and 2 are compared to the anticipated Part L 2026 notional scenario, the cost uplift ranges from 0.9-3.9% dependant on the block of flat typology. This is almost half to the uplift range when compared to the Part L 2021 notional scenario. The difference in specifications can be broadly attributed to the introduction of an MVHR, additional insulation, triple glazing windows, and increased airtightness, all of which improve the space heating demand significantly.

Capital costs results



Capital costs for the four performance scenarios on the two block of flats typologies tested. Relative costs (%) of Level 1 and Level 2 compared to the baseline cost (Part L 2021 notional scenario).

	Low-rise	Mid-rise
Indicative all in construction cost – Part L 2021 notional spec.	£2,140/m ²	£2,140/m ²
Level 1 (SHD 30, EUI 40, PVs 40%)	+5.4% (+£116/m ²)	+2.8% (+£60/m ²)
Level 2 (SHD 15, EUI 35, PVs 40%)	+7.0% (+£150/m ²)	+4.7% (+£101/m ²)
Indicative all in construction cost Part L 2026 notional spec.	£2,204/m ²	£2,169/m ²
Level 1 (SHD 30, EUI 40, PVs 40%)	+1.8% (+£39/m ²)	+0.9% (+£21/m ²)
Level 2 (SHD 15, EUI 35, PVs 40%)	+3.9% (+86/m ²)	+3.4% (+£73/m ²)

Uplift capital costs (% and £/m²) of Level 1 and Level 2 for the block of flats typologies from two different scenarios: Part L 2021 notional and Part L 2026 notional.

Residential performance levels – Running costs assessment results for houses



Running cost analysis using an energy price cap

The analysis of running costs has been carried out for the five residential typologies. The energy use for each building type has been calculated based on its gross internal area (GIA) and typical Energy Use Intensity (EUI) values for the Part L 2021 notional, Part L 2026, Level 1 and Level 2 specification scenarios. Annual running costs are then derived by applying a fixed tariff with an Ofgem price cap net of on-site renewable self-consumption. The running costs presented opposite and on the following page consider:

- Standing charges - including the saving where the gas connection is removed in electric heating scenarios;
- PV self-consumption - assumptions based on the MCS methodology (MGD 003), taking the average of the three occupancy cases: “home all day”, “in half the day”, and “out all day”;
- PV benefit - applied such that self-consumed PV is treated as avoided import at the import unit rate, while exported PV is treated as export revenue at the export rate;
- Export revenue – assumed where PV generation exceeds self-consumption.

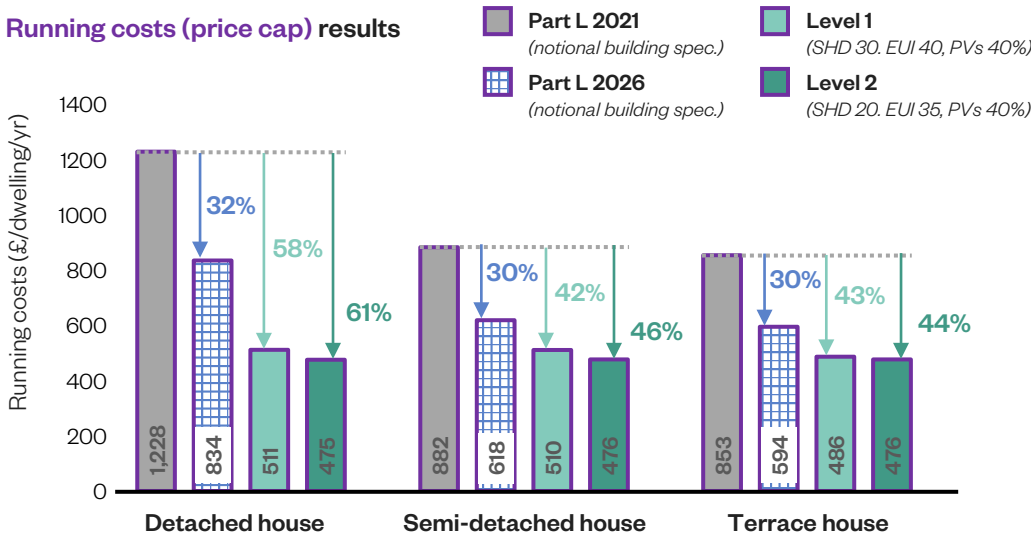
The results are presented in both absolute terms (£ per dwelling per year) and relative savings (%) to show the impact of lower EUIs on operational energy costs.

Running costs (price cap) results for houses

The results highlight the significant operational savings that can be achieved by improving energy performance for all housing typologies. Further reductions could also be made with the use of dynamic tariffs (see [Appendix 7.5](#)).

The results demonstrate that all housing types can achieve a meaningful running cost reduction through higher energy efficiency, showing how investment in fabric and systems can deliver long-term reductions in operational expenditure.

Running costs (price cap) results

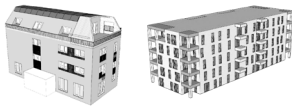


Estimated annual energy costs for the three housing typologies across all four scenarios. These costs include for the Ofgem energy price cap and effect of PV energy generation.

	Detached	Semi-detached	Terrace
Indicative running costs per dwelling – Part L 2021 notional spec.	£1,228/yr	£882/yr	£853/yr
Level 1 (SHD 30, EUI 40, PVs 40%)	58% (£716/yr)	42% (£372/yr)	43% (£367/yr)
Level 2 (SHD 20, EUI 35, PVs 40%)	61% (£752/yr)	46% (£406/yr)	44% (£377/yr)
Indicative running costs per dwelling - Part L 2026 notional spec.	£834/yr	£618/yr	£594/yr
Level 1 (SHD 30, EUI 40, PVs 40%)	39% (£323/yr)	17% (£108/yr)	18% (£108/yr)
Level 2 (SHD 20, EUI 35, PVs 40%)	43% (£359/yr)	23% (£141/yr)	20% (£118/yr)

Running cost savings for Level 1 and Level 2 from two different scenarios: Part L 2021 notional and Part L 2026 notional.

Residential performance levels – Running costs assessment results for flats



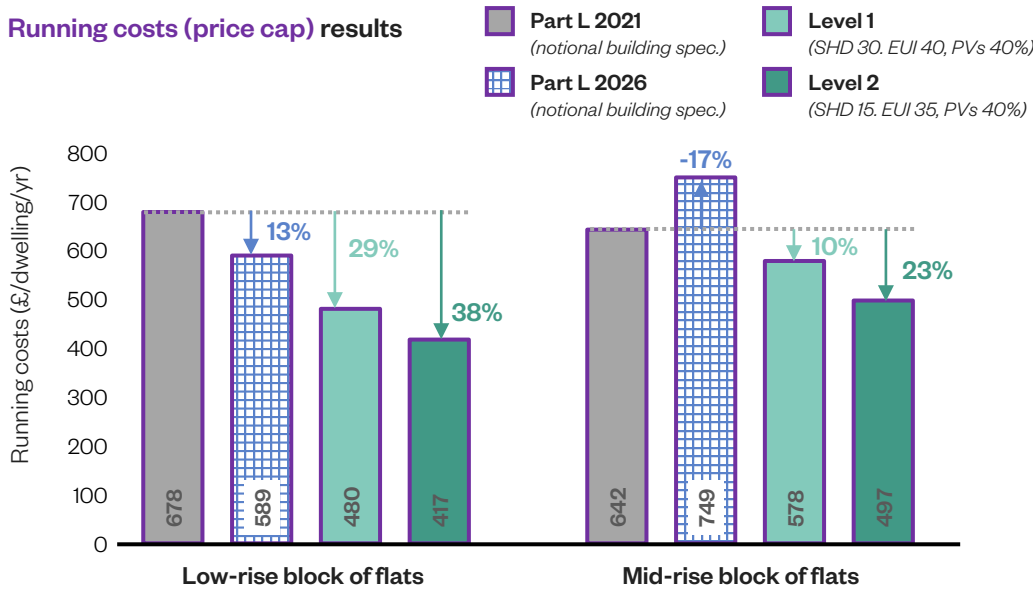
Running costs (price cap) results for block of flats

Findings from the running costs results for the two block of flats typologies across four performance scenarios include:

- The results highlight the significant operational savings that can be achieved by improving energy performance for all block of flats typologies to Level 1 or Level 2 compared against Part L 2021 scenario and Part L 2026 scenario only for the low-rise block of flats. This shows how investment in fabric and systems can deliver long-term reductions in operational expenditure.
- Savings from Level 1 and Level 2 to the Part L 2021 scenario are higher for the low-rise block of flats compared to the mid-rise block of flats. This is driven by the relative effectiveness of PV generation across building typologies. In the low-rise block, PV output is shared between seven dwellings, resulting in a higher generation-to-dwelling ratio. In contrast, the mid-rise block's PV generation is spread across around forty dwellings, reducing the benefit per unit.
- Further reductions could also be made with the use of dynamic tariffs (see [Appendix 7.5](#)).
- For the mid-rise block of flats, running costs increase by 17% from Part L 2021 to Part L 2026 notional specification scenario due to the combination of a high SHD (approximately 53 kWh/m²GIA/yr) with less efficient communal air source heat pump system compared to the gas boiler system under Part L 2021. When this high SHD demand is met by electricity (using heat pumps) rather than gas, considering current gas and electricity price differentials, running costs increase for where electricity consumption is higher. In contrast, Part L 2021 benefits from lower electricity exposure and cheaper gas price despite poorer fabric performance, resulting in lower bills for this specific typology.

This highlights the need to go beyond building regulations Part L2026.

Running costs (price cap) results



Estimated annual energy costs for the two block of flats typologies across all four scenarios. These costs include for the Ofgem energy price cap and effect of PV energy generation.

	Low-rise	Mid-rise
Indicative running costs per dwelling – Part L 2021 notional spec.	£678/yr	£642/yr
Level 1 (SHD 30, EUI 40, PVs 40%)	29% (£198/yr)	10% (£65/yr)
Level 2 (SHD 15, EUI 35, PVs 40%)	38% (£261/yr)	23% (£146/yr)
Indicative running costs per dwelling Part L 2026 notional spec.	£589/yr	£749/yr
Level 1 (SHD 30, EUI 40, PVs 40%)	19% (£109/yr)	23% (£172/yr)
Level 2 (SHD 15, EUI 35, PVs 40%)	29% (£172/yr)	34% (£253/yr)

Running cost savings for Level 1 and Level 2 from two different scenarios: Part L 2021 notional and Part L 2026 notional.

3.2

Non-residential developments

Space heating demand, energy use intensity, and renewable energy non-residential

Building on existing evidence for non-residential buildings

The analysis undertaken for non-residential developments considers the advantages and limitations of applying space heating demand (SHD) and energy use intensity (EUI) targets for various types of non-residential buildings. It also compares the use of BREEAM energy credits as a mechanism for reducing operational energy demand in non-residential developments against the application of EUI targets.

SHD and EUI performance requirements have been reviewed from:

- Existing industry guidance and recommended standards, such as UK Net Zero Carbon Building Standard, NABERS Standard, BREEAM, RIBA Climate Challenge, and LETI guidance.
- Published evidence bases from other local plan reviews including modelled performance analysis.
- As-built operational data from live projects has also been reviewed for some non-residential typologies to understand their energy-use profiles.

In general, there is a large variation of operational profiles and energy use patterns across non-residential building typologies. The aim of this section is to provide guidance on reasonable levels of performance in line with the wealth of information already published, that can be adopted by Stockport Council.

Renewable energy

All non-residential development would ultimately benefit from the inclusion of on-site renewable energy generation, with non-domestic buildings holding the greatest opportunity to include renewable technologies on expansive roof areas. Roofs of non-residential buildings are therefore considered to regularly be able to provide 40% of building footprint area with photovoltaics (PV).



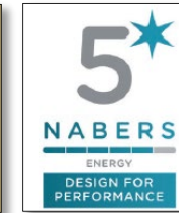
[LETI Climate Emergency Design Guide](#)



[UK Net Zero Carbon Building Standard](#)



[RIBA 2030 Climate Challenge V2](#)



[NABERS for office buildings](#)

SHD non-residential - Performance requirement

The benefits of a low Space Heating Demand (SHD)

Space heating demand is a measure of how much heating energy would be required to maintain a healthy and comfortable temperature in a building. It is influenced by the building fabric (e.g., insulation, windows, airtightness, construction quality) and its ventilation system (e.g. mechanical ventilation with heat recovery). Both residential and non-residential development can benefit from this. A building with a low space heating demand has several benefits compared with a building with a higher space heating demand:

- It requires less energy to heat and therefore has lower energy costs.
- It is more comfortable.
- The building envelope is generally of higher specification and quality.
- The building is more able to retain heat when the heating system is off.

Which non-residential buildings would benefit from a low SHD?

There are three types of 'non-residential buildings which would benefit from a low space heating demand:

1. Buildings not classified as use class C3 'dwellinghouses', but with a similar energy use as residential: this mainly applies to planning class use C2: **residential care homes, student/boarder accommodation, some non-specialist nursing homes**, but not hospitals or nursing homes.
2. Primary and secondary **schools** generally have a large building envelope and need to achieve high levels of comfort and air quality: limiting space heating demand can help achieve this while ensuring low energy bills.
3. Other buildings (e.g., **offices** and **heated industrial buildings**) as they are likely to benefit from a good envelope and low energy bills.

Feasibility of achieving a low SHD for these buildings

The technical feasibility of achieving a low level of space heating demand has been demonstrated by the completion of many buildings to the Passivhaus standard (which requires a space heating demand of less than 15kWh/m²TFA/yr), technical evidence bases (e.g., [Delivering Net Zero study](#) for 18 London Boroughs in 2023) and evidence underpinning the UK Net Zero Building Standard (NZCBS).

Based on this evidence, it is recommended that a SHD of 20kWh/m²GIA/yr is set for offices, schools and heated industrial buildings.



Student accommodation is one of the non-residential uses with strong similarities to residential. Example above: Purdon View, a completed 900+ bed development at the University of the West of England with a space heating demand of less than 15 kWh/m²/yr (© Stride Treglown)



Oak Meadow Primary School in Wolverhampton built in 2012 to a space heating demand of less than 15 kWh/m²/yr (© Architype)

EUI non-residential –BREEAM vs EUI approach

Can the BREEAM standard be used in operational energy policy?

Utilising BREEAM in planning policy as a means of demonstrating improvements in operational energy for non-domestic buildings is an option. The current BREEAM scheme is BREEAM New Construction Version 7 (V7) which was launched in September 2025. The *Places for Everyone* Joint Development Plan has currently adopted this approach, however there are factors to consider when using BREEAM in planning policy:

- **A full BREEAM assessment is a lengthy and expensive process:** A full BREEAM assessment covers a wide variety of environmental and sustainability performance issues. It is a considerable investment in both in terms of additional capital cost and additional fees for consultants and BREEAM assessors. It may only be appropriate for large non-domestic schemes.
- **It is possible to request compliance with specific energy credits:** There are two energy credits in BREEAM V7 related to energy performance:
 - Ene 01 Energy Performance (regulated energy)
 - Ene 02 – Operational Energy Prediction (Whole Building Energy).

More details on these are given on the right.

Ene 01 is not recommended in policy as it is not reflective of operational energy.

Ene 02 is a possibility as it is based on operational energy (total energy use) and is assessed through predictive energy modelling. The only benefit of using BREEAM for this purpose would be a set of specific EUI thresholds for each building type (these were not known at the time of writing this note).

Both credits may require a licenced BREEAM assessor to undertake the calculation.

Energy performance credits in BREEAM V7

Ene 01 Energy Performance (regulated energy)	Under Ene01 the building is assessed through the lens of building regulations. This compliance approach does not necessarily reflect the amount of energy the building will use in practice. It also only looks at regulated energy use – the energy used for heating, cooling, hot water, ventilation and lighting. It does not include energy used for cooking and appliances. It is therefore not suitable for assessing operational energy. Not recommended as it is not based on operational energy and does not reflect performance in use.
Ene 02 – Operational Energy Prediction (Whole Building Energy)	The Ene02 credit assesses total energy use of the building through predictive energy modelling which calculates annual energy demand and energy use intensity (EUI, kWh/m²/yr). All energy use in the building is included. Credits are awarded based on a % improvement over typical EUI benchmarks for that building type. The improvement benchmarks for different credits and BREEAM awards (e.g. Outstanding, Excellent) vary depending on building type. Potential for this to be used but EUI thresholds need to be checked before making a recommendation.

EUI non-residential - Potential EUI requirement alternative to BREEAM

What is energy use intensity?

EUI is the industry best practice method for benchmarking and setting limits for the energy consumption of buildings and many local authorities are already using them (see box below right). They also form the foundation of the Net Zero Carbon Building Standard. The EUI of a building covers all energy uses: space heating, domestic hot water, ventilation, lighting, cooking and appliances.

Key considerations

Non-domestic buildings are varied in type, function and the processes that take place within them, sometimes quite significantly. For this reason it is typically more challenging to set EUI targets for non-domestic buildings compared with residential buildings. Where EUI limits for non-domestic buildings are set in local planning policy there is also more variation than there is in residential policy.

Offices, schools and Industrial tend to be the three non-residential building types that have the most consistent EUIs.

Setting EUI limits for non-domestic buildings

There are different options for setting EUI limits for non-domestic buildings:

- Setting bespoke limits based on bespoke modelling or benchmarks from industry standards.
- Aligning limits with other standards, such as the UK Net Zero Carbon Buildings Standard (UKNZCBS), LETI, RIBA and NABERS
- Requesting compliance with a certain level of credits under BREEAM V7 Ene O2 Operational Energy Prediction (see [previous page](#)).

Adopted and emerging local plans using EUI limits

Offices

Central Lincolnshire has adopted a limits of 70 & 90 kWh/m²/yr, and Kensington and Chelsea have adopted a limit of 70 kWh/m²/yr. Five emerging local policies exist also propose a limit of 70 kWh/m²/yr. London borough of Newham proposes a limit of 55 and London borough of Southwark proposes a limit of 75 kWh/m²/yr.

Schools

Central Lincolnshire has adopted limits of 70 & 90 kWh/m²/yr, and Kensington and Chelsea have adopted a limit of 65 kWh/m²/yr. Seven emerging local policies also propose a limit of 65 kWh/m²/yr.

Industrial

Central Lincolnshire has adopted limits of 70 & 90 kWh/m²/yr, and Kensington and Chelsea has adopted a limit of 35 kWh/m²/yr. Five emerging local policies for London boroughs also propose a limit of 35 kWh/m²/yr.

EUI non-residential - Context from industry standards and other local plans

Non-Residential building performance

Non-Residential buildings perform quite differently to homes, due to the different functions, occupancy and their form. They are generally much larger than housing blocks, which can mean that their fabric performs more efficiently per square metre of floor area. Their energy use will be more variable, due to the different equipment that might be used, and more complex heating, cooling and ventilation requirements. There may also be non-typical activities inside (e.g. school with a swimming pool, industrial as a data centre).

Precedents for Non-Residential energy use intensity (EUI)

There are various local plans that have been either been approved or are under evaluation. These serve as a useful reference as they give an indication of what may or may not be deemed acceptable or pass the examination process. It is worth considering the location – as this impacts on the climate and potential space heating performance – and the timing – as policies will reflect the industry's understanding of these buildings at that time given available information. It is also sometimes worth considering the particular details of the evidence base used to develop a policy, as these will sometimes focus on higher or lower intensity versions of a type of building.

Industry standards and frameworks

Industry frameworks also provide indicative EUI and energy demand ranges for non-residential buildings (see list opposite). While these all aim to support net zero trajectories, their targets and limits can differ significantly between sources and over time, reflecting evolving evidence and a deeper understanding of specific building typologies. In some cases – particularly for offices – later iterations have revised EUI levels upwards or relaxed earlier ambitions where real-world performance data has shown that initial expectations were not achievable or did not adequately account for building use and services.

Local plans using energy metrics that have been approved or are under evaluation

Adopted local plans: there are numerous precedent local plans to refer to, from local authorities in different parts of the country.

Emerging local plans: there are also several plans in development and going through examination that can also be referred to.

Industry standards and frameworks

RIBA: EUI targets as part of RIBA's 2030 Climate Challenge. A range is shown representing the 2025-2030 targets.

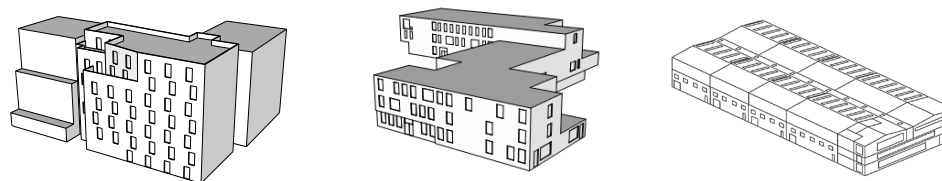
LETI: SHD and (some) EUI targets developed as part of the Climate Emergency Design Guide. These have raised the ambition across the sector.

UK NZCBS: EUI limits developed for the UK Net Zero Carbon Buildings Standard for various building typologies, based on broad industry engagement at the time of development. A range is shown representing 2025-2040 targets.

NABERS (Offices): National Australian Built Environment Rating System is a performance-based rating system for Offices. EUI range shown is approximately equivalent to star ratings 4.5 to 5.5, but these do vary per building.

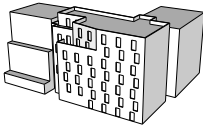
CIBSE Benchmarks: These are based on energy use for different types of existing building, separated by fuel type and 'typical' and 'good practice'.

Summary of precedent information available from local plans and industry standards and frameworks.



Office building, schools and industrial building are the typologies examined on the following pages.

EUI non-residential - Context for office buildings



This page provides a summary of the precedents available for office buildings. The green bars show the adopted and emerging local plans, and the blue bars show relevant industry standards and frameworks.

Adopted and emerging local plans

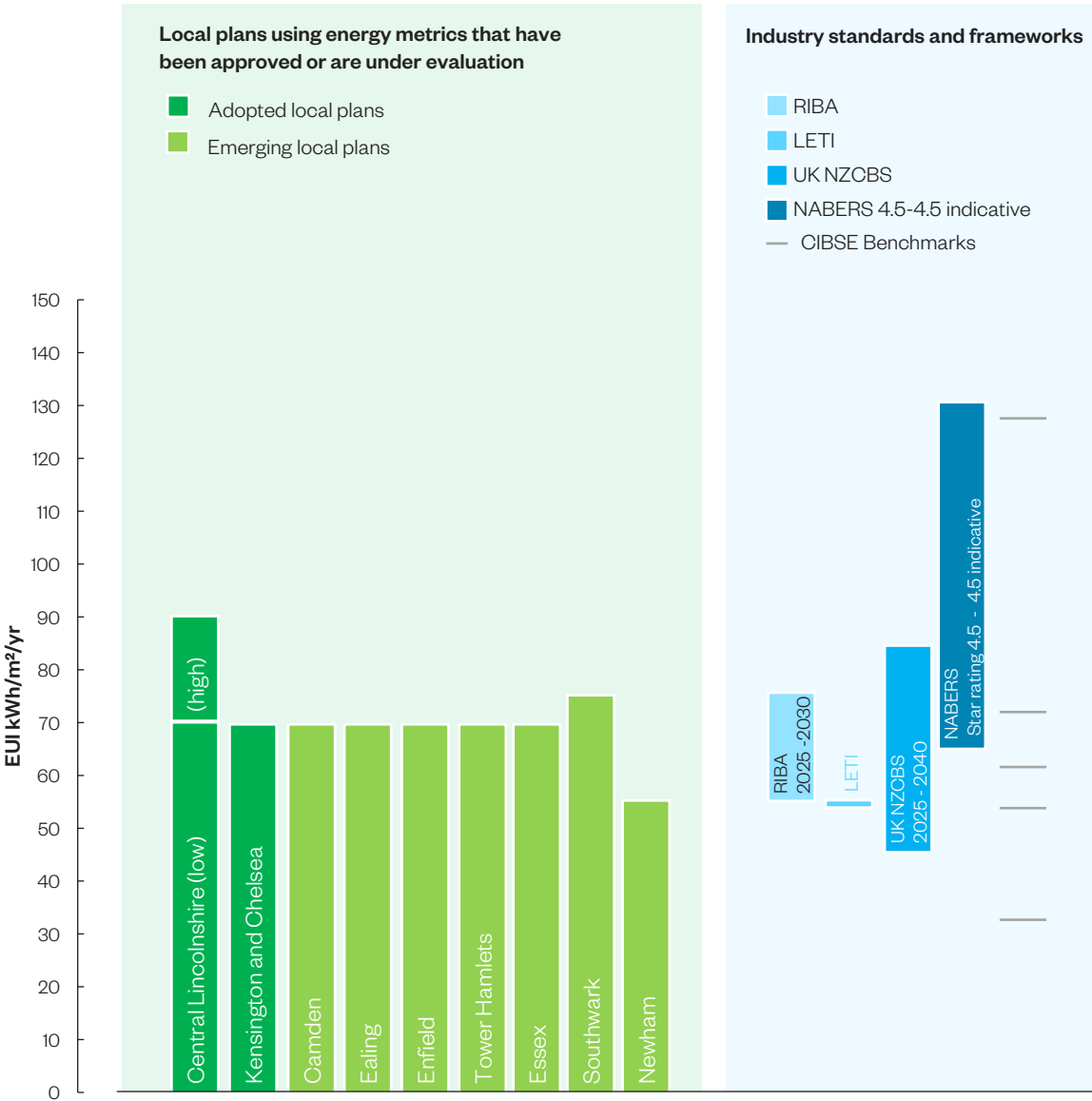
Central Lincolnshire has adopted a limits of 70 & 90 kWh/m²/yr, and Kensington and Chelsea have adopted a limit of 70 kWh/m²/yr. Five emerging local policies exist also propose a limit of 70 kWh/m²/yr. London borough of Newham proposes a limit of 55 and London borough of Southwark proposes a limit of 75 kWh/m²/yr.

Industry standards and frameworks

The RIBA targets 75 and 55 kWh/m²/yr for 2025 and 2030, and the LETI target is 55 kWh/m²/yr. UK NZOBS standard EUI limits are 85 and 45 kWh/m²/yr for 2025 and 2040, from stakeholder engagement at the time of development. CIBSE benchmarks vary considerably according to the office type. The highest is “air conditioned, prestige” and lowest is “Naturally ventilated, cellular”. The NABERS Design for Performance group have recommended that the performance levels are aligned with NABERS star ratings of 4.5, 5 and 5.5, corresponding to EUIs of 70 to 130 kWh/m²/yr as appropriate levels. (Star rating of 6 corresponds to 55 kWh/m²/yr but was deemed to hard to meet as a planning requirement so has not been included on the graph).

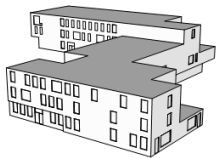
Performance level suggestion for policy

Based on available evidence from local plans and industry, this study recommends the use of an EUI target of 70 kWh/m²/yr for offices.



Evidence of technical feasibility for offices. The CIBSE benchmarks relate to the 'Good practice electricity' levels for (with EUIs in kWh/m²/yr): Naturally ventilated, cellular (33), Naturally ventilated, open plan (54), Local government office (62), Central government office (72)), Air conditioned, standard (128). Note that CIBSE benchmarks relate to existing buildings rather than new buildings.

EUI non-residential - Context for schools



This page provides a summary of the precedents available for schools. The green bars show the adopted and emerging local plans, and the blue bars show relevant industry standards and frameworks.

Adopted and emerging local plans

Central Lincolnshire has adopted limits of 70 & 90 kWh/m²/yr, and Kensington and Chelsea have adopted a limit of 65 kWh/m²/yr. Seven emerging local policies also propose a limit of 65 kWh/m²/yr.

Industry standards and frameworks

The RIBA targets 70 and 60 kWh/m²/yr for 2025 and 2030, and the LETI target is 65 kWh/m²/yr. UK NZOBS standard EUI limits are 60 and 35 kWh/m²/yr for 2025 and 2040, from stakeholder engagement at the time of development, and these cover early years, primary and secondary schools. The CIBSE benchmark is an outlier at 125 kWh/m²/yr.

Department for Education requirements

The [DfE Technical Manual Employer's Requirements](#) for schools states an EUI limit of 52kWh/m²/year for primary schools and 60kWh/m²/yr for secondary schools. It also sets Fabric Efficiency Standards which limit U-values and air permeability. These figures must be met for new state schools, therefore any EUI set in planning will ensure all schools are energy efficient.

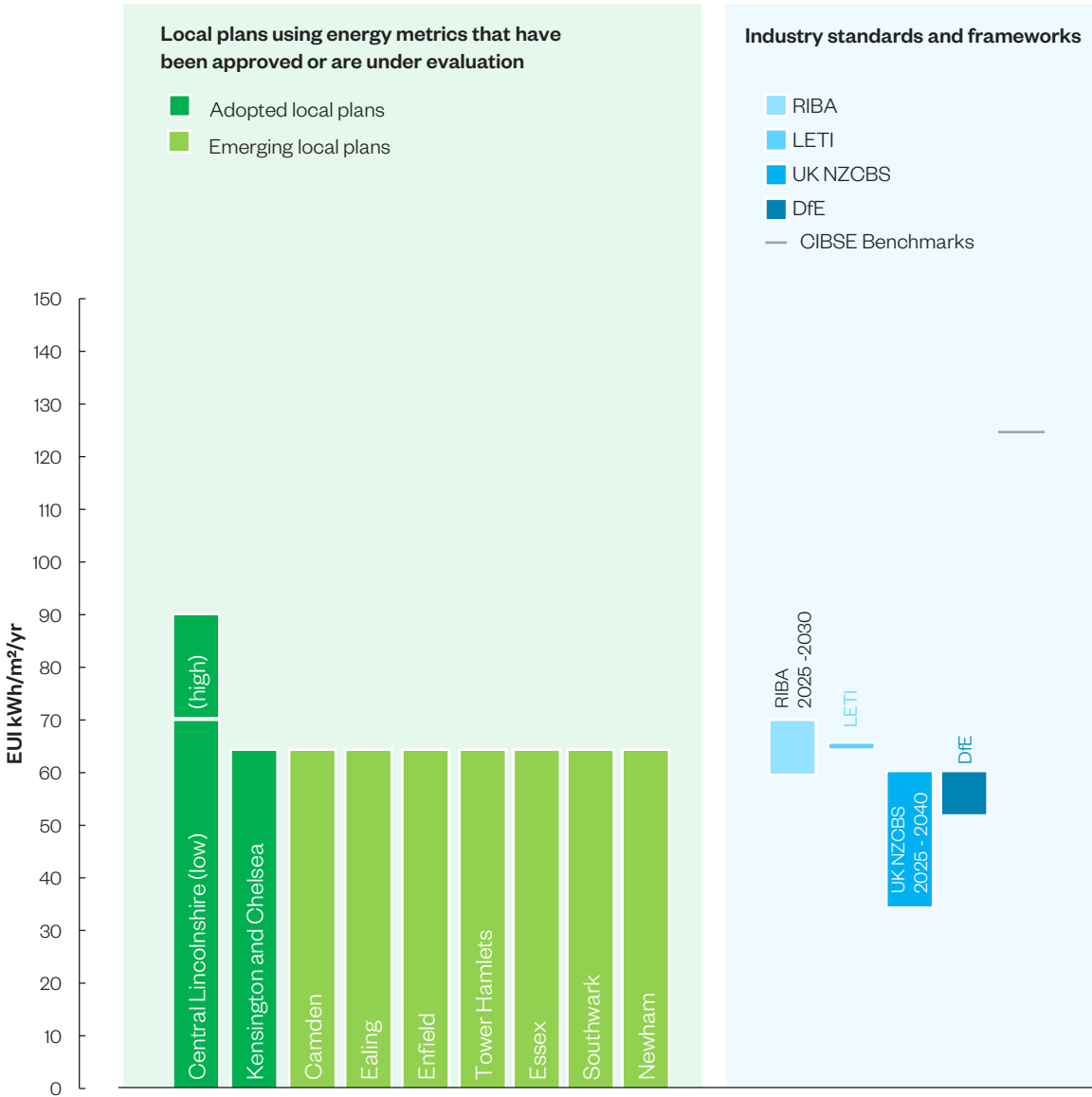
0.1.8 Energy Use Intensity (EUI)

- Buildings shall achieve or better the maximum Energy Use Intensity (EUI) values shown in Table 1 below

Typology	Energy Use Intensity (EUI) ⁶
Primary School	52 kWh/m ² maximum
Secondary School	60 kWh/m ² maximum
College	70 kWh/m ² maximum
Special School / Special College and Alternative Provision (AP)	52 kWh/m ² maximum

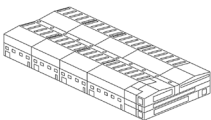
Performance level suggestion for policy

Based on available evidence from local plans and industry, this study recommends the use of an EUI target of 65 kWh/m²/yr for schools.



Evidence of technical feasibility for schools. The DfE set their own requirement for an EUI for new schools.

EUI non-residential - Context for industrial buildings



This page gives a summary of the precedents available for office buildings. The green bars show the adopted and emerging local plans, and the blue bars show relevant industry standards and frameworks.

Adopted and emerging local plans

Central Lincolnshire has adopted limits of 70 & 90 kWh/m²/yr, and Kensington and Chelsea has adopted a limit of 35 kWh/m²/yr. Five emerging local policies for London boroughs also propose a limit of 35 kWh/m²/yr.¹

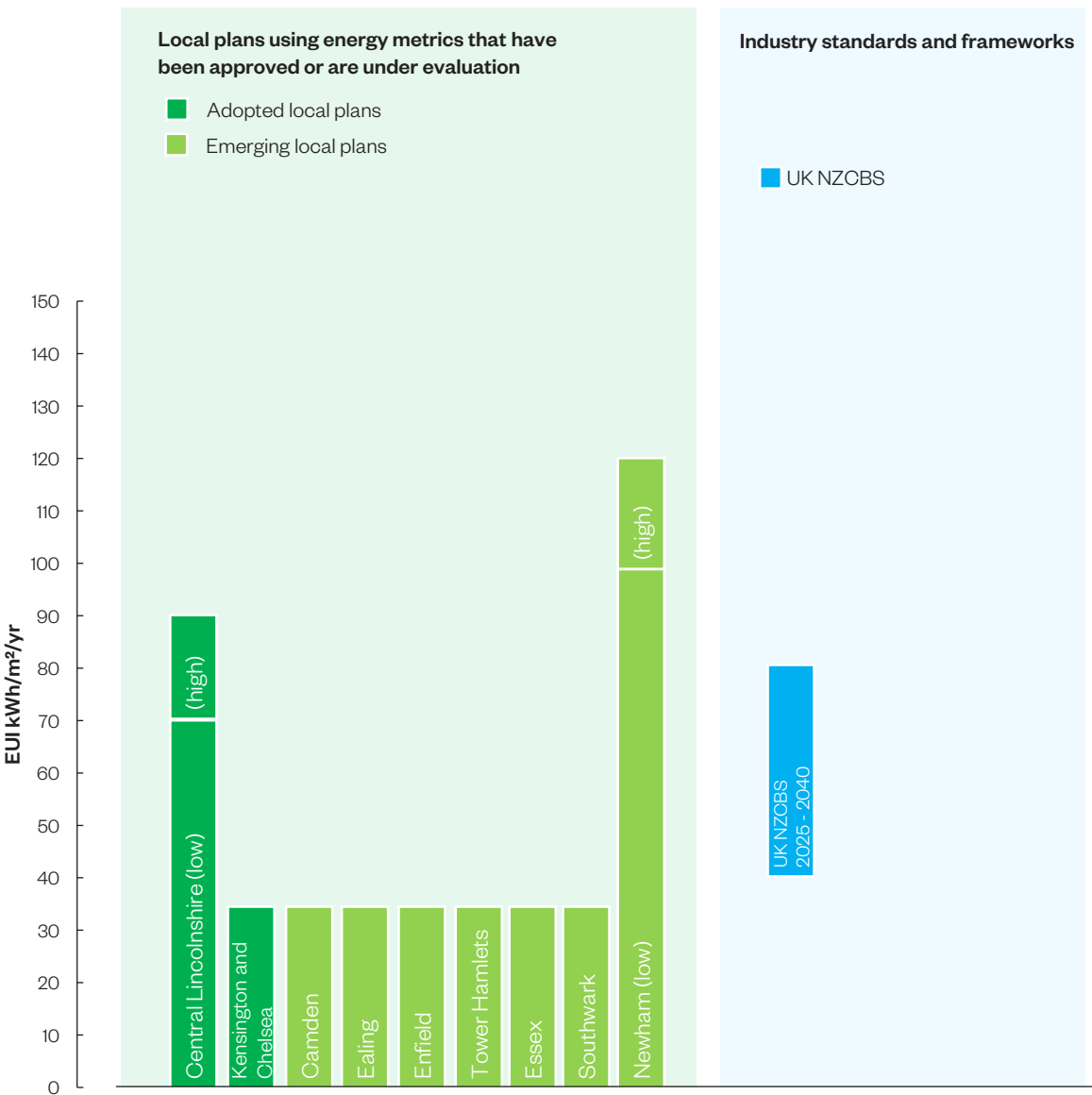
Industry standards and frameworks

UK NZCBS standard EUI limits are 80 and 40 kWh/m²/yr for 2025 and 2040 derived from stakeholder engagement at the time of development. There are no other specific EUI limits from industry standards and frameworks. UK Government are consulting on a performance-based energy rating framework, which will eventually affect large industrial buildings.

Performance level suggestion for policy

Based on available evidence from local plans and industry, this study found that an EUI target of 35-50 kWh/m²/yr for industrial buildings could be used.

However, industrial use classes tend to be more challenging to set a target on depending if they are heated or unheated spaces, and the bespoke nature of their end uses.



More detail on the existing evidence of technical feasibility for industrial. UK NZCBS is the only industry standard using EUIs.

¹The London Borough of Newham proposes a limit of 100 - 120 kWh/m²/yr for industrial buildings. These are for more intensive industrial buildings (2 storey) than generally assumed.

4

Low carbon heat

The importance of low carbon heat (which is also affordable)

Important considerations for Stockport Local Plan

The new Stockport Local Plan has a key role to play in making sure that the planning process can positively influence the choice of heating systems by applicants. In particular, it is important for heating systems to be:

- a) affordable to run for future residents/occupants
- b) financially viable for applicants
- c) consistent with the Stockport’s Net Zero Carbon ambitions
- d) consistent with Stockport’s priorities in terms of infrastructure.

The ability of Stockport’s new Local Plan to translate these overall ambitions into practical requirements for applicants will play a significant role in the ability to achieve them but a framework for decision making is likely to be more suitable than a hierarchy of heating systems.

Affordability of heat for residents/occupants

The proposed heating system should be affordable to use by residents/occupants, and they should benefit from a clear and regulated level of protection as consumers. The simplicity of use of the system will also be a key consideration to avoid the risk of some residents not being able to heat their home sufficiently.

Viability for applicants

The cost of heating systems can vary significantly therefore applicants should be able to consider the heating system’s impact on construction costs in their appraisal, particularly for social housing.

Consistency with Net Zero and environmental ambitions

The heat source should be consistent with Net Zero, and therefore not use fossil fuels or rely on processes which themselves are not consistent with Net Zero. It should also aim for a low level of embodied carbon have a limited environmental impact locally (e.g. noise, pollution). Finally, the system should not contribute to the risk of overheating.

Consistency with Stockport’s strategic infrastructure development

Decisions on heating infrastructure should be the result of coordination with other infrastructure development priorities.

Stockport objective	Key considerations
Affordability of heat for Stockport residents	• Cost of heat (per kWh) • Maintenance costs • Replacement costs • Consumer protection (e.g. energy price cap) • Access to flexible/lower tariffs
Viability for applicants	• Impact on construction costs
Consistency with Net Zero and environmental ambitions for Stockport	• Consistency with climate change mitigation objectives • Impact on local pollution (e.g. air quality, noise) • Impact on public health (e.g. overheating risk)
Consistency with Stockport’s strategic infrastructure development	• Electricity infrastructure • Delivering low carbon heating for neighbourhoods

Framework for choosing the most appropriate heating/ hot water systems

For a wider acceptance of on-site low carbon heating system

The heating revolution has started

Fifteen years ago, the challenge of decarbonising heat was mainly about how to prevent individual gas boilers from being installed in new dwellings as it would effectively 'lock-in' fossil fuel use and high carbon emissions for the next 15-20 years.

The aggregation of heat loads in order to be able to install communal low carbon heating systems and the associated development of heat networks was considered to be essential to achieve this objective.

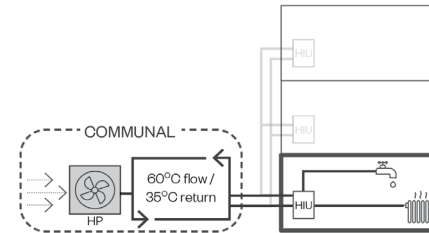
The underpinning evidence behind this approach has now changed with the new heating revolution taking place in buildings: a much wider range of systems are available at the development level which can deliver low carbon heat as they use low carbon electricity. A selection of these systems are illustrated on the right-hand side.

Based on an assessment of how these systems would perform in terms of carbon emissions and energy costs, our recommendation is for Stockport Council not to restrict the use of any on-site electric (low carbon) heating systems through the new Local Plan.

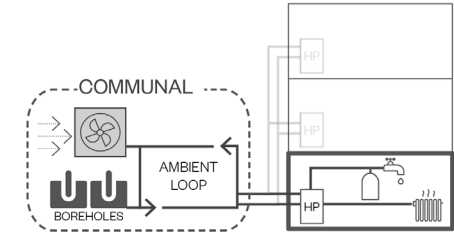
Focusing on outcomes: heat should be low carbon and affordable

In order to ensure that the system selected by the applicant does indeed provide low carbon and affordable heat to the residents, it is recommended that a **'low carbon heat appraisal'** is required for all major planning applications.

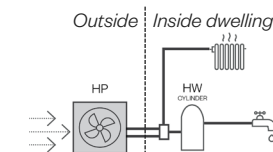
Communal air source heat pump (55-60°C)



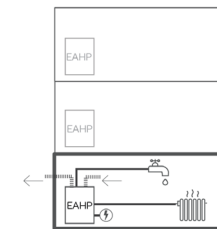
Communal ambient loop air source heat pump (25 °C)



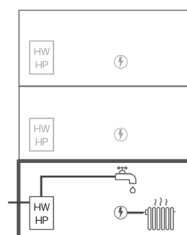
Individual air-source heat pump (monobloc)



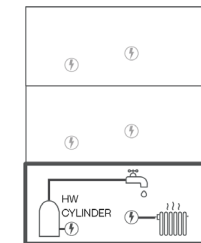
Exhaust air heat pump / Compact unit



Direct electric heating + hot water heat pump



Direct electric heating panels and hot water cylinder



Sample of low carbon heating systems which can be implemented at the development scale.

Proposed heat network in Stockport

Potential future Stockport Town Centre low carbon heat network

Stockport Council and DESNZ are in the process of planning a potential Stockport Town Centre heat network. According to the Technical Summary Report prepared in August 2025, it would initially serve 32 buildings, including Council buildings, Stockport Homes blocks, Stepping Hill Hospital, education sites and future Town Centre West developments.

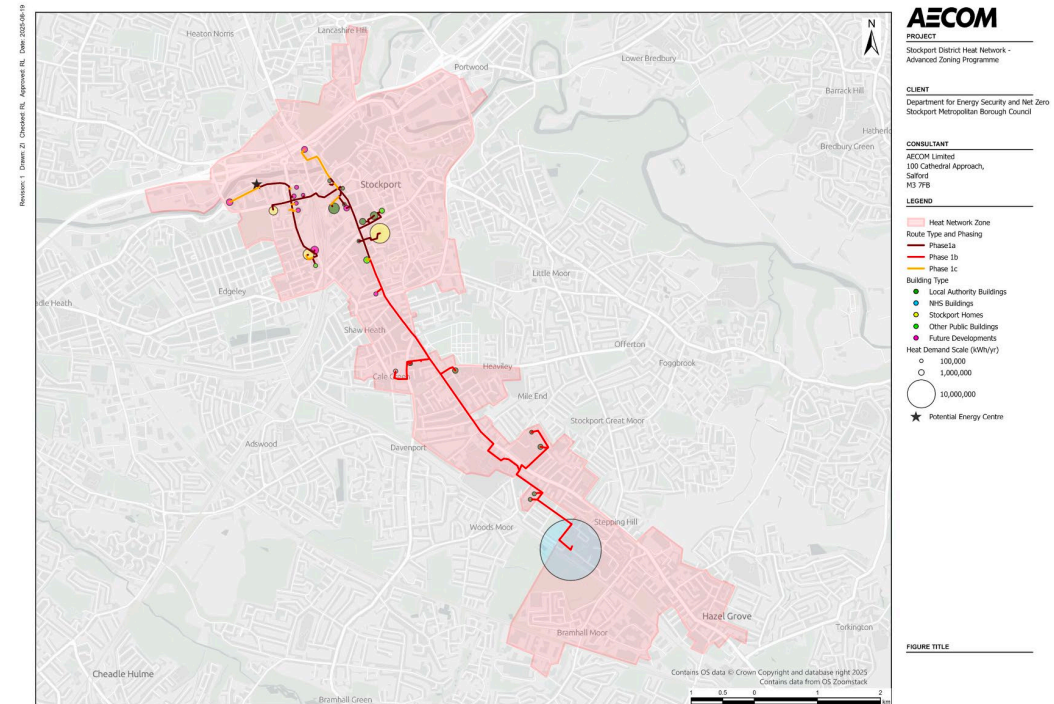
It is assumed that its primary low carbon heat source will be sewer source heat recovery from the main combined sewer near Chestergate and that it will be supported by gas boilers for peak and resilience duties. The network is designed to have a carbon intensity of less than 100 gCO₂e/kWh delivered heat and is expected in future to be able to meet the Warm Homes guidelines for low carbon heat networks, where 85% of heat is delivered by low-carbon air source heat pumps using electricity and 15% of heat is supplied by gas boilers. It is expected to deliver about 58.9 GWh of heat annually, with a peak demand of 17.1 MW. It will be a 4th generation heat network, work with 85°C flow temperature regime in the primary network during peak heating season, compensated down to 70°C during shoulder and summer seasons.

The heat network is still at an early stage of design and a number of risks have been identified, including sewer interface design, utility clashes, grid connection, river abstraction permissions and rail and river crossings. A future zonal expansion could increase sewer heat pump capacity and add River Mersey water source heat pumps.

Enabling connection to the future Stockport Town Centre low carbon heat network

Assuming that the Stockport Town Centre heat network is constructed, **that it is low carbon and that it is the most economic low carbon heating solution available**, new developments (e.g. Town Centre East development) should be able to connect to it.

We recommend an additional 10kWh/m²GIA/yr policy allowance on the EUI is applied for connection to district heat networks. This accounts for the conversion of metered heat (which includes the total energy consumed by the district heating system and any distribution losses), ensuring connected buildings are not disadvantaged compared to buildings using individual or on-site communal low-carbon heating systems.



Stockport Town Centre Heat Network reference scheme showing building connections (source: AECOM)

The introduction of low carbon heat appraisals

A framework to guide heating system selection

Following a fixed heating system hierarchy of technologies is unlikely to be the right solution as there is not currently a robust and published evidence base which would justify one.

Instead, and in order for the most suitable system to be specified depending on the building typology, scale and context, a focus on outcomes is recommended. The 'low carbon heat appraisal' is a process which would enable this assessment of future outcomes and ensure that applicants consider a range of parameters before they make a decision, hopefully leading to the selection of most appropriate heating system that delivers low carbon heat and low running costs.

It will also enable the rationale for the heating system selection to be shared transparently with Stockport Council. The council can challenge the decision if outcomes do not appear satisfactory, e.g. if there is a risk that residents could be left with a heating system which is not affordable in terms of energy, maintenance and replacement costs.

Proposed reporting framework

Indicators are recommended in the following areas: a) impact on residents/building users, b) Net Zero and environmental performance, c) infrastructure development (e.g. connection to low carbon heat network where applicable), d) viability.

A 'Low carbon heat appraisal' is recommended for all applications. However, the level of analysis and reporting expected will vary depending on the scale and location of the planning application. Guidance will need to be developed so that low carbon heat appraisals are carried out in a consistent way. A methodology for assessing energy costs would be particularly beneficial.

Already in-use through the PfE Joint Development Plan

The Greater Manchester Combined Authority has recently adopted a low carbon heat appraisal approach through its new [low carbon heat design guidance](#), developed to support effective implementation of the Places for Everyone (PfE) Joint Development plan. This guidance sets out details and consistent approach for assessing and selecting heating systems in new developments, ensuring proposals prioritise low carbon, future-proofed solutions aligned with Net Zero objectives.

Performance area	Key indicator	Unit
Impact on residents/building users	1. Estimated energy costs for heating and hot water	£/yr
	2. Estimated maintenance costs	£/yr (annualised)
	3. Estimated replacement costs	£/yr (annualised)
	4. Additional operating costs compared with benchmark ¹ low carbon heating system including standing charge. ²	+/- %
Net Zero and environmental performance	5. Fossil fuel use	yes/no
	6. Carbon content of heat ³	gCO ₂ /kWh _{of delivered heat}
	7. Local pollution	description
Infrastructure development	8. Connection to low carbon heat network	yes/no
	9. Scale of application	m ² GIA
Viability	10. Capital cost of installing the system ⁴	£ per m ²

Proposed Indicators to be assessed in the low carbon heat appraisal.

¹ It is recommended that Stockport Council defines a 'benchmark system' for houses (e.g. individual monobloc air source heat pump) and for flats (e.g. direct electric panels with hot water heat pumps or communal air source heat pump)

² Where a connection to a heat network is included in the comparison, the standing charge should be included, as some heating network operators have lower connection costs, but then increase standing charges, if this is the case, this needs to be included.

³ It is recommended that Stockport Council publishes a simple methodology on how to calculate the carbon content of heat

⁴ For systems that connect to a heat network, this includes the connection costs

5

Energy offsetting

Offsetting – Why use it

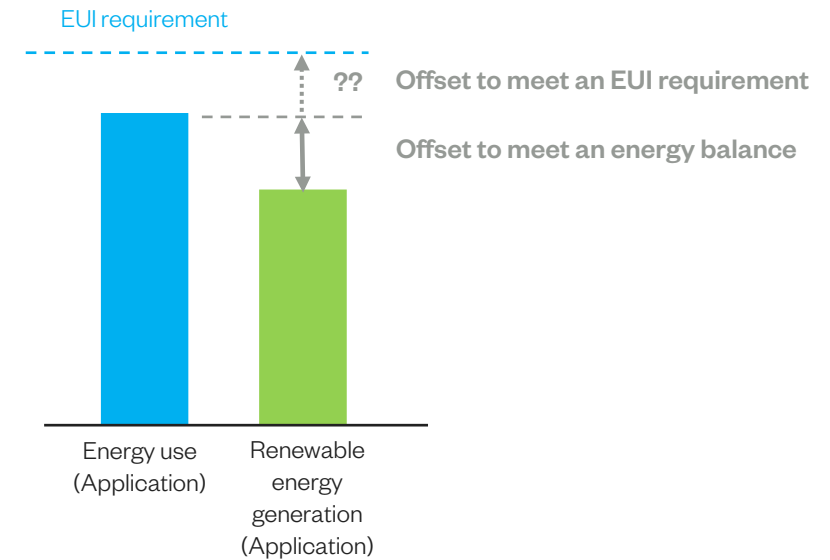
Energy offsetting is a mechanism through which applicants can comply with policy, such as an energy balance or energy generation requirement, by offsetting the shortfall in on-site energy generation against total energy consumption or policy target. Originally designed to introduce flexibility where applicants faced genuine technical challenges in meeting policy, its role has become increasingly significant and has led to perverse outcomes, with some applicants finding it more cost-effective to offset rather than deliver a lower-carbon development on-site.

Current modelling analysis demonstrates that an energy balance can be achieved on-site and that the means to do so are well understood. On-site delivery should therefore be the primary expectation and the default position of policy.

Stockport policy

Net zero is defined within Stockport's energy policy by limiting Space Heating Demand (SHD) and Energy Use Intensity (EUI), alongside a minimum target for area of on-site renewable energy generation. These are commendable standards and, when met, energy balance is achieved and offsetting becomes unnecessary. Cornwall Council has implemented comparable energy and carbon policies and has recorded that very few schemes have utilised the offset mechanism, with applicants meeting policy requirements directly instead.

While some schemes may have legitimate reasons for being unable to fully meet policy requirements, these should be assessed on a case-by-case basis and accepted where it can be demonstrated that genuine best efforts have been made. Unlike most other planning policy requirements, energy offsetting effectively now functions as a financial penalty, a characteristic that sits uncomfortably within a planning framework and risks undermining the credibility and intent of the policy.



Example of energy offset payments based on a shortfall in PV to meet an energy balance and/or EUI requirement.

Offsetting – Its role in the current context of net zero policy

Offsetting as an option

On-site compliance is far preferable to offsetting. However, offering offsetting as an alternative inevitably invites applicants to assess whether offset payments represent better value than on-site measures - an unintended consequence that can work against the ambitions of the policy itself. Furthermore, the cost of administering an offset fund, particularly one that receives limited contributions where policy is being met, may ultimately outweigh the income it generates, raising questions about its operational viability.

The recently released Building Regulations Part L 2026, which implements the Future Homes and Buildings Standards, significantly raises the baseline performance required, particularly in relation to low-carbon heating and on-site energy generation. This provides a stronger regulatory backstop, making it increasingly achievable for schemes to meet an optimal EUI and deliver genuine on-site energy balance. It is also worth noting that offsetting is most logically applied to address a shortfall in renewable energy generation (i.e. PV output); applying it against an EUI shortfall is technically inconsistent and further undermines the coherence of the mechanism.

Recommendation

Not pursuing offsetting as a compliance pathway within Stockport's energy and carbon policy would make the policy both clearer and more robust. It is recommended not to include offsetting in policy, establishing SHD, EUI and onsite renewables as primary requirements, while retaining the flexibility to assess schemes on a best-efforts basis where genuine and demonstrable constraints exist. This approach ensures that Stockport policy delivers the on-site carbon reductions it was designed to achieve, without the distraction of offsetting.

Offsetting

It is recommended **to not include offsetting** as a policy option

Offsetting

It is recommended to treat **sites with genuine reasons** not to comply with flexibility applied on **best efforts basis**

6

Implementation and opportunities to streamline the process

Operational energy policies – Streamlining the process

Streamlining planning submission requirements for operational energy will save the applicant and Stockport Council time and resource. A simpler submission process will divert time away from the submission and back towards the quality of the analysis underpinning the submission.

To ensure transparency and delivery against the intent of policy, applicants should be required to submit predictive energy and carbon data (as a summary) with an explanation of how new development has achieved the level of performance (in a standardised way).

Combining policy with efficient processes to achieve outcomes

With clear policy requirements that are proportional to the scale of development, the focus can be placed on guidance to achieve the desired outcomes through good environmental design and robust energy analysis. This guidance should make it clear what is expected of applicants and provide simple tools for submission.

Achieving quality

A well-thought through submission process can replace the need for vast amounts of data and onerous verification in the quest for quality. To achieve quality submissions and outcomes, Stockport Council should consider:

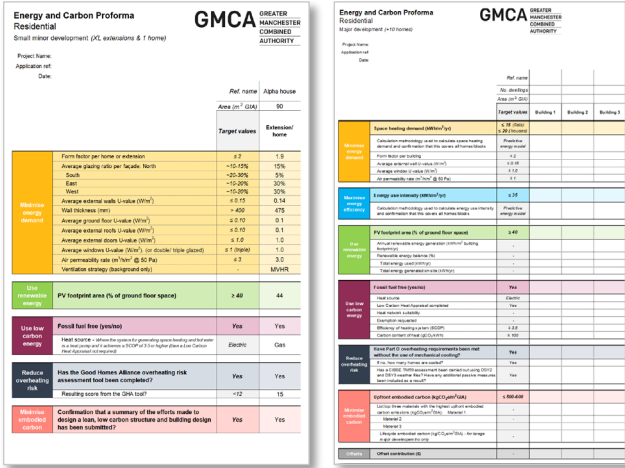
- Providing updated guidance and tools covering:
 - ✓ How to design low energy buildings and what low carbon heating solutions should be considered where;
 - ✓ Submission requirements including simplified tools/proformas;
 - ✓ Requirement for applicants to sign-off on quality of submission.
- Carrying out spot checks on energy calculations which require more detail to be shared with third parties for analysis.
- Building an expert Stockport energy and carbon panel to:
 - ✓ Review planning applications with an eye for what good and poor energy performance looks like;
 - ✓ Provide a forum to discuss challenging applications with applicants in detail, to seek a balance between policy and outcomes.

Pre-app	Description	Summary of efforts made to reduce space heating demand through environmental design and specification, reduce energy use intensity through provision and selection of low carbon heating, and increase the provision of renewable technologies.
	Format	Short presentation at pre-app against a checklist of topics.
	Governance	Unless a pre-app is made mandatory for all major projects then this will remain optional.
Planning submission	Description	Outline, full and reserved matters applications: - Predictive energy modelling carried out for a sample set - Operational energy limits set in planning to be met - Compliance with the 'passive design test' (full), or commitment to comply (outline).
	Format	Outline applications: - Commitment to achieve operational energy limits and use of predictive energy modelling. Demonstration of environmental design and how it will contribute to meeting operational limits. Full and reserved matters applications: - Energy and carbon proforma that collates and summarises the predictive energy modelling results. - Supplementary energy and carbon statement describing how a reduction in operational energy has been achieved, with appendices for detailed results from modelling. This should include a low carbon heat appraisal and outcomes of the cooling passive design test.
	Governance	Refusal of permission if limits are not met.
Discharge of pre-commencement condition, required again as part of Discharge of pre-occupation	Description	Updated predictive energy modelling carried out for all buildings. Confirmation that the SHD, EUI limits and Renewable energy targets submitted at planning have been followed through during construction.
	Format	- Resubmission of energy and carbon proforma - Confirmation statement of any amendments made since planning permission was granted.
	Governance	Officer discretion with regards to actions to be taken in relation to compliance with policy or non-alignment with original planning application.

Operational energy policies – Simplified submission process

In order to make a submission process more simple and effective, it could follow similar guidance to GMCA and be split into two parts

- Energy and Carbon Proforma** - A summary Excel tool for applicants to complete and submit as part of outline and full planning applications. This summary tool would simply require the entry of final results, rather than form part of the processing/calculation of data to generate results. The data entered into the proforma would be expected to be backed by further detail included in an Energy and Carbon Statement.
- Energy and Carbon Statement** - An Energy and Carbon Statement using a standardised contents list to describe how a development meets the energy and carbon policies. It need not be more than a 20+ page report with appendices containing supplementary reports (overheating, embodied carbon and low carbon heat appraisals).



GMCA, Places for Everyone Energy and Carbon Proforma. Three residential and three non-residential proformas bring proportionality to submissions and have been provided for applicants to complete as part of their planning application.

Bringing proportionality to policy and planning submissions

The scale of submission requirements should be proportionate to the scale of the development (minor/major/referable). Submission requirements should also vary depending on the stage/type of application (outline planning application or full/reserved matters application), and by sector.

Use of a simplified energy proforma

In our work for Greater Manchester Combined Authority we found the introduction of a simplified proforma, completed by the applicant, is a useful way to streamline the planning application process (for both applicants and local authorities). A series of residential and non-residential proformas brought proportionality to the submission for different scales of development. The proforma collects results on key metrics for each building/block that can be compared back to policy to determine compliance. Additional supporting data (such as form factor, U-value and efficiency of heating system) is also captured to give an indication of how plausible the results are.

	Minor development		Major development	
	Small minor	Minor	Major	Large major
Residential	Single home and extra large extensions	2-9 homes	10-149 homes	+150 homes
Non-residential	<100m ²	100-999m ²	1,000-4,999m ²	+5,000m ²

	Minor development		Major development	
	Small minor	Minor	Major	Large major
Residential	Residential Small minor Proforma	Residential Minor Proforma	Residential Major Proforma	
Non-residential	Non-residential Small minor Proforma	Non-residential Minor Proforma	Non-residential Major Proforma	

	Minor development		Major development	
	Small minor	Minor	Major	Large major
Residential	Design and access statement	Energy and Carbon Statement		
Non-residential	Design and access statement	Energy and Carbon Statement		

Breakdown of development types and scales for GMCA Places for Everyone Energy and Carbon Proforma.

Operational energy policies – Predictive energy modelling for residential developments

Part L modelling – residential buildings

Standard Assessment Procedure (SAP 10.2) was developed to check compliance of residential developments with Approved Document Part L of the Building Regulations. SAP was not developed to predict the energy performance of a home, and more importantly was not meant to predict future energy use accurately. This is a widely accepted fact, hence why the Government is developing a new energy modelling methodology for residential buildings: the Home Energy Model (HEM) and its Future Homes Standard (FHS) wrapper.

A move to predictive energy modelling

To influence the energy efficiency of the building design and improve performance outcomes, we must move to the use of predictive energy modelling (e.g. Passivhaus Planning Package (PHPP), or when complete and tested the future building regulations model – Home Energy Model (HEM)). Predictive modelling not only gives more accurate predictions of performance, but it can also better influence early design to ensure the thermal envelope and systems are better designed.

Predictive energy modelling for residential buildings

Benefits of using predictive modelling for new residential projects include:

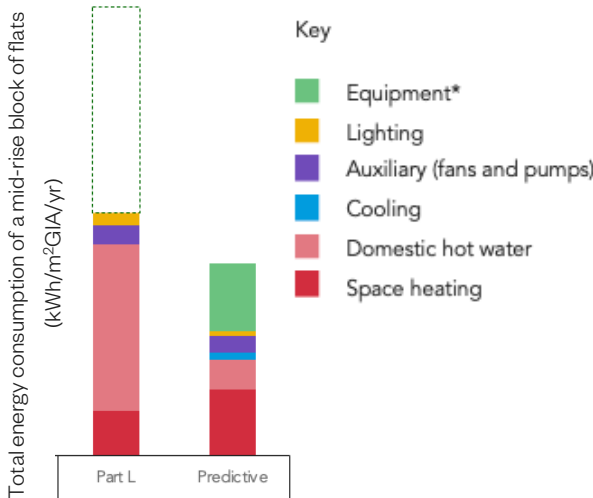
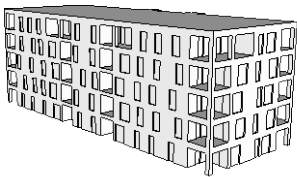
- Greater accuracy (e.g. Greater Manchester weather file, more accurate shading assessment, ventilation duct heat losses taken into account)
- Inclusion of unregulated energy (e.g. cooking and appliances)
- Ability to assess the benefit of better building orientations, building form and window sizes early during the design.

Applicants should summarise their key modelling assumptions to make it easier for Stockport Council to review them.

The use of PHPP is independent of meeting Passivhaus standards and certification.

CIBSE TM54 dynamic modelling tends to overestimate energy consumption in residential buildings, resulting in misreporting of the energy use intensity KPI. This can lead to incorrect conclusions, potentially forcing unnecessary design interventions, increasing costs, and wasting time and resources. As mentioned above the recommended energy tool for residential buildings to report against the energy targets is the Passivhaus Planning Package (PHPP).

Part L modelling	Predictive modelling	HEM
SAP 10.2	PHPP	HEM:FHS
Used to check compliance with Part L 2021	Used to predict space heating demand and energy use intensity (it is also used to check compliance with Passivhaus Standard)	Will be used to check compliance with Future Home Standard
Active - to be replaced by HEM in 2026 (tbc)	Agnostic of building regulation methodology changes	From 2026 (tbc)
Least accurate • UK standard weather file • Underestimates space heating and overestimates domestic hot water and appliances	Most accurate • Specific weather conditions and location used • As-built performance predicted more accurately	To be determined Strengths and weaknesses of HEM:FHS are not confirmed yet



There is a significant difference between Part L modelling currently used to demonstrate compliance with building regulations and predictive energy use modelling which should be used to demonstrate compliance with the proposed policies.

(Source: Delivering Net Zero Study, 2023)

SAP doesn't account for unregulated emissions, overestimates hot water energy consumption, while underestimating space heating.

Operational energy policies – Predictive energy modelling for non-residential developments

Part L modelling – non-residential buildings

The NCM (National Calculation Methodology) is the calculation methodology used on new non-residential buildings and is used through the Simplified Building Energy Model (SBEM) and Dynamic Simulation Modelling (DSM) tools in order to demonstrate compliance with Approved Document Part L of the Building Regulations. However, this methodology was never meant to perform key functions that are required to assess Net Zero Carbon buildings, and most importantly they were not meant to predict future energy use accurately. This is why the use of predictive energy modelling is required to demonstrate compliance with Net Zero requirements.

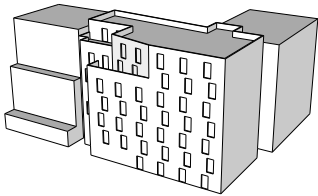
Predictive energy modelling for non-residential buildings

For non-residential buildings, PHPP methodology (an excel based tool) has also been shown to predict energy use accurately. The methodology set out in CIBSE Technical Memorandum 54 (TM54) can also be followed for DSM models. Benefits of using predictive modelling on new non-residential building projects include:

- Ability to model opening/working hours and occupancy patterns specifically.
- Inclusion of unregulated energy (e.g. IT and equipment).
- Possibility to compare predictive performance against benchmarks for similar buildings.

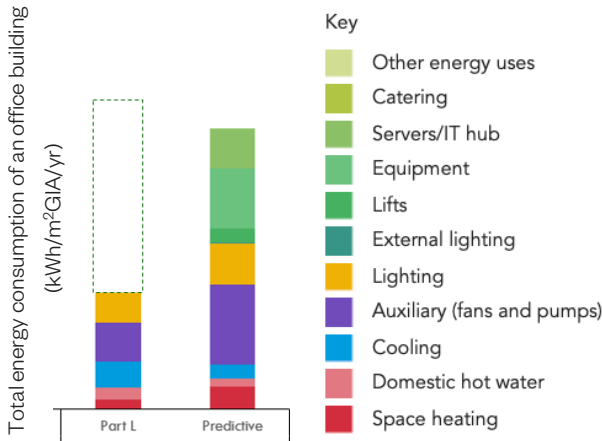
Applicants should summarise their key assumptions to make it easier for the local planning authority to review them.

Part L modelling	Predictive modelling
SBEM and DSM for Part L (e.g. IES , TAS)	DSM for CIBSE TM 54 (e.g. IES , TAS), PHPP
Used to check compliance with Part L 2021	Used to predict space heating demand and energy use intensity (PHPP is also used to check compliance with Passivhaus Standard)
Active No planned updates	Agnostic of building regulation methodology changes
Least accurate • High level of standardisation • Underestimates space heating and overestimates domestic hot water and equipment (incl. IT)	Most accurate • As-built performance predicted most accurately



There is a significant difference between Part L modelling currently used to demonstrate compliance with building regulations and predictive energy use modelling which should be used to demonstrate compliance with the proposed policies.

(Source: Delivering Net Zero Study, 2023)



SBEM doesn't account for unregulated emissions, and grossly under estimates energy consumption, especially related to improvements to the building fabric.

Operational energy policies – Predictive energy modelling standardisation process

Standardisation of predictive energy modelling

There are various approaches to carrying out predictive energy modelling. If space heating demand and energy use intensity targets are incorporated into policy, then it is important that guidance is produced for applicants on how to carry out this energy modelling. Without some level of standardisation, results could vary significantly between applicants, similar to the inconsistencies observed in Whole Life Carbon assessments. This poses a risk of unfairly penalising applicants who use more accurate methods compared to those who don't. This guidance can be drawn from various sources that already exist, such as CIBSE TM54, the LETI Operational energy modelling guide, RICS Whole life carbon assessment guidance for the built environment and NABERS design for performance modelling guidance.

Standardisation/guidance can be light touch or more detailed. Options are listed below, with pros and cons opposite:

- 1. Predictive energy modelling** - with no template assumptions, guidance on the steps required, level of detail required to be carried out as well as the outputs.
- 2. Standardised predictive energy modelling** - with template assumptions (this could be called performance modelling). Providing default assumptions on inputs such as occupancy density, operating hours and temperature set points. (as well as the guidance mentioned in Option 1)
- 3. A two-step process**, where first a performance model using template assumptions is developed and then for buildings where the assumptions are significantly different from the template, assumptions are updated and to create a predictive model.

If there is predictive energy modelling - with no template assumptions

PROS	CONS
✓ Model is highly bespoke to the building ✓ The design team can fully understand the energy reduction benefits of various fabric and system efficiencies ✓ Provides an accurate prediction of the energy consumption ✓ In-use energy consumption results from the Be Seen policy can be compared to the results	✗ For some building types the intended occupier is not known at planning stage (e.g. small retail units as part of a multi-use scheme) or the intended use is variable (e.g. industrial, science and tech). This means that energy modelers will have to use their own default assumptions, depending on what they use it will be easier or harder to meet the SHD and EUI limits. ✗ For a more typical building, like a home, not having standardised assumptions means greater variance in modelling results even though they should be consistent. Making it difficult to understand why a dwelling may be performing better or worse than the SHD and EUI limits.

If there is standardised predictive energy modelling - with template assumptions

PROS	CONS
✓ Easier for limits to be met as there is more consistency	✗ Does not predict the energy use as accurately as the bespoke approach above (unless Stage 5 energy modelling is completed with bespoke assumptions).

If there is a two-step process

PROS	CONS
✓ As this has both model types, it has all of the pros of the predictive energy model and the performance model	✗ This process requires two versions of the energy modelling for buildings. The assumptions on how the building is used are significantly different from the template assumptions.

Low carbon heat appraisal – Predictive energy modelling standardisation process

Planning has a key role to play in the selection of the best low carbon heating system. In our previous work for the Greater Manchester Combined Authority we have found the introduction of a low carbon heat appraisal as part of the planning submission to be beneficial.

Selecting the most suitable low carbon heating system

In order to enable applicants to select the most suitable low carbon heating system and to facilitate Stockport Council's appraisal of their proposal, the following KPIs are recommended:

- **Impact on residents:** estimated energy, maintenance and replacement costs and additional cost compared to a 'benchmark' low carbon heating system (e.g. (on-site air source heat pump).
- **Impact on viability:** estimated capital costs of selected heating system and additional cost compared to a 'benchmark' low carbon heating system (e.g. (on-site air source heat pump).
- **Environmental performance:** whether the system uses fossil fuels or not, its predicted carbon content of heat and whether it will create any local pollution issues. Embodied carbon/whole life carbon as an optional KPI.
- **Infrastructure development:** whether the scheme is proposing to connect to the local low carbon heat network or not with suitable justification for exemption if required.

A 'Low carbon heat appraisal' is recommended

It is recommended that full and reserved matters planning applications of a suitable scale (e.g. 2 or more new dwellings or new non-residential development >100m²) include a Low Carbon Heat Appraisal and that the most suitable low carbon heating system is proposed. However, the level of analysis and reporting expected will vary depending on the scale and location of the planning application.

Performance area	Key indicator	Unit
Impact on residents/ building users	1. Estimated energy costs for heating and hot water	£/yr
	2. Estimated maintenance costs	£/yr (annualised)
	3. Estimated replacement costs	£/yr (annualised)
	4. Additional operating costs compared with benchmark ¹ low carbon heating system including standing charge. ²	+/- %
Net Zero and environmental performance	5. Fossil fuel use	yes/no
	6. Carbon content of heat ³	gCO ₂ /kWh _{of delivered heat}
	7. Local pollution	description
Infrastructure development	8. Connection to low carbon heat network	yes/no
	9. Scale of application	m ² GIA
Viability	10. Capital cost of installing the system ⁴	£ per m ²

Proposed Indicators to be assessed in the low carbon heat appraisal.

¹It is recommended that Stockport Council defines a 'benchmark system' for houses (e.g. individual monobloc air source heat pump) and for flats (e.g. direct electric panels with hot water heat pumps or communal air source heat pump)

²Where a connection to a heat network is included in the comparison, the standing charge should be included, as some heating network operators have lower connection costs, but then increase standing charges, if this is the case, this needs to be included.

³It is recommended that Stockport Council publishes a simple methodology on how to calculate the carbon content of heat

⁴For systems that connect to a heat network, this includes the connection costs

7

Appendix

7.1

Glossary of terms, abbreviations and definitions

Glossary of terms

Capacity - The capacity of the system is the maximum power output. It depends on the installation's size and technical capability. The capacity may be in terms of electrical or thermal output.

Carbon budget - A carbon budget is the cumulative amount of carbon dioxide (CO₂) emissions permitted over a period of time to keep within a certain temperature threshold.

CIBSE - The Chartered Institution of Building Services Engineers (CIBSE) is an international professional engineering association based in London, England that represents building services engineers.

CIBSE TM54 - The TM54 is a Technical Memorandum published by CIBSE that sets a methodology to calculate predicted in-operation energy use.

Dwelling Emission Rate (DER) - The dwelling emissions rate is calculated using SAP (Standard Assessment Procedure). The DER quantifies the estimated regulated CO₂ emissions of the proposed dwelling in kgCO₂/m²/yr. It covers space heating, space cooling, water heating, ventilation, and lighting less the emission that could be saved from renewable technology. Emissions from appliances, equipment and cooking are not included.

Embodied carbon - *'The embodied carbon emissions of an asset are the total GHG emissions and removals associated with materials and construction processes, throughout the whole life cycle of an asset (modules A0–A5, B1–B5, C1–C4, with A0[2] assumed to be zero for buildings.'* Source: [*RICS Whole life carbon assessment for the built environment, 2nd edition*](#)

Energy Balance - Achieving an energy balance is when the amount of renewable energy generated on-site over a year (kWh/yr or kWh/m²GIA/yr) meets or exceeds the amount of energy used by the building (its Energy Use Intensity) over a year (kWh/yr or kWh/m²GIA/yr).

EUI - Energy Use Intensity expresses a building's energy use as a function of its size, typically expressed as energy consumption in kWh/m²/yr. The measurement of floor area can be expressed in terms of Net Lettable Area (NLA) or Gross Internal Area (GIA).

Fabric Energy Efficiency (FEE) - It is a measure of the efficiency of the building fabric that would reduce the amount of energy required to heat a home. Under the current Part L 2013, the Fabric Energy Efficiency Standard (FEES) metric sets the benchmark for a building through its 'notional building' and minimum u-values for fabric standards.

Future Home Standard (FHS) - The Future Homes Standard is an update to Building regulations, called Part L 2026. The key purpose of the standard is to significantly reduce carbon emissions, with properties being built with 75% less carbon compared with existing regulations (Part L 2021).

Gross Internal Area (GIA): is the total usable floor space of a building contained within its external walls, measured to the internal face of the perimeter walls.

Heat Pump - A heat pump is a device that transfers thermal energy from a heat source to a heat sink (e.g. the ground to a house). There are many varieties of heat pump e.g. air, ground and water source heat pumps. The first word in the title refers to the heat source from which the pump draws heat. The pumps run on electricity, however less energy is required for their operation than they generate in heat, hence their status as a renewable technology.

Home Energy Model (HEM) - See SAP.

kW - Stands for kilowatt. A kilowatt is a unit of power equivalent to a thousand watts.

kWh - Stands for a kilowatt hour and is a unit of energy. It is equal to the amount of energy a system will generate in an hour whilst running at a kilowatt power output.

Low Energy Transformation Initiative (LETI) - LETI is a voluntary network of individuals across the built environment. Responsible for releasing thought documents including Climate Emergency Design Guide.

Notional building (Part L) - A hypothetical building of the same size, shape, orientation and shading as the actual building, with the same activities, zoning and system types and exposed to the same weather data, but with pre-defined specified properties for the building fabric, fittings and services. The notional building is concurrent with the national building regulations for Wales 2014, Northern Ireland 2012 and England 2013. For Scotland 2013, the 'notional' building is generated based upon a building designed to meet the 2002 standards and a percentage improvement is applied to define the compliant building target carbon dioxide emission rate (TER). BRE Group

Glossary of terms

NZCBS – The Net Zero Carbon Building Standard is a science-based standard, aligned with the 1.5deg Paris Agreement and achieving Net Zero in the UK by 2050. It was developed collaboratively by prominent industry bodies to form a single agreed definition of Net Zero Carbon and conclude a Standard for demonstrating whether it has been met.

Offsetting – Carbon/energy offsetting consists of using finance to support projects to reduce CO₂ emissions or energy consumption off-site.

Operational carbon – *'Operational carbon – energy (module B6) refers to GHG emissions arising from all energy consumed by an asset in use, over its life cycle.'* Source: [*RICS Whole life carbon assessment for the built environment, 2nd edition*](#)

Part L - Part L is a building regulation that concerns construction projects that are new, or result in the change of use of a dwelling or all other buildings in England. It sets the standards for the energy performance and carbon emissions of new and existing buildings.

Photovoltaics (PV) – solar panels converting sunlight into electricity.

Primary energy - Energy from fossil fuel and renewable sources that has not undergone any conversion or transformation process. Primary energy is transformed by the means of energy generation used and its transmission to the building.

Regulated energy - Regulated energy is building energy consumption resulting from the specification of controlled, fixed building services and fittings, including space heating and cooling, hot water, ventilation, fans, pumps and lighting. Such energy uses are inherent in the design of a building.

Renewable energy - Renewable energy is derived from sources which are naturally replenished or are practically inexhaustible. They are often described as 'clean', 'green' or 'sustainable' forms of energy because of their minimal environmental impact compared to fossil fuels.

RIBA - The Royal Institute of British Architects is a professional body for architects primarily in the United Kingdom, but also internationally, founded for the advancement of architecture.

Space heating demand (SHD) - The amount of heat energy needed to heat a building over a year (per square metre)

Standard Assessment Procedure (SAP) - Is the methodology required by the UK government to assess and compare the energy and environmental performance of dwellings. Its purpose is to provide regulatory compliance assessments for dwellings for Part L. HEM is due to replace SAP under Part L 2026.

Target Emission Rate (TER) - Annual regulated CO₂ emissions of a notional building of the same size and shape to the proposed one with pre-set building specification. The TER sets the maximum emission rate allowable for the building to comply with building regulations. It is expressed in annual kg of CO₂ per m² per year (kgCO₂/m²/yr).

Thermal bridge – *'Heat makes its way from the heated space towards the outside. In doing so, it follows the path of least resistance. A thermal bridge is a localised area of the building envelope where the heat flow is different (usually increased) in comparison with adjacent areas (if there is a difference in temperature between the inside and the outside).'* Source: [LETI](#)

UKGBC - The UK Green Building Council (UKGBC) is a United Kingdom membership organisation, formed in 2007, which aims to 'radically transform' the way that the built environment in the UK is planned, designed, constructed, maintained and operated.

Unregulated energy - Unregulated energy is building energy consumption resulting from a system or process that is not 'controlled', i.e. energy consumption from systems in the building on which the Building Regulations do not impose a requirement. For example, this may include energy consumption from systems integral to the building and its operation, e.g. IT equipment, lifts, escalators, refrigeration systems, external lighting, ducted-fume cupboards, servers, printers, photocopiers, laptops, cooking, audio-visual equipment and other appliances.

U-value – *'The rate of transfer of heat through a structure (which can be a single material or a composite), divided by the difference in temperature across that structure. The units of measurement are W/m²K.'* Source: [LETI](#)

Waste water heat recovery - Is a system designed to retrieve thermal energy from hot water used in a shower before it disappears down the drain.

Abbreviations

ASHP: Air source heat pump

B&NS: Bath and North East Somerset

CCC: Climate Change Committee

CIBSE: Chartered Institution of Building Services Engineers

CLT: Cross Laminated Timber

CO₂: Carbon dioxide

DHW: Domestic hot water

dMEV: Decentralised continuous mechanical extract ventilation

EUI: Energy Use Intensity

FHS: Future Homes Standard

GHG: Greenhouse gas

GIA: Gross Internal Area

IPCC: Intergovernmental Panel on Climate Change

KPI: Key Performance Indicator

LETI: Low Energy Transformation Initiative

MEP: Mechanical, electrical and plumbing

MVHR: Mechanical Ventilation with Heat Recovery

NPPF: National Planning Policy Framework

NZCBS: UK Net Zero Carbon Buildings Standard

PHPP: Passivhaus Planning Package

RIBA: Royal Institute of British Architects

UKGBC: The UK Green Building Council

Energy Use Intensity (EUI) - a simple, measurable metric

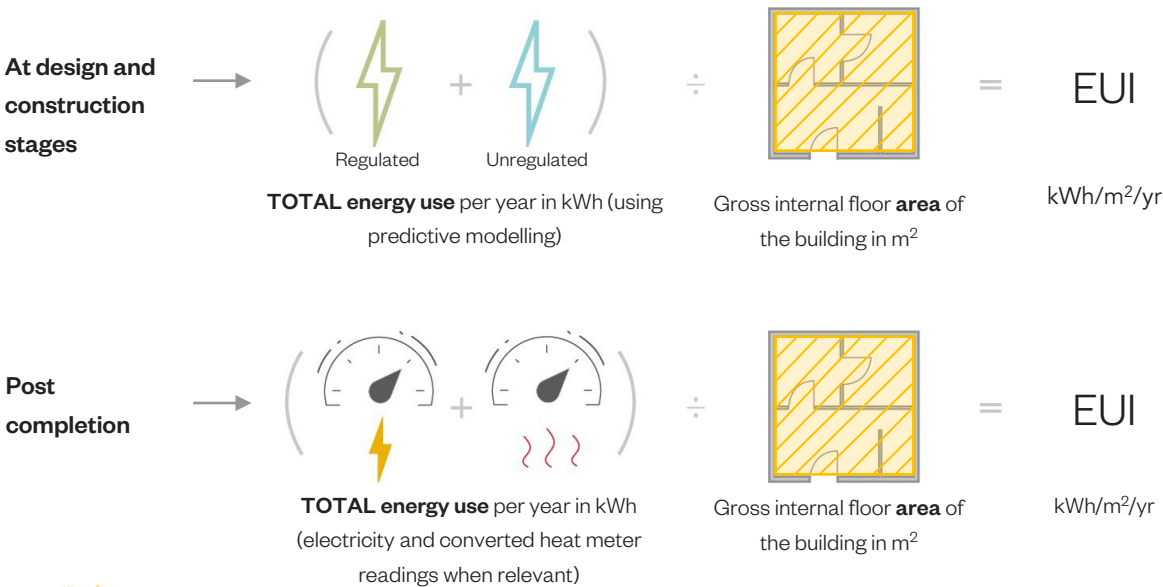
What is the EUI?

The Energy Use Intensity (EUI) represents the total amount of energy used by a building divided by its gross internal floor area (GIA). This includes any spaces within the thermal line of the building, such as: living and dining, bedrooms and communal/circulation spaces. It is reported in kWh/m²/year. It is based on delivered energy and does not need to be converted to primary energy using any factors.

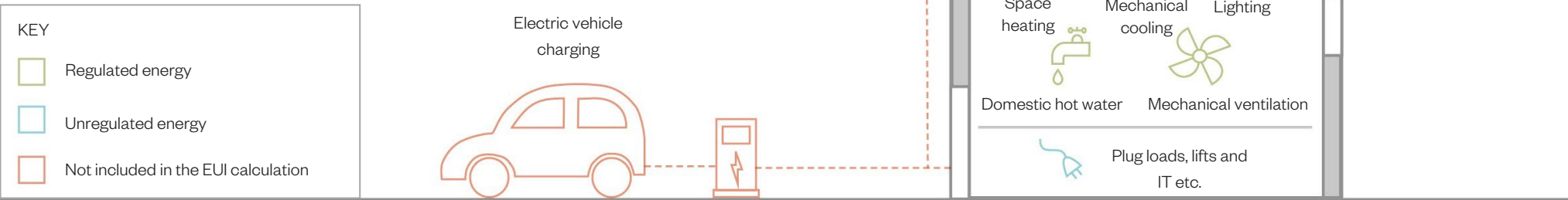
The EUI is a good indicator of the energy efficiency of a home/building and can be calculated or checked at both design stage and post completion. For homes/buildings heated by an individual heating system, it is very easy for the occupant/resident to check post-completion as it will be the annual 'energy at the meter' divided by the floor area. For communally heated dwellings/buildings, heat 'at the meter' will need to be converted to heat energy.

What is included in the EUI?

EUI includes both the regulated energy use and unregulated energy use from homes and communal spaces. Energy generated by on or off-site renewables does not affect the EUI value. For example, the EUI will be the same whether the building has PV or not. The EUI calculation does also not include charging of electric vehicles, as long as this is sub-metered. For further detail refer to [LETI guidance](#) on Net Zero and EUI.



The Energy Use Intensity (EUI) during design construction and post-completion



What is included in the EUI?

Note: EUI should not be confused with Primary Energy which relies on the multiplication of energy use by primary energy factors specific to each fuel (similarly to carbon emissions which rely on the multiplication of energy use by carbon factors).

Energy Balance – on-site renewable energy generation matching energy use intensity

What is an energy balance?

Achieving an energy balance is when the amount of renewable energy generated on-site over a year (kWh/m²GIA/yr) meets or exceeds the amount of energy used by the building (Energy Use Intensity) over a year (kWh/m²GIA/yr). It is one approach for setting planning policy for on-site renewable energy generation.

LETI's definition of Net Zero

According to LETI, in order for a building to be net zero, renewable energy must be generated to balance the annual energy use of the building. This balance should ideally happen within the site boundary. This typically means installing solar PVs on the roof of the development.

Considerations on achieving energy balance

The amount of energy that needs to be generated on-site through the use of renewables to achieve an energy balance depends on the energy intensity of the building. For example, dwellings use less energy than offices or hotels.

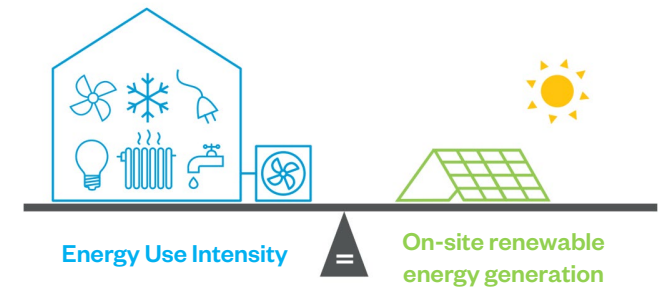
However, in terms of how much renewable energy generation is possible per building depends greatly on the building's context (e.g. a heavily overshadowed building will find it harder to meet energy balance) and the project brief (e.g. roof top amenities and location of mechanical plants requirements) may restrict roof space available for PV.

For houses it is possible to achieve or even exceed an energy balance, as there is ample roof space to meet the energy needs of the home. Whereas, apartment blocks tend to have a smaller roof space to total dwelling area ratio. This means flats find it harder to meet an energy balance. They often have smaller roofs with competing demands for roof space which comes from the need to meet biodiversity requirements, adhere to fire regulations, maximise on-site renewables, include amenity and plant space.

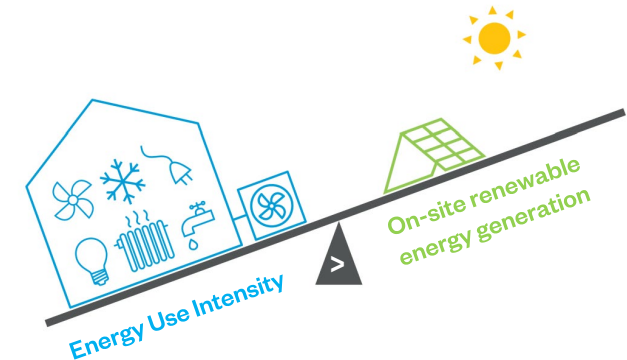
Alternative policy positions for renewable energy generation

For the above reasons, setting minimum areas of PV or minimum energy generation targets is often used as an alternative approach to an energy balance. Where a limit is set on EUI to keep total energy use down, some dwelling types (such as houses) can achieve an energy balance where they meet a minimum PV provision (e.g. 40% of building footprint). This also allows the minimum PV provision for flats can be set at an achievable and amicable level (e.g. 40% of building footprint) to keep policy proportionate.

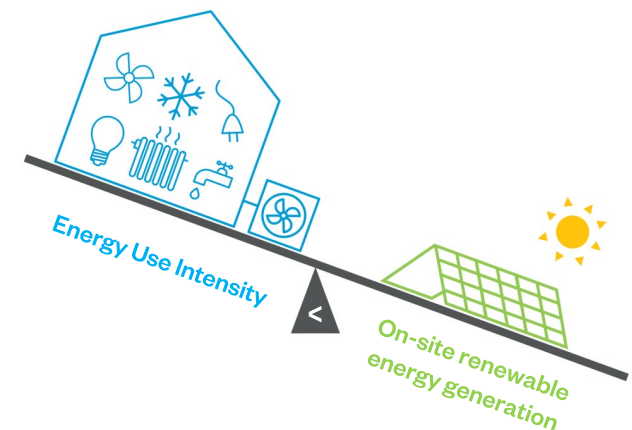
Energy balance met



Energy balance is NOT met



Energy balance is exceeded



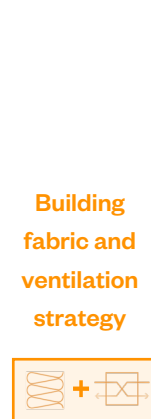
7.2

Technical specifications

Residential typologies - Technical specifications (1/3)



Detached house



U-values (W/m²K)

Floor
Walls
Roof

Windows (W)
Doors (D)

Air permeability (m³/m²h)

Ventilation strategy

Heating, hot water



Heating system

Hot water heating system

Waste water heat recovery (WWHR)

Renewables



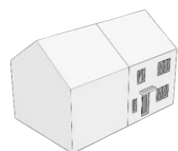
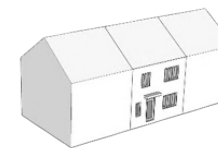
PV panels

Part L 2021 Notional building specifications	Part L 2026 Notional building specifications	Level 1 (SHD 30 / EUI 40)	Level 2 (SHD 20 / EUI 35)
Part L 2021 notional energy fabric	Part L 2026 notional energy fabric	Low energy fabric	Ultra-low energy fabric
0.13 (SAP), 0.16 (PHPP)*	0.13 (SAP), 0.16 (PHPP)*	0.09 (SAP), 0.10 (PHPP)*	0.09 (SAP), 0.10 (PHPP)*
0.18	0.18	0.14	0.10
0.11	0.11	0.10	0.10
Double glazing	Double glazing	Triple glazing	Triple glazing
W - 1.2 (1.2) (g: 0.62)	W - 1.2 (1.2) (g: 0.62)	W - 0.8 (g: 0.49)	W - 0.8 (g: 0.49)
D - 1.0	D - 1.0	D - 1.0	D - 1.0
5**	4**	1** (1.01 ach)	0.59 (0.60 ach**)
oMEV	oMEV	MVHR (88% efficiency) Duct lengths: 2m (ins. thickness 25mm)	MVHR (88% efficiency) Duct lengths: 2m (ins. thickness 40mm)
Gas boiler	ASHP Individual Monobloc (SCOP heating: 4.18)	ASHP Individual Monobloc (SCOP heating: 4.04)	ASHP Individual Monobloc (SCOP heating: 3.92)
N/A	200l cylinder (SCOP hot water: 2.84)	200l cylinder (SCOP hot water: 2.79)	200l cylinder (SCOP hot water: 2.75)
Yes (36% efficiency)	Yes (50% efficiency)	No	No
8 PV panels (605 W) (40%GFA / 6.5) 4.8kWp	11 PV panels (605 W) (40%GFA / 4.5) 6.7kWp	11 PV panels (605 W) (40%GFA / 4.5) 6.7kWp	11 PV panels (605 W) (40%GFA / 4.5) 6.7kWp

*The PHPP floor U-value is higher compared to SAP's because it includes ground floor U-value correction.

**Air permeability or air tightness value that has been used to derive the other

Residential typologies - Technical specifications (2/3)



Semi-detached house

Terrace house

	Part L 2021 Notional building specifications	Part L 2026 Notional building specifications	Level 1 (SHD 30 / EUI 40)	Level 2 (SHD 20 / EUI 35)	Part L 2021 Notional building specifications	Part L 2026 Notional building specifications	Level 1 (SHD 30 / EUI 40)	Level 2 (SHD 20 / EUI 35)	*The PHPP floor U-value is higher compared to SAP's because it includes ground floor U-value correction. **Air permeability or air tightness value that has been used to derive the other
U-values (W/m ² K)	Part L 2021 not. energy fabric	Part L 2026 not. energy fabric	Low energy fabric	Ultra-low energy fabric	Part L 2021 not. energy fabric	Part L 2026 not. energy fabric	Low energy fabric	Ultra-low energy fabric	
Floor	0.13 (SAP), 0.16 (PHPP)*	0.13 (SAP), 0.16 (PHPP)*	0.09 (SAP), 0.10 (PHPP)*	0.09 (SAP), 0.10 (PHPP)*	0.13 (SAP), 0.19 (PHPP)*	0.13 (SAP), 0.19 (PHPP)*	0.13 (SAP), 0.19 (PHPP)*	0.09 (SAP), 0.11 (PHPP)*	
Walls	0.18	0.18	0.17	0.15	0.18	0.18	0.18	0.18	
Roof	0.11	0.11	0.10	0.10	0.11	0.11	0.11	0.10	
Windows (W)	Double glazing	Double glazing	Double glazing	Triple glazing	Double glazing	Double glazing	Double glazing	Triple glazing	
Doors (D)	W - 1.2 (g: 0.62) D - 1.0	W - 1.2 (g: 0.62) D - 1.0	W - 1.2 (g: 0.62) D - 1.0	W - 0.8 (g: 0.49) D - 1.0	W - 1.2 (g: 0.62) D - 1.0	W - 1.2 (g: 0.62) D - 1.0	W - 1.2 (g: 0.62) D - 1.0	W - 0.8 (g: 0.49) D - 1.0	
Air permeability (m ³ /m ² h)	5**	4**	2** (2.2 ach)	0.55 (0.6 ach**)	5**	4**	2** (2.0 ach)	1** (1.1 ach)	
Ventilation strategy	cMEV	cMEV	MVHR (88% efficiency) Duct lengths: 2m (ins. thickness 25mm)	MVHR (88% efficiency) Duct lengths: 2m (ins. thickness 40mm)	cMEV	cMEV	MVHR (88% efficiency) Duct lengths: 2m (ins. thickness 25mm)	MVHR (88% efficiency) Duct lengths: 2m (ins. thickness 40mm)	
Heating system	Gas boiler	ASHP Individual Monobloc	ASHP Individual Monobloc	ASHP Individual Monobloc	Gas boiler	ASHP Individual Monobloc	ASHP Individual Monobloc	ASHP Individual Monobloc	
Hot water heating system	N/A	180l cylinder	180l cylinder	180l cylinder	N/A	180l cylinder	180l cylinder	180l cylinder	
Waste water heat recovery (WWHR)	Yes (36% efficiency)	Yes (50% efficiency)	No	No	Yes (36% efficiency)	Yes (50% efficiency)	No	No	
PV panels	5 PV panels (605 W) (40%GFA / 6.5) 3.0kWp	7 PV panels (605 W) (40%GFA / 4.5) 4.2kWp	7 PV panels (605 W) (40%GFA / 4.5) 4.2kWp	7 PV panels (605 W) (40%GFA / 4.5) 4.2kWp	5 PV panels (605 W) (40%GFA / 6.5) 3.0kWp	7 PV panels (605 W) (40%GFA / 4.5) 4.2kWp	7 PV panels (605 W) (40%GFA / 4.5) 4.2kWp	7 PV panels (605 W) (40%GFA / 4.5) 4.2kWp	

Residential typologies - Technical specifications (3/3)



Low-rise block of flats

Mid-rise block of flats

	Part L 2021 Notional building specifications	Part L 2026 Notional building specifications	Level 1 (SHD 30 / EUI 40)	Level 2: (SHD 15 / EUI 35)	Part L 2021 Notional building specifications	Part L 2026 Notional building specifications	Level 1 (SHD 30 / EUI 40)	Level 2: (SHD 15 / EUI 35)	
U-values (W/m ² K)	Part L 2021 not. energy fabric	Part L 2026 not. energy fabric	Low energy fabric	Ultra-low energy fabric	Part L 2021 not. energy fabric	Part L 2026 not. energy fabric	Low energy fabric	Ultra-low energy fabric	*The PHPP floor U-value is higher compared to SAP's because it includes ground floor U-value correction.
Floor	0.13 (SAP), 0.18 (PHPP)*	0.13 (SAP), 0.18 (PHPP)*	0.09 (SAP), 0.11 (PHPP)*	0.08 (SAP), 0.10 (PHPP)*	0.13 (SAP), 0.21 (PHPP)*	0.13 (SAP), 0.21 (PHPP)*	0.13 (SAP), 0.21 (PHPP)*	0.08 (SAP), 0.10 (PHPP)*	
Walls	0.18	0.18	0.14	0.13	0.18	0.18	0.18	0.13	
Roof	0.11	0.11	0.09	0.09	0.11	0.11	0.11	0.09	
Windows (W) Doors (D)	Double glazing W - 1.2 (g: 0.62) D - 1.0	Double glazing W - 1.2 (g: 0.62) D - 1.0	Double glazing W - 1.2 (g: 0.62) D - 1.0	Triple glazing W - 0.8 (g: 0.52) D - 1.0	Double glazing W - 1.2 (g: 0.62) D - 1.0	Double glazing W - 1.2 (g: 0.62) D - 1.0	Double glazing W - 1.2 (g: 0.62) D - 1.0	Triple glazing W - 0.8 (g: 0.49) D - 1.0	
Air permeability (m ³ /m ² h)	5**	4**	2** (2.53 ach)	0.48 (0.6ach**)	5**	4**	2** (2.13 ach)	0.56 (0.6ach**)	**Air permeability or air tightness value that has been used to derive the other
Ventilation strategy	cMEV	cMEV	MVHR (88% efficiency) Duct lengths: 6m (ins. thickness 25mm)	MVHR (88% efficiency) Duct lengths: 2m (ins. thickness 40mm)	cMEV	cMEV	MVHR (75% efficiency) Duct lengths: 6m (ins. thickness 25mm)	MVHR (88% efficiency) Duct lengths: 4m (ins. thickness 40mm)	
Heating system	Communal gas boiler	ASHP Individual Monobloc	ASHP Individual Monobloc	ASHP Individual Monobloc	Communal gas boiler	Communal ASHP	Communal ASHP	Communal ASHP	
Hot water heating system	N/A	7 x 180l cylinder	7 x 180l cylinder	7 x 180l cylinder	N/A	Communal ASHP	Communal ASHP	Communal ASHP	
Waste water heat recovery (WWHR)	Yes (36% efficiency)	Yes (50% efficiency)	No	No	Yes (36% efficiency)	Yes (50% efficiency)	No	No	
PV panels	16 PV panels (475 W) (40%GFA/6.5*4) 7.6kWp	23 PV panels (475 W) (40%GFA/4.5*4) 10.9kWp	23 PV panels (475 W) (40%GFA/4.5*4) 10.9kWp	23 PV panels (475 W) (40%GFA/4.5*4) 10.9kWp	70 PV panels (475 W) (40%GFA/6.5*5) 33.3kWp	100 PV panels (475 W) (40%GFA/4.5*5) 47.5kWp	100 PV panels (475 W) (40%GFA/4.5*5) 47.5kWp	100 PV panels (475 W) (40%GFA/4.5*5) 47.5kWp	

Understanding U-values

The table below shows some examples of U-values for external walls, ground floor and roof can be achieved.

It outlines different material combinations and construction methods, along with the typical thickness ranges needed for these building elements.

External walls	Traditional cavity wall construction (brick and block with partial fill mineral wool insulation in cavity) U-value: 0.14 W/m²K Thickness: ~525-550 mm U-value: 0.18W/m²K Thickness: ~450 mm	Brick face and light gauge steel frame (with partial fill mineral wool insulation in cavity) U-value: 0.13 W/m²K Thickness: ~500-550 mm U-value: 0.18W/m²K Thickness: ~420 mm
	Beam and block (PIR insulation) U-value: 0.09 W/m²K Thickness: ~375 mm U-value: 0.13W/m²K Thickness: ~265 mm	Ground bearing concrete slab (PIR insulation) U-value: 0.09 W/m²K Thickness: ~500 mm U-value: 0.13W/m²K Thickness: ~425 mm
Roof	Pitched roof (with mineral wool insulation) U-value: 0.10 W/m²K Thickness: ~440 mm	Flat inverted roof (XPS insulation) U-value: 0.09 W/m²K Thickness: ~650 mm

7.3

Further energy modelling

Hybrid systems scenario for flats

Residential performance levels – Hybrid systems scenario for flats



Testing a hybrid heating and hot water system scenario

Based on our previous experience with planning applications across Greater Manchester, it is evident that a hybrid approach - combining direct electric space heating with hot water heat pump cylinders - has become increasingly common in new residential developments especially blocks of flats. This could be mainly attributed to the practical benefits of simplified installation and maintenance in high-density residential schemes compared to communal low-carbon heating and hot water systems.

Although the primary assessment for the Stockport policy Level 1 and Level 2 options focused on low-carbon heating and hot water systems, additional modelling was undertaken to evaluate the impact of this hybrid systems scenario on the EUI of the block of flats typologies.

Hybrid systems scenario modelling specifications

The fabric specifications of the hybrid system approach for both block of flats typologies are sitting somewhere in between Level 1 and Level 2. On the following page, the space heating demand of this additional scenario is compared against the other four specification scenarios.

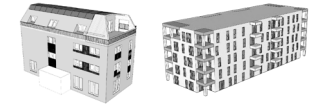
Why this hybrid systems scenario is not included within the formal policy options?

To date, the understanding is that under the upcoming Part L 2026 building regulations and its associated notional specifications allow only low-carbon heating systems. As the new compliance tool, Home Energy Model (HEM), is not yet available, it remains unclear whether direct electric heating will comply with minimum regulatory standards. Therefore, this option has been excluded from the main report.

Specification scenarios		Part L 2021 (notional building spec.)	Part L 2026 (notional building spec.)	Level 1 (SHD 30, EUI 40, PVs 40%)	Hybrid systems (Direct electric & HWHP)	Level 2 (SHD 15, EUI 35, PVs 40%)
Building fabric and ventilation strategy	Walls	0.18	0.18	0.14-0.18	0.13-0.14	0.13
	Floor	0.13	0.13	0.09-0.13	0.09	0.08
	Roof	0.11	0.11	0.09-0.11	0.09	0.09
	(U-values W/m ² K)					
Building fabric and ventilation strategy	Windows	Double-glazing	Double-glazing	Double-glazing	Triple-glazing	Triple-glazing
	Air permeability (m ³ /m ² h)	5	4	2	2	0.48-0.56
	Ventilation strategy	Centralised Mechanical Extract Ventilation (cMEV)	cMEV	Mechanical ventilation with heat recovery (MVHR)	MVHR	MVHR
Heating, hot water systems	Heating and hot water system	Gas boiler	Air-source heat pumps	Air-source heat pumps	Direct electric for heating and hot water heat pump	Air-source heat pumps
	Waste water heat recovery	Yes	Yes	No	No	No

Key technical specifications of the four modelled scenarios and the additional hybrid systems scenario. Where ranges are presented (e.g. wall, floor and roof u-values) these reflect variation across different residential building typologies. The full set of specifications tested are provided in [Appendix 7.2](#).

Residential performance levels – Hybrid systems scenario for flats



SHD results

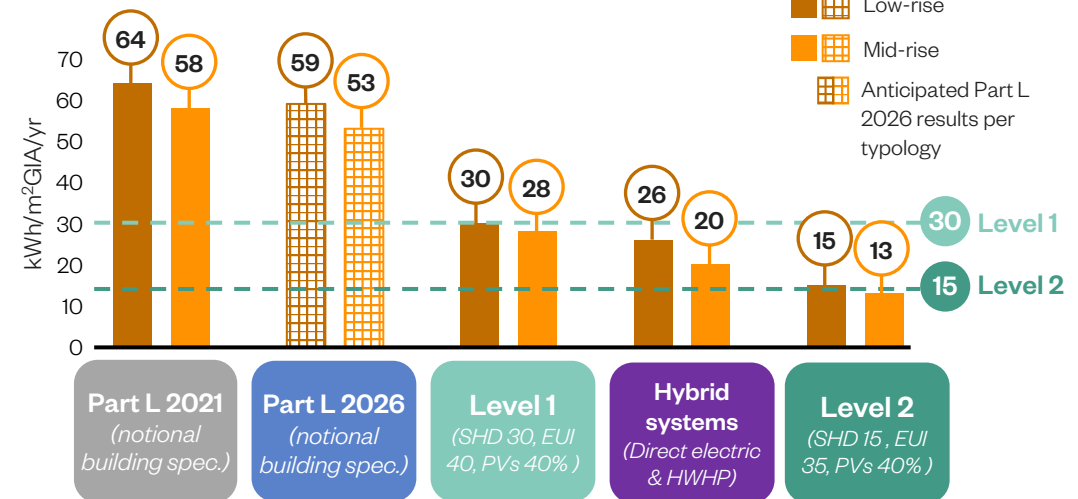
Since the fabric specifications of the hybrid approach lie somewhere in between Level 1 and Level 2 specs, the SHD for both the low-rise and the mid-rise typologies sit in between Level 1 and Level 2 SHDs. Even though the fabric specifications of both typologies under the hybrid scenario are almost identical, the low-rise block of flats is achieving a higher SHD (26 kWh/m²GIA/yr) compared to the mid-rise (20 kWh/m²GIA/yr). This is mostly attributed to the higher exposed surface area relative to their floor area of the specific low-rise archetype (form factor of 2.0) modelled compared to the mid-rise one (form factor of 1.1), which leads to greater heat losses.

EUI results

Modelling results indicate that for the low-rise block with a SHD of 26 kWh/m²GIA/yr, the hybrid system approach results in an EUI of 47 kWh/m²GIA/yr. This relatively higher EUI compare to Levels 1 and 2 reflects the lower efficiency of direct electric heating, which is approximately three times less efficient than air source heat pumps (ASHPs). A similar outcome was observed for the mid-rise block, where a SHD of 20 kWh/m²GIA/yr still resulted in an EUI of 47 kWh/m²/yr.

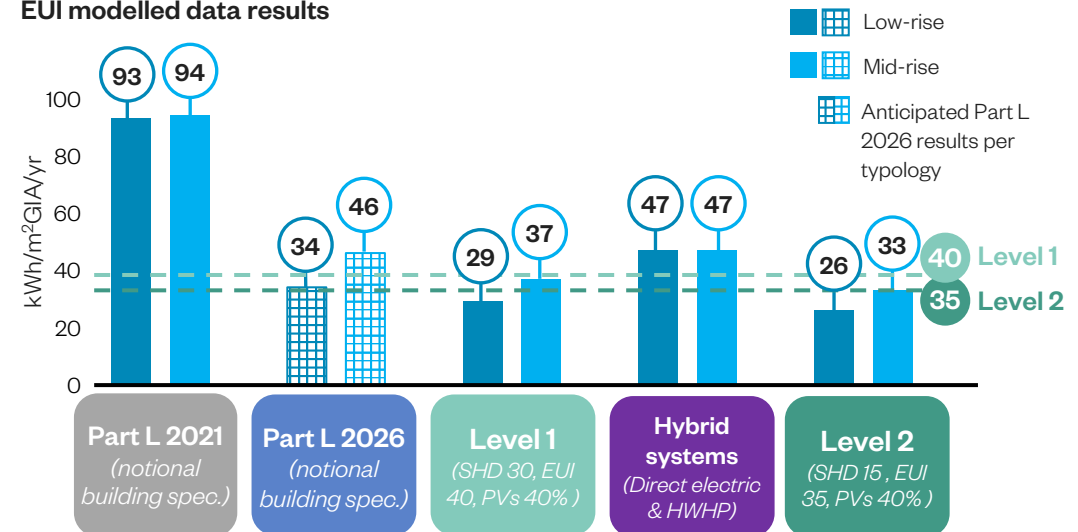
Further improvements in the EUIs of the hybrid systems scenario are possible by adopting higher-performing fabric specifications (e.g. SHD of 15). However, further modelling is required to testing it unsure where these changes could push the EUIs of the hybrid systems scenario under Level 1 or Level 2.

SHD modelled data results



Annual space heating demand in kWh/m²GIA per performance scenario for each block of flats typology tested.

EUI modelled data results



Annual energy use intensity in kWh/m²GIA per performance scenario for each block of flats typology tested.

7.4

Further energy modelling

Additional on-site renewable energy generation scenarios

Residential performance levels - EUI vs renewable energy generation additional modelling

Additional modelling was conducted for on-site renewable energy generation to understand how a different percentage of the building's footprint covered by PVs affect on-site renewable energy generation (kWh/m²GIA/yr). The graphs opposite compare the results against the total yearly energy consumption (EUI) of Level 1 and Level 2 specification scenarios under the residential typologies modelled.

The performance levels tested for the **housing typologies** include:

- **40%** of the building's footprint covered by PVs;
- **60%** of the building's footprint covered by PVs

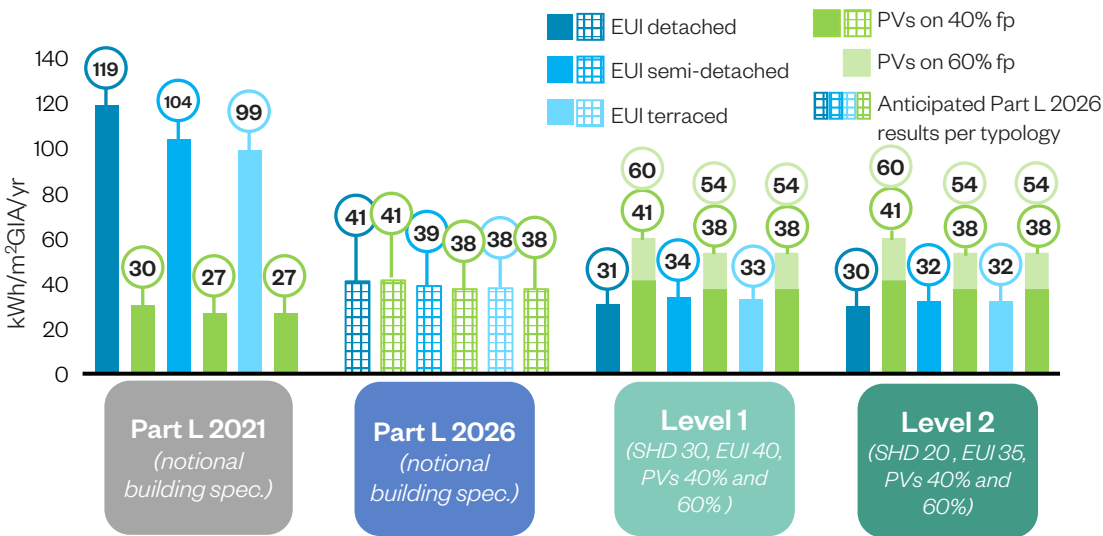
The performance levels tested for the **block of flats typologies** include:

- **40%** of the building's footprint covered by PVs;
- **60%** of the building's footprint covered by PVs;
- **Maximise PV** installation across available roof area

Findings include:

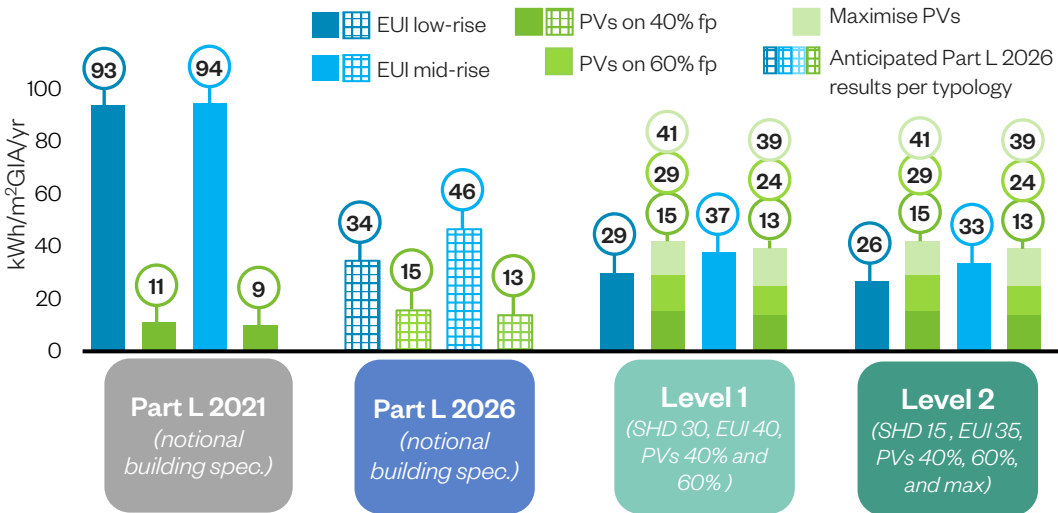
- For houses, both Level 1 and Level 2 are achieving an energy balance as their on-site renewable energy generation for both 40% and 60% PVs scenario modelled exceed their EUI.
- For the block of flats, the renewable energy generation of the 40% PVs scenario for Level 1 and Level 2 is only meeting about half of their EUI.
- For the low-rise block of flats on Level 1 and Level 2 energy balance is met with both the 60% and maximise PVs scenarios, whereas for the mid-rise block of flats only the maximise PVs does. This is attributed to low-rise having smaller EUIs to balance against, compared to the mid-rise. As explained in the main report, the mid-rise block of flats have a higher EUI due to the use of communal ASHPs, which are generally less efficient (incl. distribution losses from central plant and extended pipework) than individual ASHPs used in the low-rise block of flats.
- Generally, it is harder to achieve an energy balance for a block of flats than for lower-density housing typologies because the amount of roof area available per dwelling is much smaller.

EUI vs renewable energy generation modelled data results for houses



Annual energy use intensity in kWh/m²GIA per performance scenario for each of the housing typology tested compared against its annual on-site renewable energy generation in kWh/m²GIA.

EUI vs renewable energy generation modelled data results for block of flats



Annual energy use intensity in kWh/m²GIA per performance scenario for each of the block of flats typology tested compared against its annual on-site renewable energy generation in kWh/m²GIA.

7.5

Further cost assessment analysis

Running costs using dynamic tariffs

Residential performance levels – Running costs assessment results for houses



Methodology using dynamic tariffs

An additional analysis of running costs has been carried out for the five residential typologies, this time using dynamic tariffs (derived from Octopus, Agile and Energy Stats) rather than a price cap. The primary difference between a price cap and a dynamic tariff is:

- Price Cap: Sets a limit on maximum rates, updated every 3 months by Ofgem with the aim to protect residents from high energy prices.
- Dynamic Tariff: Is a flexible pricing model that changes daily or half-hourly based on wholesale market prices. It is derived by matching demand to renewable energy availability and therefore, it rewards residents for using energy when it is cheapest (e.g., windy/sunny times) and penalises them during peak hours.

The running costs presented opposite and on the following page consider:

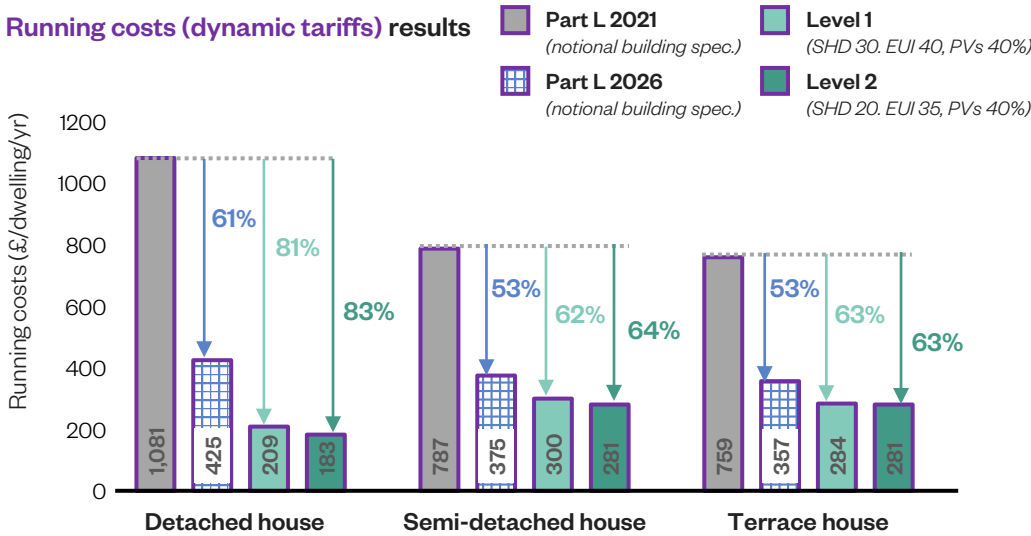
- Standing charges - including the saving where the gas connection is removed in electric heating scenarios;
- PV self-consumption - assumptions based on the MCS methodology (MGD 003), taking the average of the three occupancy cases: “home all day”, “in half the day”, and “out all day”;
- PV benefit - applied such that self-consumed PV is treated as avoided import at the import unit rate, while exported PV is treated as export revenue at the export rate;
- Export revenue – assumed where PV generation exceeds self-consumption.

The results are presented in both absolute terms (£ per dwelling per year) and relative savings (%) to show the impact of lower EUIs on operational energy costs.

Running costs (dynamic tariffs) results for houses

Compared to [running costs using a price cap](#) for all housing typologies, reductions are greater with the use of dynamic tariffs.

Running costs (dynamic tariffs) results

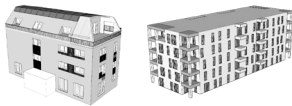


Estimated annual energy costs for the three housing typologies across all four scenarios. These costs include for dynamic tariffs based on Octopus, Agile and Energy stats and effect of PV energy generation.

	Detached	Semi-detached	Terrace
Indicative running costs per dwelling – Part L 2021 notional spec.	£1,081/yr	£787/yr	£759/yr
Level 1 (SHD 30, EUI 40, PVs 40%)	81% (£872/yr)	62% (£486/yr)	63% (£475/yr)
Level 2 (SHD 20, EUI 35, PVs 40%)	83% (£897/yr)	64% (£506/yr)	63% (£478/yr)
Indicative running costs per dwelling - Part L 2026 notional spec.	£425/yr	£375/yr	£357/yr
Level 1 (SHD 30, EUI 40, PVs 40%)	51% (£216/yr)	20% (£73/yr)	20% (£73/yr)
Level 2 (SHD 20, EUI 35, PVs 40%)	57% (£242/yr)	25% (£92/yr)	21% (£76/yr)

Running cost savings for Level 1 and Level 2 from two different scenarios: Part L 2021 notional and Part L 2026 notional.

Residential performance levels – Running costs assessment results for flats

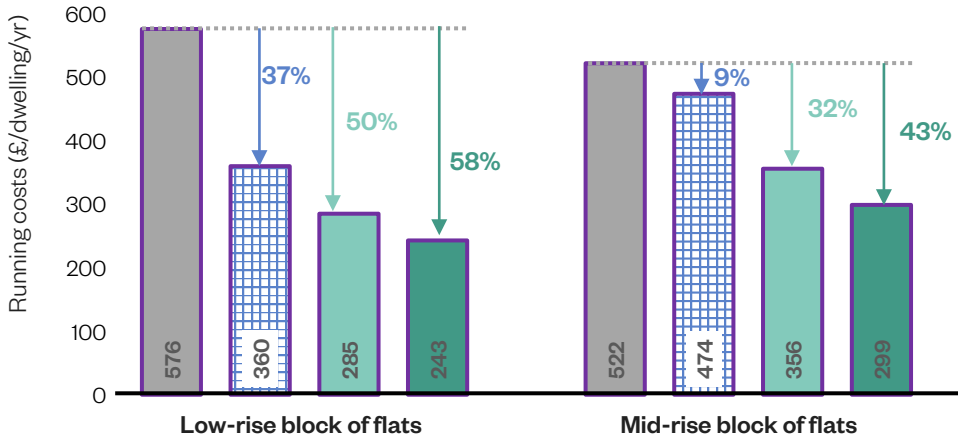


Running costs (dynamic tariffs) results for flats

Compared to [running costs using price cap](#) for both block of flats typologies, reductions are greater with the use of dynamic tariffs.

Running costs (dynamic tariffs) results

- Part L 2021**
(notional building spec.)
- Part L 2026**
(notional building spec.)
- Level 1**
(SHD 30, EUI 40, PVs 40%)
- Level 2**
(SHD 15, EUI 35, PVs 40%)



Estimated annual energy costs for the two block of flats typologies across all four scenarios. These costs for dynamic tariffs based on Octopus, Agile and Energy stats and effect of PV energy generation.

	Low-rise	Mid-rise
Indicative running costs per dwelling – Part L 2021 notional spec.	£576/yr	£522/yr
Level 1 (SHD 30, EUI 40, PVs 40%)	50% (£291/yr)	32% (£166/yr)
Level 2 (SHD 15, EUI 35, PVs 40%)	58% (£333/yr)	43% (£223/yr)
Indicative running costs per dwelling Part L 2026 notional spec.	£360/yr	£474/yr
Level 1 (SHD 30, EUI 40, PVs 40%)	21% (£75/yr)	25% (£118/yr)
Level 2 (SHD 15, EUI 35, PVs 40%)	33% (£117/yr)	37% (£175/yr)

Running cost savings for Level 1 and Level 2 from two different scenarios: Part L 2021 notional and Part L 2026 notional.

7.6

Operational energy cost assessment methodology

Cost assessment methodology – additional information

The cost modelling carried out in this operational energy study used the following methodology:

Cost sources

- Baseline - The reference baseline build costs were derived using the Building Cost Information Service (BCIS) 'mean' rate for the period of the last 5 years, with an uplift to reflect Part L 2021 notional regulatory compliance.
- Cost analysis - Currie & Brown's internal cost-uplift database was used to derive the cost of building elements. For which the energy and carbon related elements were costed in detail. This database incorporates information from market prices, specific market testing and first principles cost planning by specialist quantity surveyors.
- Rebasing – The Currie & Brown internal cost-uplift database was rebased to Q1 2026 using the BCIS indices localised for the Stockport area.

Cost uplift calculation methodology

- Capital costs have been calculated as incremental uplifts in pounds per square meter (£/m² GIA). Only the energy-related elements were costed in detail, including changes to fabric, ventilation, heating systems and renewables/PV.
- The building elements that are not materially affected by the energy efficiency / low carbon technology options. e.g., substructure, roof coverings, kitchen and bathrooms, etc, were not costed in detail. Instead, these costs were incorporated within the baseline build cost mentioned above.
- It should be noted that total build costs can vary significantly dependent on design and specification choices to reflect target market requirements.
- The energy-related elements costed have then been added to the baseline to express them as a percentage uplift against the BCIS baseline build costs stated above.
- The capital cost uplift calculations have been carried out for each of the building typologies and [specification scenarios modelled](#).

- [Running cost uplifts](#) were calculated and compared to two different baselines:
 - Part L 2021 notional specifications, and
 - Part L 2026 notional specifications

Version 3.1 – June 2026

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