South Downs National Park Authority Policy Study

A technical evidence base for operational energy planning policy

April 2026

Currie & Brown Etude Levitt Bernstein People.Design

Contents

Executive summary – Explainer

The purpose of this study

The purpose of this Operational Energy Policy Study is to provide the technical evidence to support the development of a planning policy approach for reducing operational energy consumption for developments in the South Downs National Park Authority (SDNPA) area.

What is operational energy?

Operational energy is the total energy consumed by a building to operate daily, including heating/cooling, domestic hot water, ventilation systems, lighting, appliances and plug-in loads.

A full glossary of terms can be found in the Appendix in Section 5.1.

How the study fits in to planning policy for the SDNPA

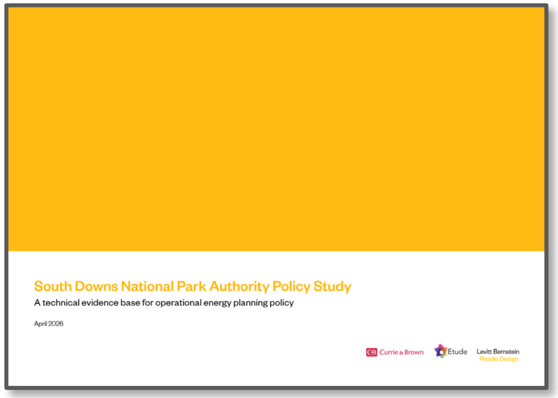
Addressing operational energy through planning policy is vital to meet local and national climate targets. The SDNPA has simultaneously appointed an embodied carbon evidence base, complimentary to this operational energy study.

Who the study is aimed at

The prime audience is the SDNPA and Planning Inspectors examining local plans. The study will also provide insight to planning officers and the development industry and other stakeholders to reduce operational energy in new development. The study builds upon a body of evidence that is developing nationally, and will be of interest to other Local Authorities, industry bodies and other stakeholders in the UK seeking to address operational energy carbon emissions from development.

What the evidence-base covers

The evidence-base provides wider context for the recommended policy requirements set out. It also provides a technical evidence base for the introduction of space heating demand, energy use intensity limits (particularly for residential developments), energy balance requirements and energy offsetting.


South Downs National Park Authority Policy Study
A technical evidence base for operational energy planning policy
April 2026

This study *– A technical evidence base for operational energy planning policy.*

Operational energy *– energy consumed by the building detectible at the building's energy meters*


South Downs National Park Policy Study
A technical evidence base for embodied carbon planning policy
April 2026

Complimentary study *– A technical evidence base for embodied carbon planning policy.*

Embodied carbon *– The carbon locked up in the manufacture, transport, and use of materials in buildings.*

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Executive summary – Why is the SDNPA proposing limits to operational energy in new buildings?

Together for Nature, Climate and People – South Downs National Park Partnership Management Plan 2026-2031

The South Downs National Park Authority climate change commitments

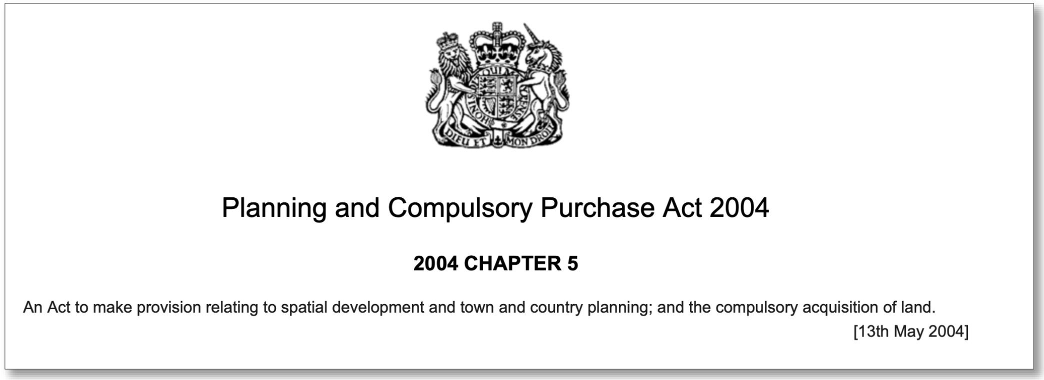
The South Downs National Park Authority (SDNPA) formally committed to accelerated, comprehensive climate action in March 2020 by adopting its first Climate Change Strategy and Action Plan. This has since been updated to cover the period of 2026-2031 and states: "*Working together as a National Park family, we have ambitious targets to reach net zero by 2040*".

The Authority 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".

Why go further than Building Regulations?

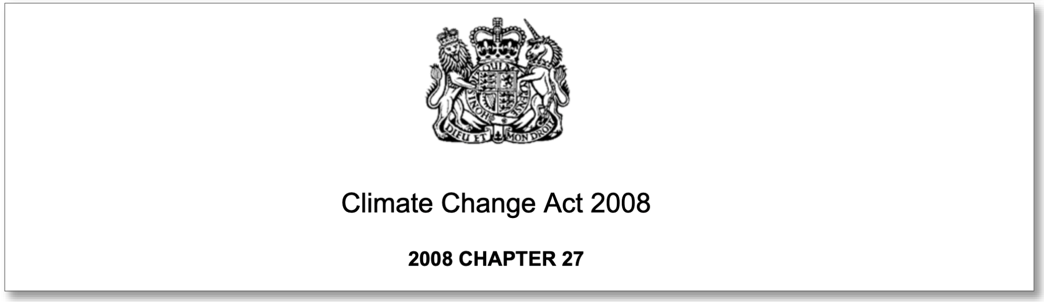
Part L 2021 is the current version of the building regulations on operational energy and carbon. Unfortunately it is not consistent with Net Zero carbon principles (e.g. fossil fuel heating is still possible). The Future Homes and Future Buildings Standards (Part L 2026) has been published which improve upon the systems and renewables required, but not the fabric and ventilation of the building. The calculation methodologies required to demonstrate compliance were not available at the time of writing this evidence base and could not therefore reliably be used to develop an evidence base. Finally, it should be noted that Part L does not cover all energy uses (appliances, equipment and cooking are excluded).


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

The SDNPA has primary duties and powers to mitigate change, including the impact of new development

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Executive summary – The need for operational energy policies

There is a climate emergency

There is overwhelming scientific consensus that climate change is happening. The latest 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.

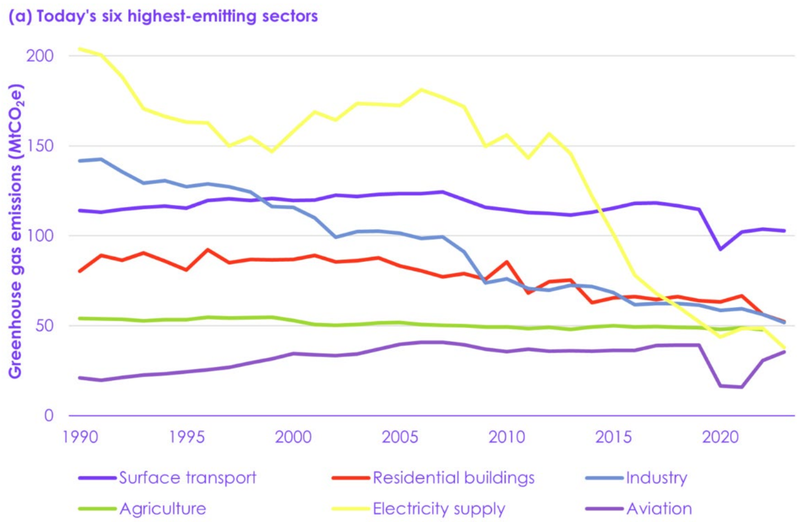
New buildings can be compliant with our climate targets

Operational carbon emissions associated with new buildings that meet current planning policy are still very significant. These new buildings are not energy efficient enough, some of them continue to use fossil fuels for heating and hot water (e.g. gas boilers), and they generate very small amounts of renewable energy. New buildings designed and built today, with available and affordable skills, and already existing techniques and technologies, can be compliant with climate change commitments. The skills and techniques used are a growing industry that is forecast to continue to expand to meet demand, as is demonstrated by the buildings already successfully designed and built to net zero carbon standards.

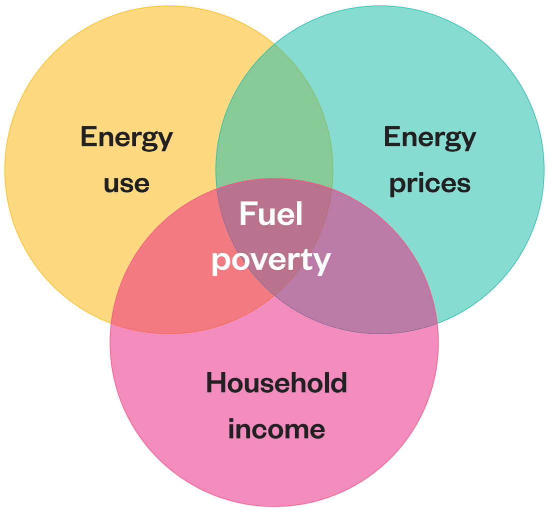
In their UK housing: Fit for the future? Report the CCC provides clear guidance on what should be expected from new buildings from now on. To ensure the UK can continue on the projected decarbonisation pathway, new residential buildings should not be contributing further to emissions, or be left in a position to require retrofit shortly after being built.

Net zero buildings should also minimise energy costs and embodied carbon

New buildings should also be cheap to run and be based on a construction process and materials which minimise embodied carbon. New buildings should use as little energy as possible and enable residents to make the most of flexible energy prices to reduce fuel poverty.



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.

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Executive summary – Local plans and industry guidance have led the way

Local Plans leading the way - targets, limits and benchmarks

Net zero standards have been demonstrated to pass viability tests through examined evidence bases in areas in which they have been tested - including those where land values are typically low. 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 by the Low energy Transformation initiative (LETI) for the NPPF consultation in 2026 - 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.

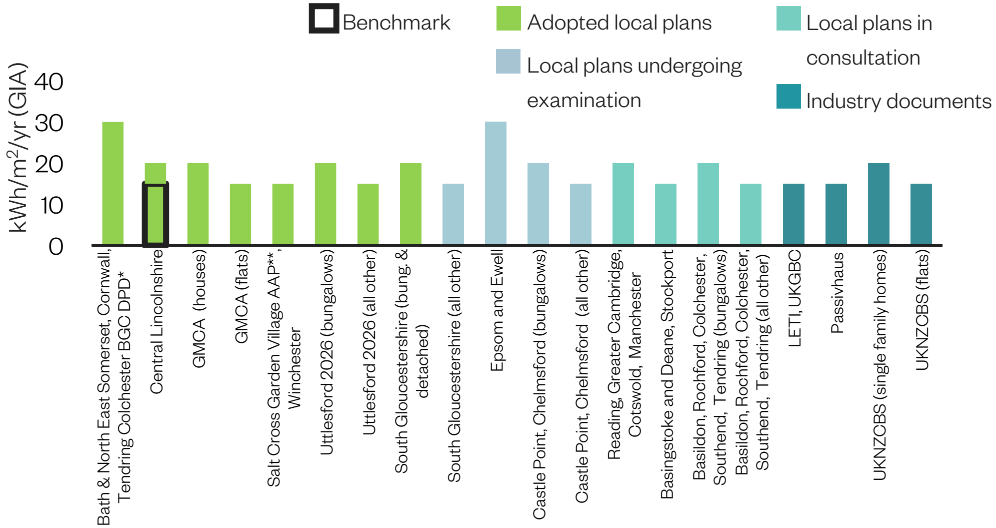
In addition, viability has been proven across 16 different local planning authorities nationally. Policy examination reports frequently state that there are no viability issues found with local policies adopting energy-based metrics with similar space heating demand and energy use intensity limits and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

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

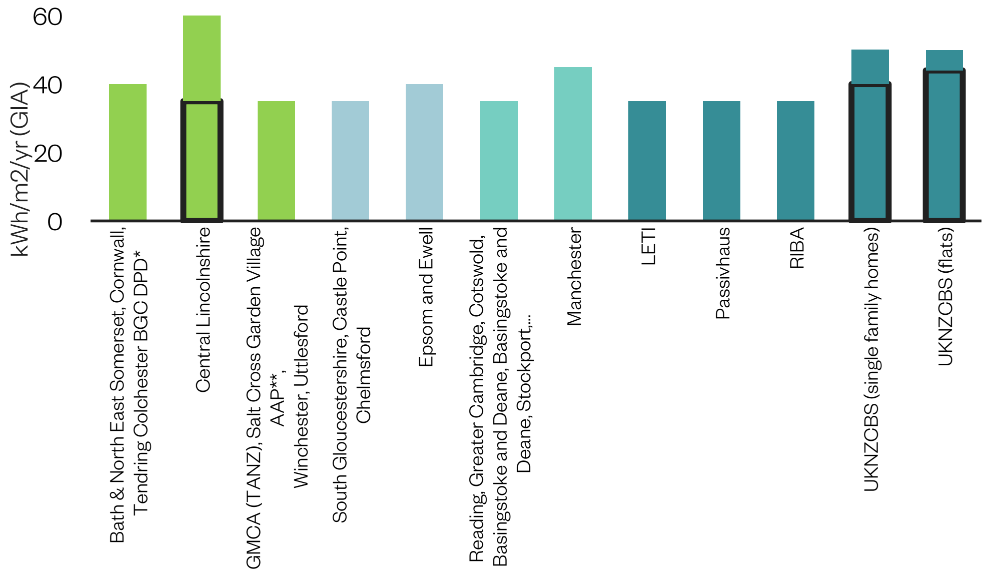
Net Zero Carbon Building Standard – well evidenced targets

The Net Zero Carbon Building Standard (NZCBS) 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 NZCBS limits are based on in-use energy data. Passivhaus doesn't have an EUI limit, however Passivhaus homes broadly meet an EUI of 35 kWh/m²/yr (GIA).

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Executive summary – Operational energy modelling and cost analysis (1/2)

Typologies modelled

Three residential typologies have been identified and assessed for the operational energy and cost modelling in this study, these are representative for the SDNPA developments:

- Detached house
- Terraced house
- Low-rise apartment block

Modeling methodology

Space heating demand (SHD) and Energy Use Intensity (EUI) results have been calculated for each building typology using predictive energy modelling: PHPP (10). Compliance modelling using SAP 10.2 (Elmhurst Design SAP 1.7.25) has also been carried using notional building specifications. PHPP models have been adjusted for local weather data to ensure they are representative for the South Downs National Park.

Performance scenarios

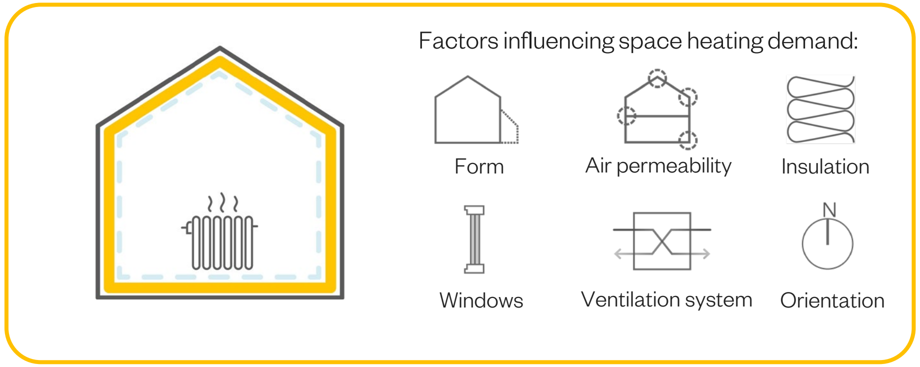
Different operational energy performance scenarios have been tested on the three residential typologies to enable the setting of limits in policy. A set of specifications have been curated for each typology and scenario. The scenarios for each home typology are as follows:

- **Part L:** Using the notional specifications from Building Regulations Approved Document Part L (Volume 1) 2021.
- **Anticipated Future Homes Standard (FHS):** A set of anticipated notional building specifications (Option 2) from the Future Homes Standard consultation plus the inclusion of waste water heat recovery and solar PV for 40% ground area. At the time of modelling the new Part L 2026 had not been publicly released.
- **Net Zero Carbon:** A set of specifications designed to achieve a space heating demand (SHD) of 20 kWh/m^2 (GIA)/yr and an energy use intensity (EUI) of 40 kWh/m^2 (GIA)/yr. PV has been provided to meet an energy balance (energy generated annually from the PV matches the total energy consumed (EUI) by the home).

Metrics tested include:

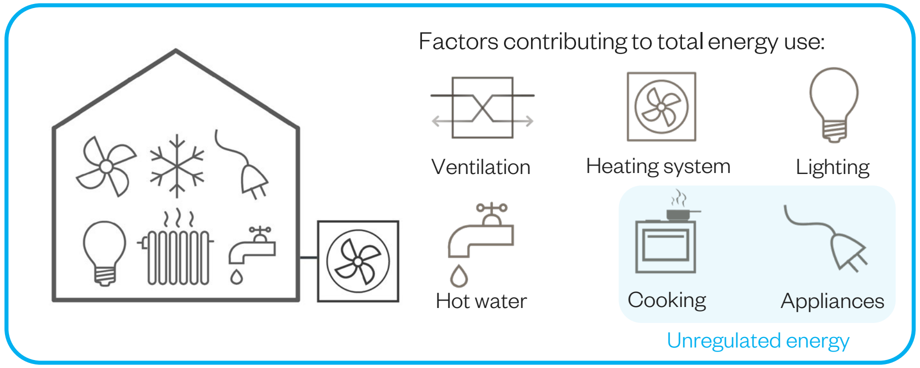
- *Space Heating Demand (SHD)* represents the heat energy needed to heat a building over a year (per sqm).
- *Energy Use Intensity (EUI)* represents *the total energy needed to run a building over a year (per sqm).*
- *Energy balance* represents *the amount of renewable energy generated in a year when is to match the EUI.*

Space Heating Demand



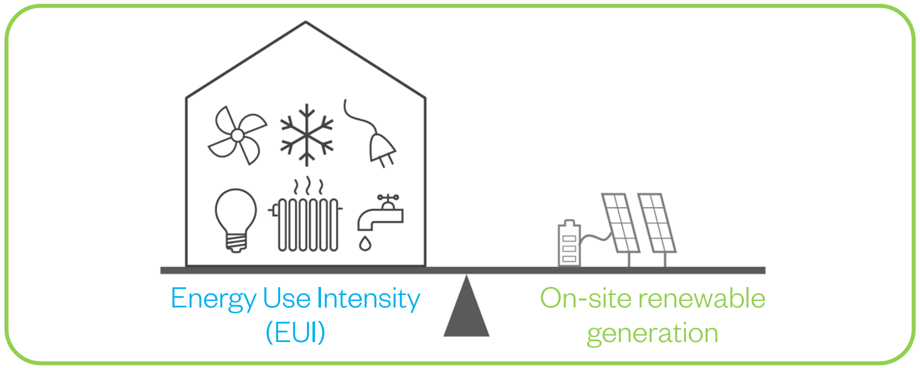
The space heating demand (SHD) metric

Energy Use Intensity (EUI)



The Energy Use Intensity (EUI) metric

Energy balance



Energy balance diagram

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Executive summary – Operational energy modelling and cost analysis (2/2)

Space heating demand (SHD) results

Part L 2021 and anticipated FHS scenarios have approximately a space heating demand three times higher than Net zero carbon. 20 kWh/m^2(GIA)/yr has been shown to be technically feasible in all three residential typologies and is therefore recommended as a policy limit.

Energy use intensity (EUI) results

The Part L 2021 scenario shows the highest energy use intensity by an average of three times higher than the anticipated FHS and Net zero carbon scenarios.

40 kWh/m^2(GIA)/yr has been shown to be technically feasible in all three typologies. While both FHS and Net zero carbon performance scenarios are below the 40 kWh/m^2(GIA)/yr target, the Net Zero scenario will have energy bills approximately 20% lower than the FHS scenario.

On-site renewable energy generation results

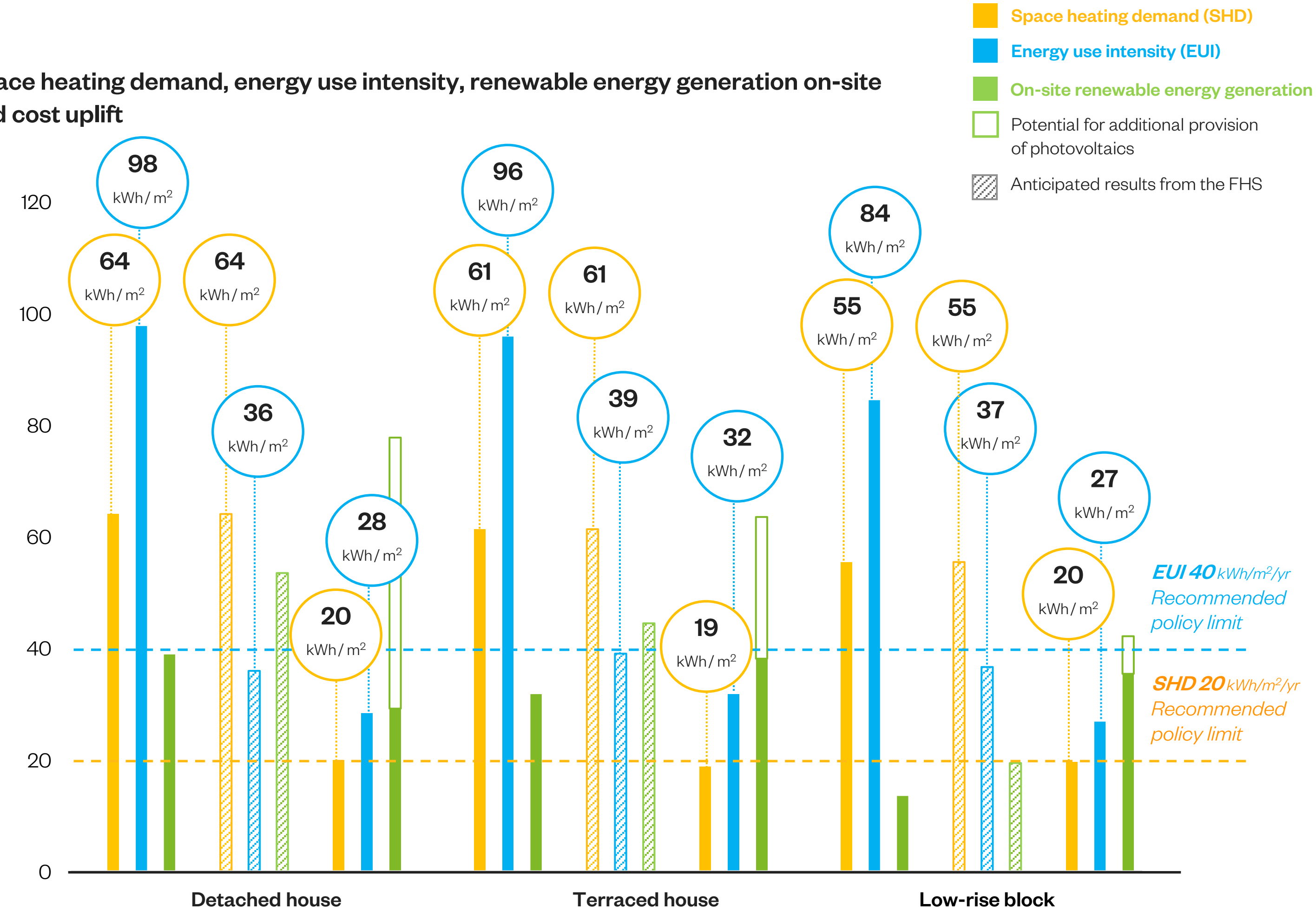
The Net zero carbon scenario achieves energy balance in all three typologies, with the potential to generate twice as much energy than the home requires in a year.

Cost analysis

When compared to the Part L 2021 notional specification scenario, the cost uplift for the Net zero carbon building ranges from 5.6-7.4% dependant on typology.

When the Net zero carbon scenario is compared to the anticipated Future Homes Standard (FHS) scenario, the cost uplift ranges from 2.6-4.4% dependant on typology. The difference in specifications can be broadly attributed to the introduction of an MVHR, additional insulation, triple glazing, and increased airtightness, all of which improve the space heating demand significantly and assist in reducing energy bills.

Space heating demand, energy use intensity, renewable energy generation on-site and cost uplift



	Detached house: Part L 2021	Detached house: FHS (anticipated)	Detached house: Net zero carbon	Terraced house: Part L 2021	Terraced house: FHS (anticipated)	Terraced house: Net zero carbon	Low-rise block: Part L 2021	Low-rise block: FHS (anticipated)	Low-rise block: Net zero carbon
Cost uplift from a 'Part L 2021' scenario to a net zero carbon building	0%	+2.9%	+5.6%	0%	+3.9%	+6.9%	0%	+2.9%	+7.4%
Cost uplift from the anticipated Future Homes Standard to a net zero carbon building	-	0%	+2.6%	-	0%	+2.9%	-	0%	+4.4%

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Executive summary – Policy conclusions and recommendations

A summary of the modelled limits and targets for policy has been displayed on the right and explained below:

Space heating demand limit for policy - 20 kW/m² GIA/yr

This ensures homes are comfortable and resilient, while reducing the amount of heating dwellings need to stay warm.

Energy use intensity limit for policy - 40 kW/m² GIA/yr

This aligns with current and upcoming targets and limits set by other local authorities in their local plans and the Net Zero Carbon Building Standard, while putting the SDNPA on track to meet their net zero carbon ambitions.

On-site renewable energy generation target – energy balance

All new residential development should achieve an energy balance. Meaning that net zero carbon should be achieved on-site by energy from renewables matching the buildings total energy consumption.

Implementing space heating demand, energy use intensity and on-site renewable energy generation limits in policy has been proven technically feasible in all three residential typologies tested, with a cost uplift from 5.5-7.3% over Part L 2021 notional specification and a 2.5-4.3% uplift when compared to the anticipated Futures Homes Standard.

Offsetting – £1.86 /kW to in-lieu of achieving an on-site energy balance

Where, for agreed technical reasons, there is a shortfall in matching energy consumed with energy generated. A financial contribution of £1.86/kWh to make up the shortfall can be used. The offset price has been set on the basis of the cost of PVs as a fair energy offset price for applicants.

Low carbon heat – fossil fuel free target

New buildings cannot continue to burn fossil fuels for heating if the SDNPA is to stay within local carbon budgets. Low carbon heat is therefore an essential component to a Net Zero Carbon building and should be actively encouraged.

Predictive energy modelling

It is recommended that a nationally recognised predictive energy modelling tool is used to compliment the use of energy-based metrics (SHD, EUI and energy balance) for all new developments, such as Passivhaus Planning Package (PHPP). To ensure accurate energy predictions and assist on reducing the performance gap at design stage.

Space heating demand

≤ 20
kWh/m² GIA/yr

For all new residential developments

Energy use intensity

≤ 40
kWh/m² GIA/yr

For all new residential developments

On-site renewable energy generation

Energy balance

For all new residential developments

Offsetting

£1.86
/kW

To make up any shortfalls in energy generation to meet the energy balance

Low carbon heat

Fossil fuel free

All development should be fossil fuel free for heating, hot water and cooking

Predictive energy modelling

Require the use of predictive energy modelling for all new developments

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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

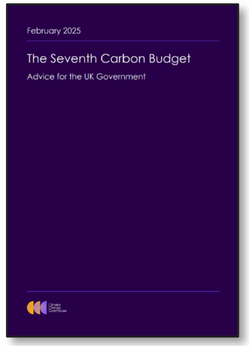
The UK's national commitment is set through the Climate Change Act 2008, which was updated in 2019. It legislates that the UK must be net zero carbon by 2050 and sets a system of carbon budgets to ensure that the UK does not emit more than its allowance in the next 27 years. This legal requirement is 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.

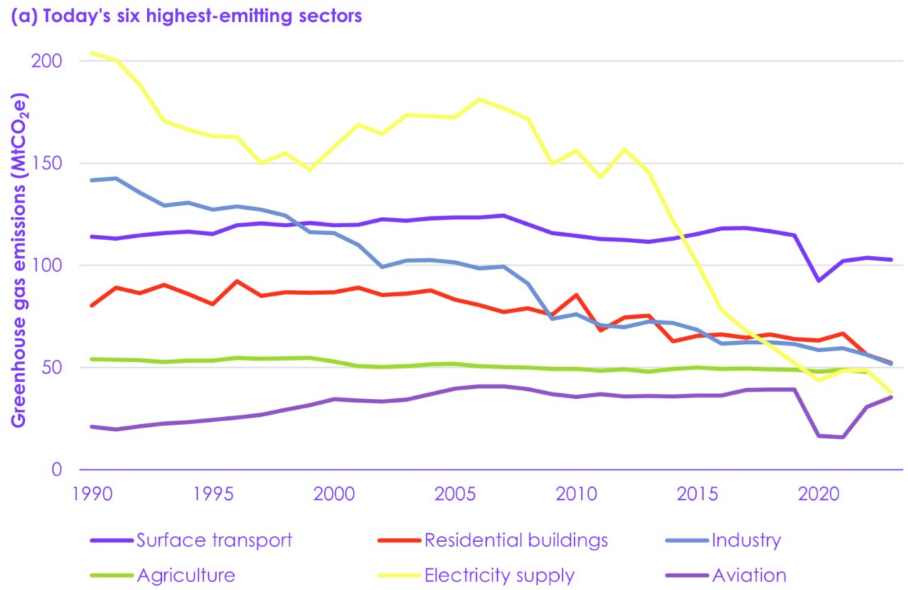
Net Zero: The UK's Contribution to Stopping Global Warming (Source: CCC, 2019)



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"



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.

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The need for action in new buildings

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 and existing techniques and technologies, can be compliant with climate change commitments, as demonstrated by Cornwall Council and Bath & North East Somerset who have set energy targets in their Local Plans. 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/m^2.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.

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.

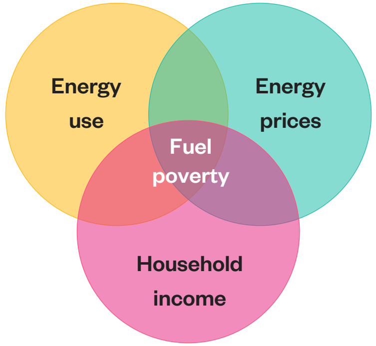
- An energy efficient dwelling will help to reduce energy consumption which in turn will reduce energy bills.
- It will also make the temperature more stable, enabling a 'smart' heating system to make the most of flexible dynamic electricity prices. If electricity is used for heating and cooling, this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

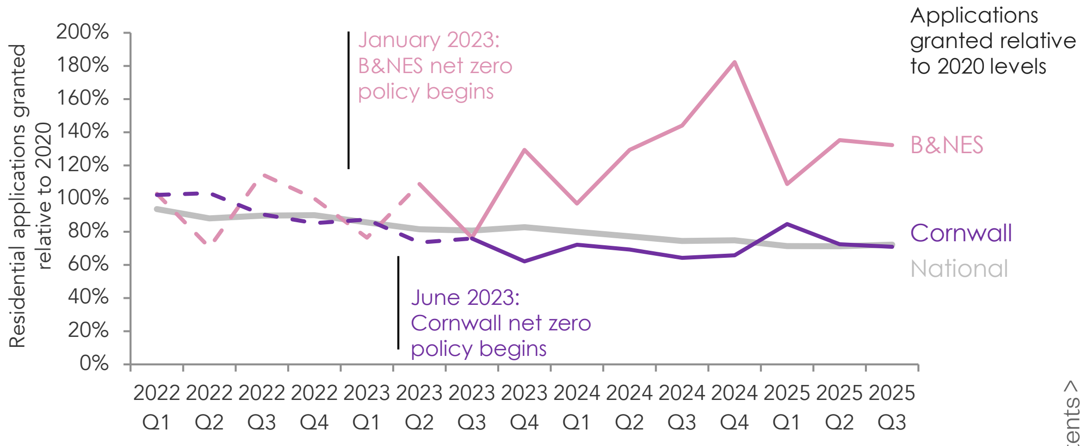
Extract from UK Housing: Fit for the Future? Committee on Climate Change, 2019.

"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/m^2/yr. Designing in these features from the start is around one-fifth of the cost of retrofitting to the same quality and standard."



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.

New buildings must not add to the problem



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)

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

There is significant industry evidence[1] 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 (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

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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 2023, states that a main objective 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. 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 158 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 (see pages 23-24 for examples).

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

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

The 2023 Written Ministerial Statement

A Written Ministerial Statement (WMS) was made on 13th December 2023 by the Parliamentary Under Secretary of State for Levelling Up, Housing and Communities. A key extract of the statement is:

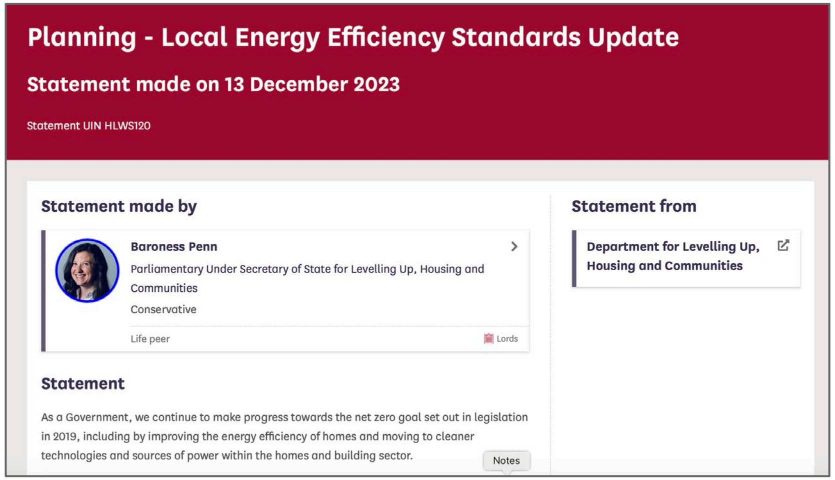
> *Any planning policies that propose local energy efficiency standards for buildings that go beyond current or planned buildings regulation should be rejected at examination* ***if they do not have a well-reasoned and robustly costed rationale*** *that ensures:*
>
> - *That development remains viable, 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).*

Reaction to the 2023 WMS

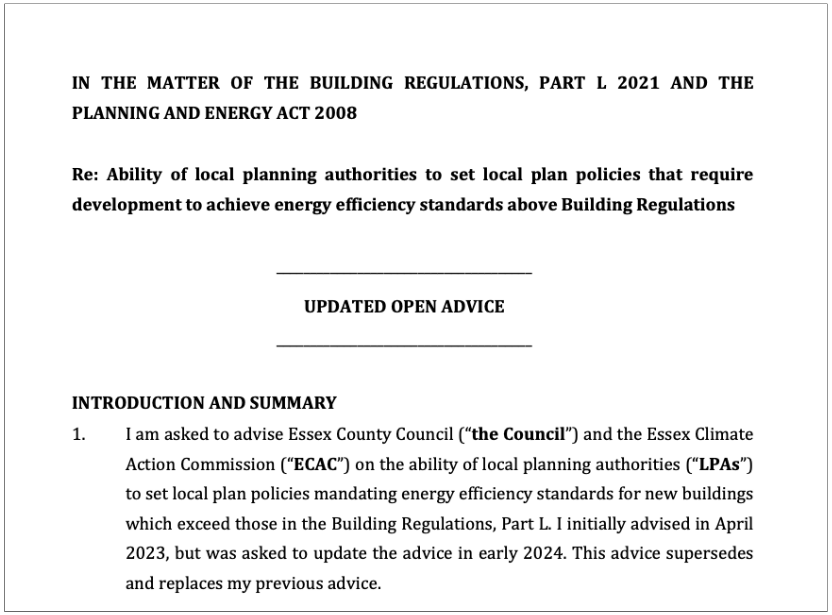
Essex County Council has since published the written legal advice provided to them by Estelle Dehon KC. The written advice concludes that the WMS should not prevent local authorities from exercising their statutory powers and duties.

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".

This highlights the importance for the SDNPA to demonstrate that the proposed policies will not negatively impact housing supply.



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

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South Downs National Park Authority's ambition

South Downs Climate Change Action Plan

The South Downs National Park Authority (SDNPA) formally committed to accelerated, comprehensive climate action in March 2020 by adopting its first Climate Change Strategy and Action Plan.

The climate and nature emergency was to be addressed by:

- Setting a target for the South Downs National Park Authority to become a 'Net-Zero' Organisation by 2030
- Agreeing to work with constituent Local Authorities in the South Downs National Park (SDNP) and other partners, in particular local communities and landowners, to deliver actions that respond effectively to the climate and nature emergency
- Working towards the SDNP becoming 'Net-Zero with Nature' by 2040, a strategy focusing on carbon sequestration, nature restoration, and sustainable land management

The Action Plan is updated every year, with the latest SDNP Climate Action Plan - 2024-25 transitioning from planning to active delivery, with a particular emphasis on "Net Zero with Nature" initiatives, enhanced community action, and mandatory biodiversity net gain.

Together for Nature, Climate and People (2026 -2031)

The South Downs National Park Partnership Management Plan is set out to shape the future of South Downs National Park. It is a Partnership Management Plan (PMP) but it does not contain planning policies.

The document states that *'The South Downs National Park is on track to become net zero by 2040 by mitigating and adapting to the impacts of climate change',* defining net zero as *'no longer adding to the total amount of greenhouse gases in the atmosphere'.*

The South Downs National Park has joined the United Nations backed "Race to Zero", committing to drive action to halve carbon emissions within their landscapes by 2030 and to become significant net carbon sinks by 2050.

Together for Nature, Climate and People – South Downs National Park Partnership Management Plan

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Net zero and operational energy explained

Areas of influence for operational energy planning policy

A number of operational energy metrics should be combined to ensure a holistic approach to energy reductions in planning policy. In addition metrics for embodied carbon emission reductions can ensure that the total building emissions are reduced.

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

1 Energy efficient fabric and ventilation

Space heating demand (kWh/m^2$_{GIA}$/yr)

The building should achieve an ultra-low level of space heating demand, in line with the recommendations of the Climate Change Committee.

2 Low total energy use

Energy Use Intensity (EUI) (kWh/m^2$_{GIA}$/yr)

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

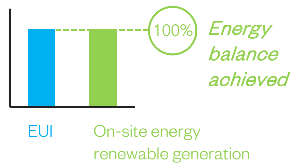
3 Fossil fuel free

Yes/ No

The budling 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).

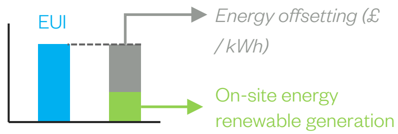
4 On-site renewable energy generation

% of total energy use



The building should seek to generate as much renewable energy as possible. Ideally there should be a balance between predicted annual energy use (EUI) and annual renewable energy generation.

5 Energy offsetting as last resort

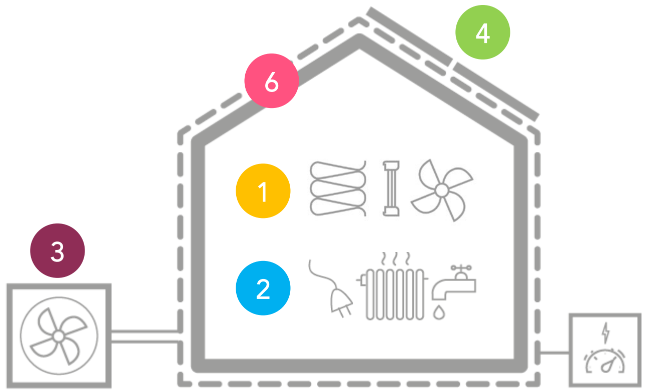


If the building cannot generate enough renewable energy to match energy use on an annual basis, an energy offset contribution will be required.

6 Embodied carbon

Upfront embodied carbon limit (kgCO_2e/m^2$_{GIA}$)

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



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Space heating demand (SHD), Energy use intensity (EUI) and Energy balance explained

Space Heating Demand (SHD)

*The **heat energy** needed to heat a building over a year (per sqm)*

Various design and specification decisions affect space heating demand including building form and orientation, insulation, air-tightness, windows and doors and the type of ventilation system. The Climate Change Committee recommends a space heating demand of less than 15-20 kWh/m^2/yr for new homes.

Energy Use Intensity (EUI)

*The **total energy** needed to run a building over a year (per sqm)*

The Energy Use Intensity (EUI) represents the total amount of energy used by a building divided by its 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/m^2.year. It is based on delivered energy and does not need to be converted in 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 individually metered, it is very easy for the occupant/resident to compare design predictions to actual energy consumption as it will be the annual 'energy at the meter' divided by the floor area.

EUI includes both the regulated energy use and unregulated energy use to create a better understanding of the total energy consumed by buildings. 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, this is to allow a clear comparison between total energy consumed (EUI) and energy generated. The EUI calculation also does not include charging of electric vehicles, as long as it is sub-metered.

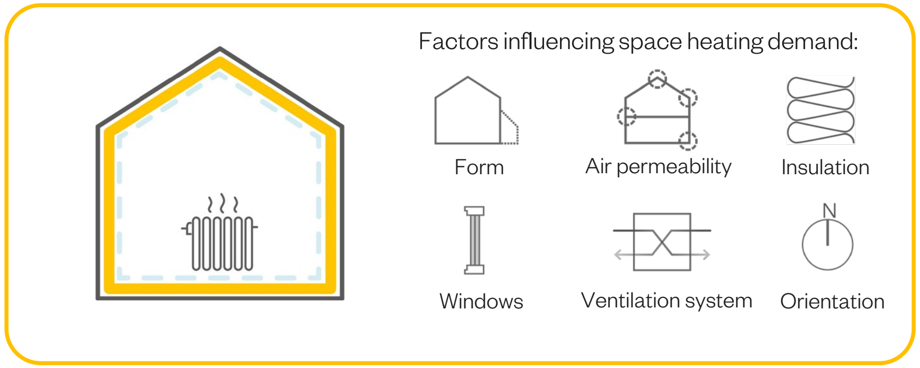
Energy balance

*The amount of **renewable energy** generated in a year is to match the **EUI***

To meet the UKs carbon commitments renewable energy should be generated at a volume to balance the annual energy use of the building. This balance should ideally happen within the site boundary, which typically means installing solar PVs on roofs.

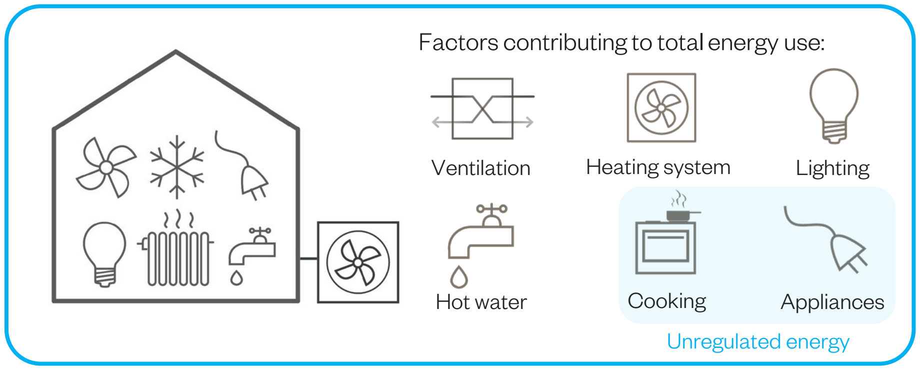
The cost effectiveness of Solar PV changes depending on how much of the energy generated is being used by the building at the time that it is generated, and how much is sold back to the grid. It is much more cost effective to use the electricity than to sell it to the grid, as the price that householders can sell the electricity for is less than the price that they purchase electricity.

Space Heating Demand



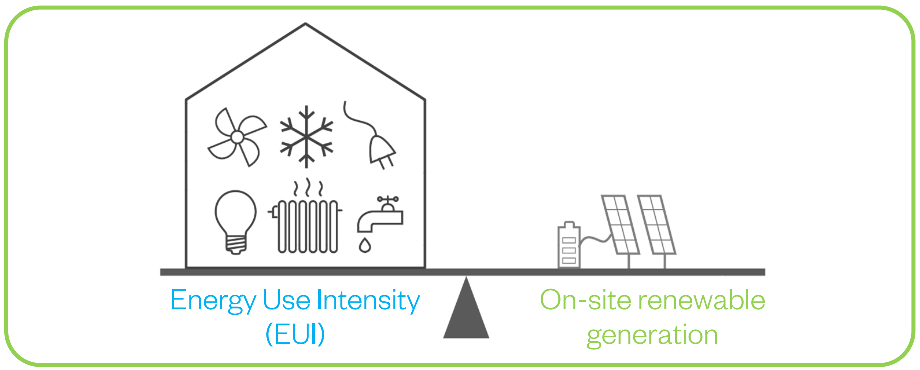
The space heating demand (SHD) metric

Energy Use Intensity (EUI)



The Energy Use Intensity (EUI) metric

Energy balance



Energy balance diagram

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Predicting energy and carbon and delivering outcomes through improved modelling

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

To achieve this aim, development must show ambition through design and construction and become more accurate and transparent in calculating and reporting expected performance. The current way of achieving this (by use of building regulation models) has so far failed to deliver.

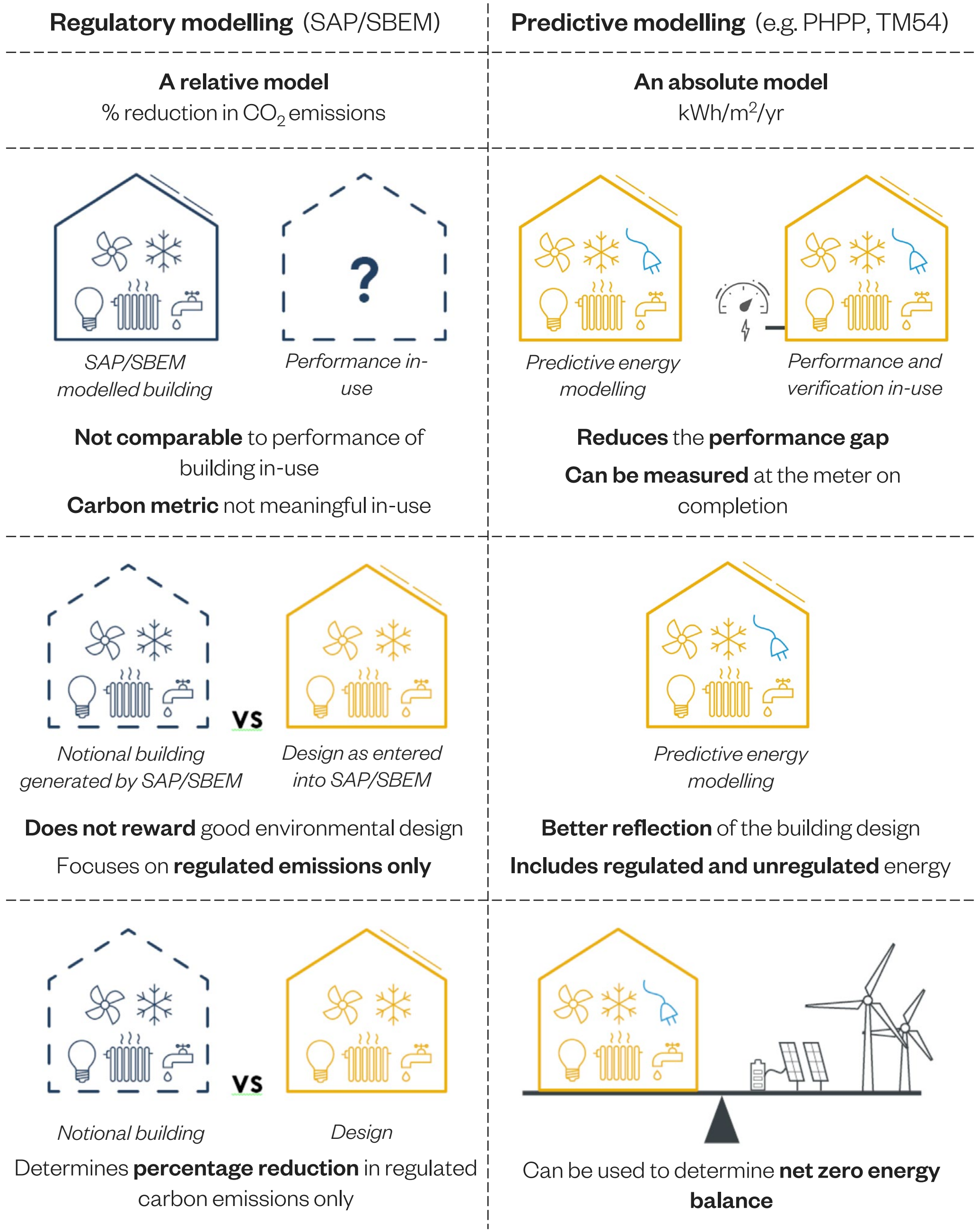
Predictive modelling is needed to better predict energy use

Building regulation tools such as the Standard Assessment Procedure (SAP) and Simplified Building Energy Model (SBEM) are frequently used to determine carbon reductions for building regulations compliance purposes and as a demonstration of performance for planning applications. However, it is widely understood by industry that SAP and SBEM were not designed to be accurate predictions of energy use and therefore, are not fit for use in designing net zero buildings. For this reason their use is best kept for building regulation compliance only.

To achieve Net Zero Carbon now and in the future, the built environment industry must move to the use of predictive energy modelling (e.g. Passivhaus Planning Package (PHPP), dynamic modelling using CIBSE TM54 methodology) that can assist in influencing the design and performance outcomes. Predictive modelling not only gives more accurate predictions of performance, but they can also better influence early design to ensure the thermal envelope and systems are better designed. The use of predictive energy modelling tools works hand in hand with energy based metrics such as space heating demand, energy use intensity and achieving an energy balance.

The future of regulatory calculations

The Future Homes Standard is set to introduce a new energy model for homes (Home Energy Model (HEM)) to replace SAP. However, until 2027 when the tool is complete and adopted there remains a gap that only predictive modelling can fill. This is a challenge that needs to be addressed through planning policy.



Source: LETI

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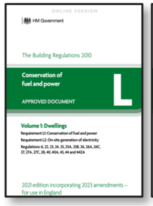
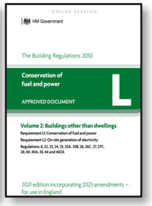
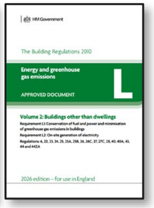
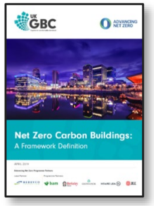
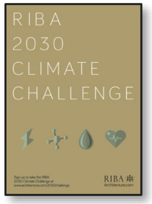
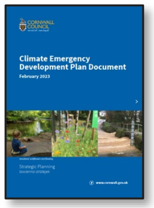
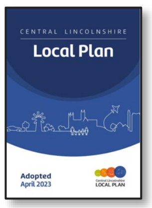
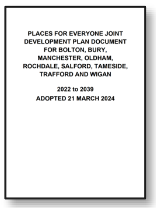
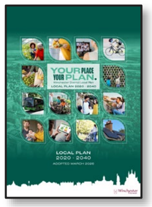
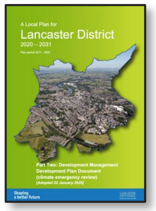
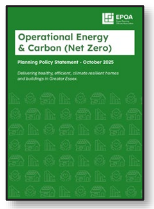
3

Industry guidance and policies on operational energy

Current regulations, local plans and guidance on operational energy

The table below 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 existing 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.

Operational energy	
Source	Document
National building regulations	  *Approved document L: Conservation of fuel and power Vol 1 & Vol 2 - 2021*   *Approved document L: Energy and greenhouse gas emissions Vol 1 & Vol 2 - 2026 – due to come into force in 2027*
Industry guidance and standards	 *Climate Change Committee*  *LETI climate emergency design guide*  *UKGBC Net zero carbon buildings framework*  *RIBA 2030 Climate Challenge*   *UK Net Zero Carbon Buildings Standard*
Existing and emerging local plans	 *Merton local plan 2024-2037/38*  *Cornwall CEDP 2023*  *Central Lincolnshire local plan 2023*  *GMCA, Places for Everyone Plan 2024*  *Milton Keynes local plan 2019*  *Winchester local plan 2026*  *Lancaster district local plan 2025*  *Essex planning policy statement 2025*  *South Staffordshire Local plan (examination)*  *Bath & North East Somerset sustainable construction checklist SPD 2023*  *Kensington and Chelsea new local plan 2024*

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Why should the new 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:

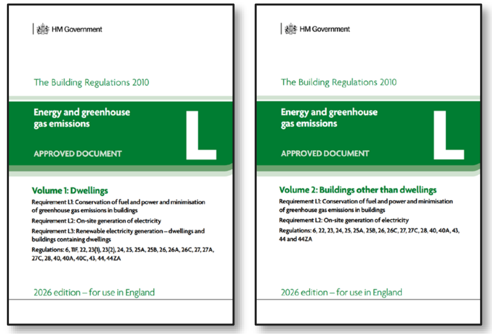
- The use of relative metrics, based on 'notional building' specifications, together with the SAP/SBEM compliance modelling tools, do not report or limit meaningful energy and carbon reductions.
- The 'notional' specification' does not mandate the levels of energy efficiency recommended by the Committee on Climate Change .
- Gas boilers will continue to be permitted until the new Part L 2026 is implemented in 2027/2028. This locks in carbon emissions and cost to residents to change their heating system in the future.
- Solar panels 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 renewable energy and displace gas consumption from power stations.

Part L 2026 – Future Homes Standard

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

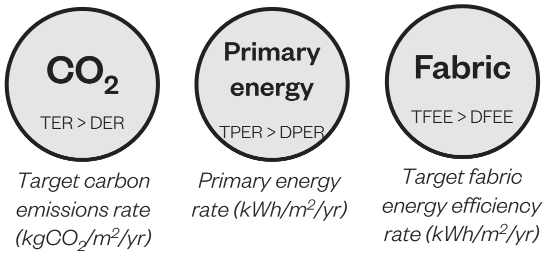
- The continued use of the three relative metrics, compared against updated 'notional building' specifications. This approach continues to make it difficult to verify as-built performance against design intent.
- Temporary replacement of SAP 10.2 with SAP 10.3, which is planned to later be permanently 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.
- The same fabric specifications for domestic buildings 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.
- 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: Conservation of fuel and power Vol 1 & Vol 2 – 2021.



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

Domestic buildings



Summary of Approved Document Part L1 relative metrics (% reductions over a set of 'notional' building specifications) (T= Target, D= Dwelling)

Relative metrics: *The use of relative metrics by Part L (TER) 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.*

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.*

See page 19 for further explanation of the difference between relative and absolute energy metrics.

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Beyond building regulations - using energy-based metrics and predictive energy modelling

Beyond building regulations - capturing 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 that reduces energy consumption. 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.

Accuracy of calculation methodology and ease of implementation

Current regulatory calculation methodologies (SAP/ SBEM) 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[1]. By contrast, predictive energy modelling, such as PHPP and TM54, assess energy use more accurately and provide absolute energy-based outputs. 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. It is also anticipated that HEM will be a satisfactory methodology[1] to predict energy use for residential developments.

Industry supported metrics

Industry-led standards and guidance developed by experts in the built environment have been developed to further define net zero carbon buildings. They have been recommending Space Heating Demand and Energy Use Intensity as the main approaches for assessing fabric and energy efficiency in buildings and ensuring a successful pathway to net zero.

	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	✓	✓	✓		✓
Energy use intensity		✓	✓	✓	✓

[1] SAP is soon to be replaced with a new methodology Home Energy Model (HEM) as part of Part L 2026. However, Part L will still use metrics that rely on a comparison to a notional building. The new regulatory tool (HEM) is likely to be more accurate than SAP at absolute estimates of SHD and EUI.

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Industry standards have defined what's possible - Net Zero Carbon Building Standard

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 1.5deg 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.

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.

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 2030 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 to modelling carried out for this study the energy use intensity 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. For SDNPA alternative limits have been recommended based on modelling and viability in this study, these should be reviewed every 3-5 years.

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)

NZCBS limits:

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

Space heating delivered metric and limit set under the Net Zero Carbon Building Standard for homes. This limit does not change over time.

	Energy use-intensity (kWh/m^{2}GIA/yr)						
Date of commencement	**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

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

	On-site renewable energy generation (kWh/m^2 building footprint/yr)
Single family homes	75
All other buildings	45

On-site renewable energy generation metric and limit set under the Net Zero Carbon Building Standard for homes. This limit does not change over time.

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Local Plans leading the way - targets, limits and benchmarks (1/2)

The graphs opposite illustrate the targets, limits and benchmarks for residential space heating demand (SHD) and energy use intensity (EUI) set by a range of existing, draft and emerging local plans and industry documents.

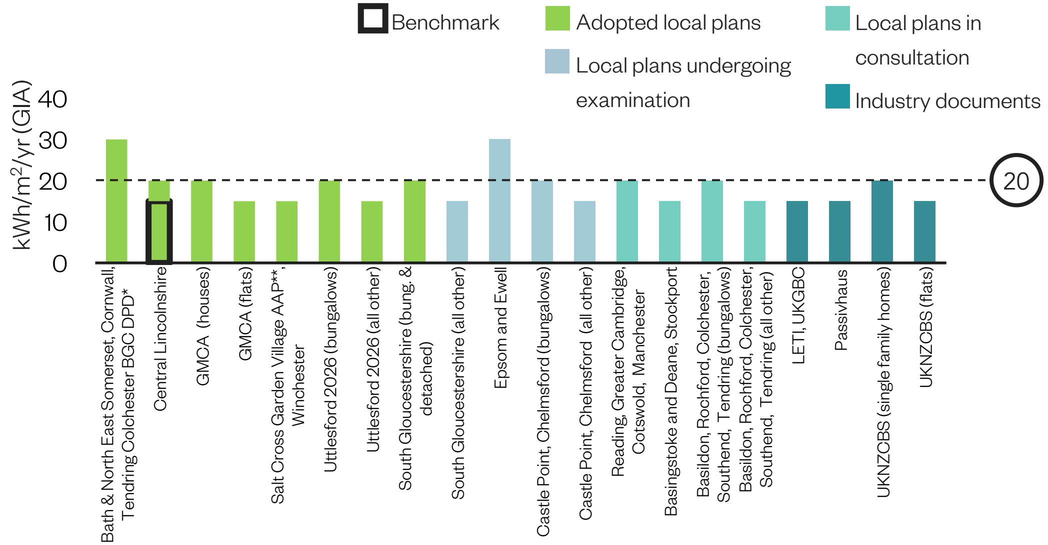
Space heating demand (SHD)

- Most adopted local plans with a space heating demand target or limit for residential developments have set this to 15 or 20 kWh/m^2/yr (GIA) or below. Except for Cornwall and Bath & North East local plan who have set it at 30 kWh/m^2/yr (GIA).
- The local plans undergoing examination with a target or limit for space heating demand follow this trend, most of them have set this to 15 or 20 kWh/m^2/yr (GIA) or below. Except for Epsom and Ewell who have set it at 30 kWh/m^2/yr (GIA).
- All local plans in consultation, as well as all relevant industry documents have set space heating demand at 20 kWh/m^2/yr (GIA) or lower.
- If the SDNPA set a target or limit of 20 kWh/m^2/yr (GIA) space heating demand, it will align with other Local Plans in the UK and industry standards.

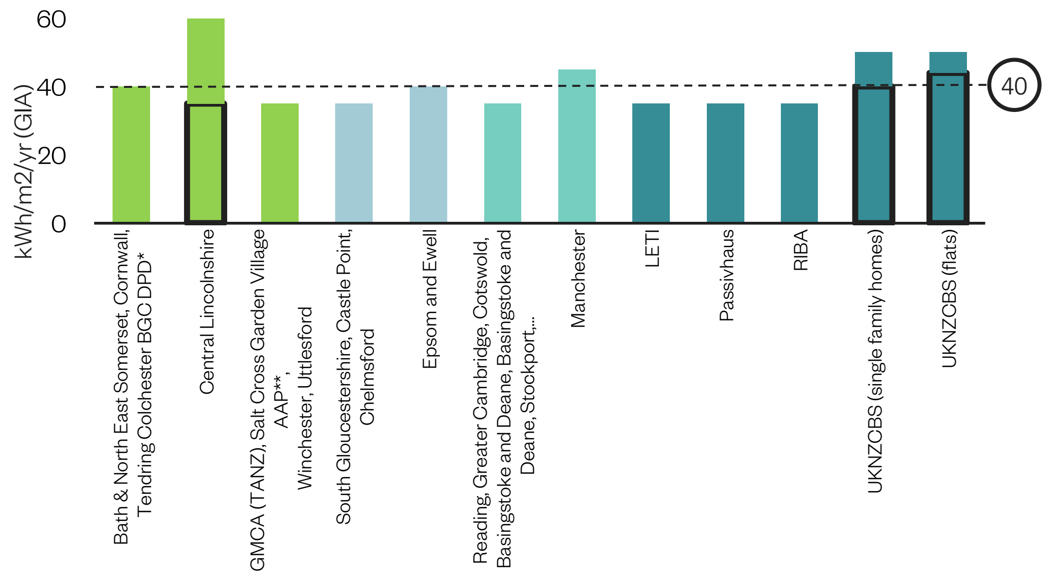
Energy Use Intensity (EUI)

- Most adopted local plans and those in consultation, with an energy use intensity target or limit for residential developments have set this to 40 kWh/m^2/yr (GIA) or below. Except for Manchester City's local plan and Central Lincolnshire, although the latter has a benchmark below 40 kWh/m^2/yr.
- All local plans undergoing examination with a proposed target or limit for energy use intensity have set this to 40 kWh/m^2/yr (GIA) or below.
- Relevant industry documents and standards have also set a limit or target for energy use intensity of 40 kWh/m^2/yr (GIA) or below. While UK NZCBS 2026 limit[1] is higher than this, the 2040 limit[1] for homes drops to 40 kWh/m^2/yr (GIA).

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 is 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 nationally. Policy examination reports frequently state that there are no viability issues found with local policies adopting energy-based metrics.



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 NZCBS limits are based on in-use energy data. Passivhaus doesn't have an EUI limit, however Passivhaus homes broadly meet an EUI of 35 kWh/m^2/yr (GIA).*

[1] While the local plans and industry documents rely on modelled/predicted performance-based data, UKNZCBS uses measured in-use data, which seeks to narrow the performance gap between predicted and actual use.

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Local Plans leading the way - targets, limits and benchmarks (2/2)

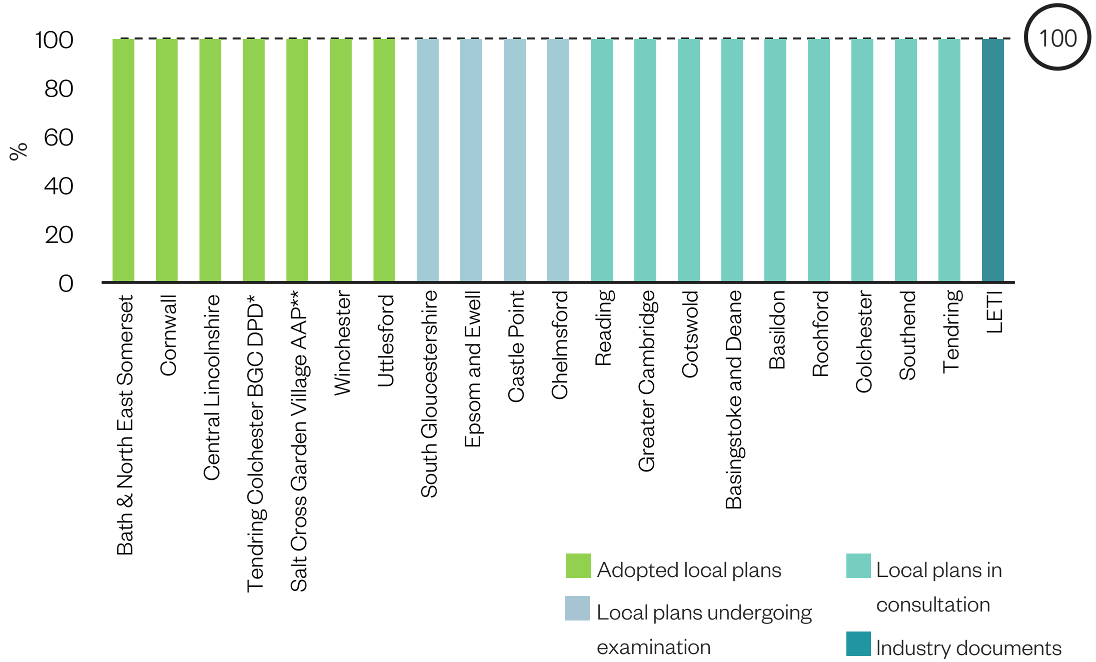
On-site renewable energy generation

The graphs opposite illustrate the local authorities which are pursuing an energy balance in residential developments. This includes local plans that have been adopted, that are currently undergoing examination or are in consultation, as well as relevant industry documents.

To achieve an energy balance, the on-site renewable energy generated needs to match the total energy needed to run the building (energy use intensity).

Energy Balance is achieved when:

Energy Use Intensity
(kWh/m2 /yr)
=
On-site renewable energy generation
(kWh/m2 /yr)



Residential percentage of energy use intensity (EUI) generated by on-site renewable energy targets and limits from various sources

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Operational energy technical evidence base

Building typologies modelled

Typologies modelled

Three residential typologies have been identified as being relevant locally and modelled to determine the operational energy consumption and any associated cost uplifts:

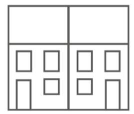
- Detached house
- Terraced house
- Low-rise apartment block

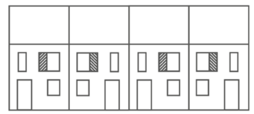
How building form affects operational energy consumption

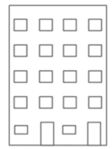
An efficient building form (lower form factor) is more likely to have lower operational emissions and reduce construction costs than a complex building form (higher form factor). This also supports a reduction in upfront carbon as part of wider policy. A form factor of 2.5 or below should be aimed for where possible to ensure the building is cost efficient to build and run.

Where other home typologies are built, such as detached houses or bungalows, they will likely require more careful consideration of the building fabric to reduce heat loss and ensure they reduce residents' energy bills, while operating within policy limits.

Residential







	Semi-detached	Terraced	Low-rise block
Number of storeys	3	2	4
Dwelling size	4 bedroom	3 bedroom	Mix of 1,2 & 3 bedroom
GIA (m^2)	142	93	641
Form factor	2.8	2.0	2.0

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Modelling methodology

Modeling methodology

Space heating demand (SHD) and Energy Use Intensity (EUI) results have been calculated for each building typology using predictive energy modelling: PHPP (10). Compliance modelling using SAP 10.2 (Elmhurst Design SAP 1.7.25) has also been carried using notional building specifications.

PHPP models have been adjusted for local weather data to ensure they are representative for the SDNPA.

Performance scenarios

Different operational energy performance scenarios have been tested on the three residential typologies to enable the setting of limits in policy. See Appendix 5.2 for the full specifications tested.

Two of the three scenarios focus on current and anticipated national regulations (Part L and FHS), while the final scenario tests policy limits. The scenarios for each home typology are as follows:

- **Part L:** Using the notional specifications from Building Regulations Approved Document Part L (Volume 1) 2021.
- **Future Homes Standard (FHS):** A set of anticipated notional building specifications (Option 2) from the Future Homes Standard consultation plus the inclusion of solar PV for 40% ground area.
- **Net Zero Carbon:** A set of specifications designed to achieve a space heating demand (SHD) of 20 kWh/m2 (GIA)/yr and an energy use intensity (EUI) of 40 kWh/m2 (GIA)/yr. PV has been provided to meet an energy balance (energy generated annually from the PV matches the total energy consumed (EUI) by the home).

Results

The results of the energy modelling and cost uplifts across the space heating demand, energy use intensity and energy balance have been included on the following pages.

Future Homes Standard – Part L 2026

The Future Homes Standard had not been released at the time of carrying out the energy modelling in this study. Therefore, the modelling assumptions relied heavily on the consultation version. Considerations include:

1. Two options were proposed for the 'notional building' in the consultation version. Our modelling was carried out using 'Option 2' but with the inclusion of PV allocation in line with 'Option 1' and a dMEV ventilation system. However, the since released FHS has indicated that 'Option 1' has been selected, this brings an improved air permeability (from 5 to 4 in the notional building) and the inclusion of waste water heat recovery.
2. 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.

The FHS, Part L 2026, has since been released but the full implications will be unpicked by industry over the following year ahead of implementation in March 2027. Therefore, best judgement has been taken at this time to predict the outcomes of Part L 2026.

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Space heating demand (SHD) – modelled data

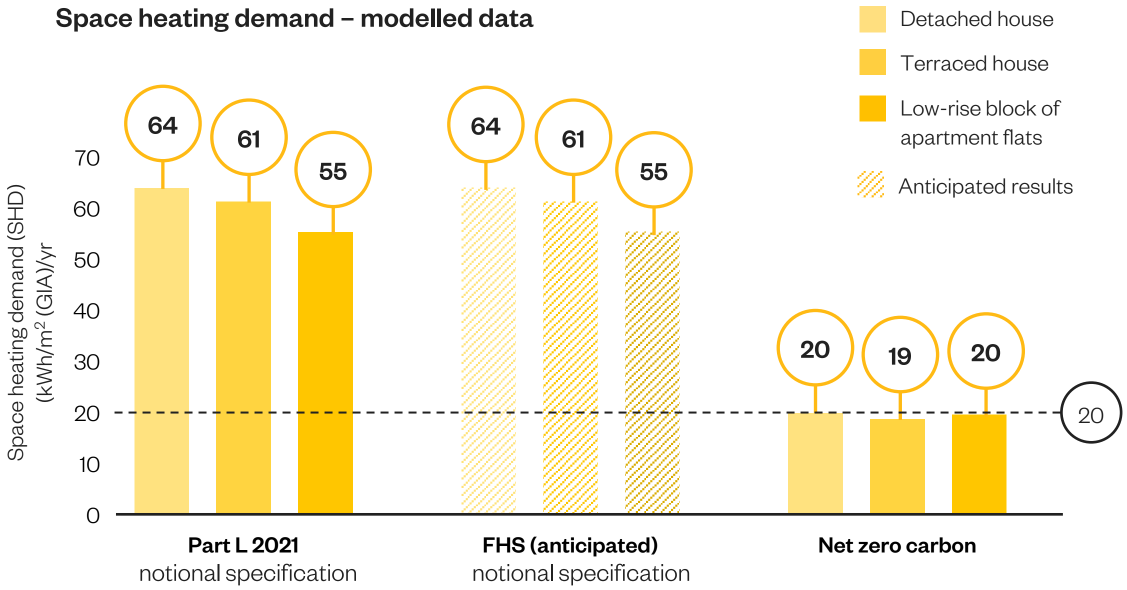
Space heating demand (SHD)

The top bar chart to the right shows the space heating demand results from PHPP energy models conducted for the three residential typologies across three performance scenarios. Findings include:

- The Part L 2021 notional building specification and anticipated Future Homes Standard (FHS) notional specification scenarios result in the same space heating demand requirements. This is because the 'Option 2' notional specification for fabric and ventilation from FHS remained unchanged in comparison to Part L 2021.
- The Net zero carbon scenario in all three residential typologies is able to achieve a SHD of 20kWh/m^2(GIA)/yr.
- The Part L 2021 notional and FHS anticipated scenarios have a space heating demand approximately three times higher than the Net zero carbon scenario. As a consequence the Net Zero scenario will be more comfortable, require less heating and more resilient long term.

The specifications used to underpin the PHPP modelling have been included in Appendix 5.2.

Space heating demand – modelled data



Annual space heating demand in kWh/m^2 (GIA) per performance scenario for each building typology tested.

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Energy use intensity (EUI) – modelled data

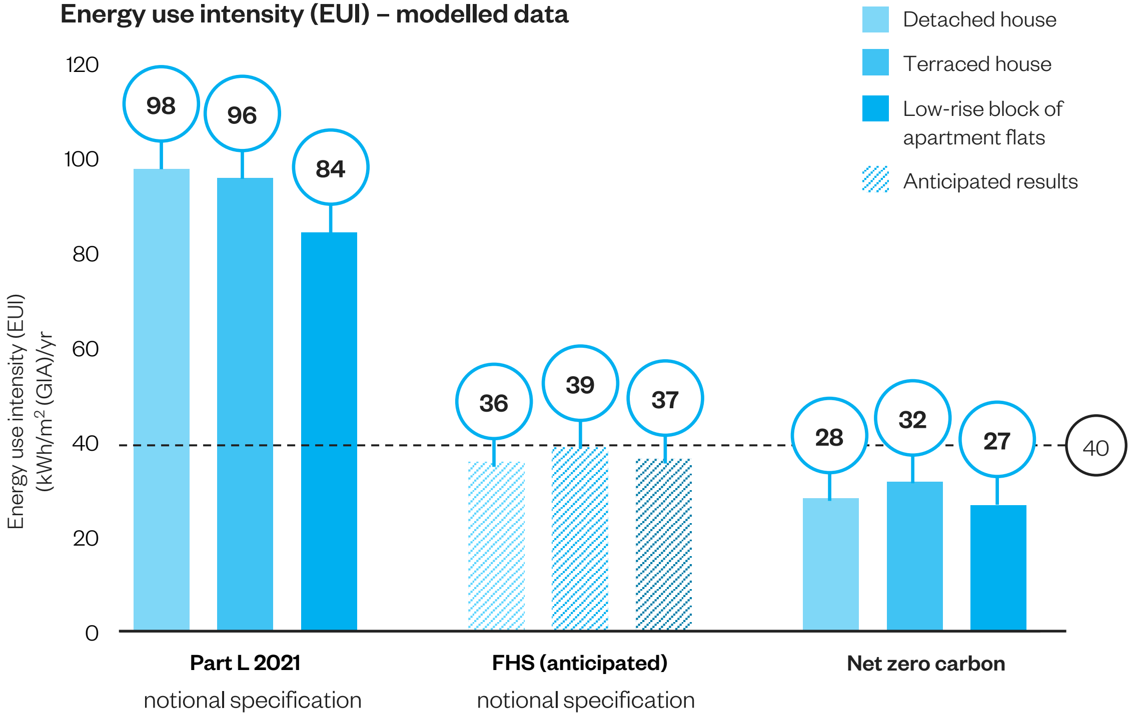
Energy use intensity (EUI)

The bottom bar chart to the right shows the energy use intensity results from same PHPP energy modelling conducted for the three residential typologies in three performance scenarios. Findings include:

- The Part L 2021 notional building specification scenario shows the highest energy use intensity by approximately an average of three times higher than the anticipated FHS and Net zero carbon scenarios.
- The anticipated Future Homes Standard (FHS) notional specification scenario results in a EUI below the targeted 40 kWh/m^2(GIA)/yr for all three residential typologies tested. This is due to the use of low carbon heat technologies (air source heat pumps) expected to be required in the upcoming Future Homes Standard. Where less efficient systems are used (such as direct electric), it is unlikely the EUI will remain below 40 kWh/m^2(GIA)/yr. However, the change of system may also mean that the home is not compliant with regulations, this is yet to be understood fully.
- The Net zero carbon scenario in all three residential typologies is able to achieve an EUI of 40 kWh/m^2(GIA)/yr.
- While both FHS and Net zero carbon performance scenarios are below the 40 kWh/m^2(GIA)/yr target, the Net Zero scenario will have energy bills approximately 20% lower than the FHS scenario. The modelling also does not accurately reflect the adopted FHS, it relies on anticipated notional specifications, so there is potential for these to change when the full implications of the FHS and its associated modelling tools are understood.

The specifications used to underpin the PHPP modelling have been included in Appendix 5.2.

Energy use intensity (EUI) – modelled data



Annual energy use intensity in kWh/m^2 (GIA) per performance scenario for each building typology tested.

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On-site renewable energy generation – modelled data

On-site renewable energy generation and energy balance

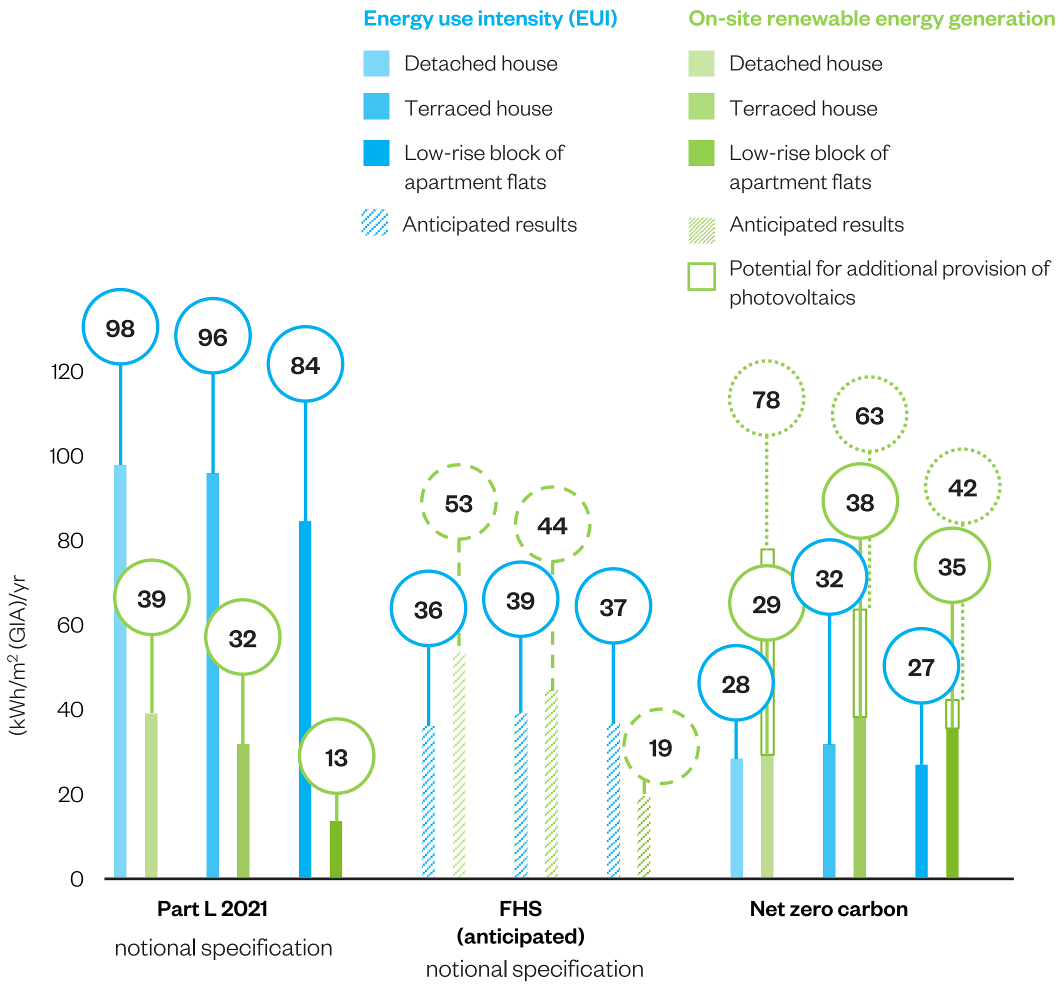
The bar chart to the right shows how the on-site renewable energy generation results compare to the Energy Use Intensity across the typologies and scenarios. Where the renewable energy generated matches or exceeds the EUI an energy balance has been met.

Findings include:

- The Part L 2021 scenario includes the amount of PV included in the notional specification. This results in less than 50% of the total energy use of the building.
- The anticipated Future Homes Standard (FHS) notional specification scenario results in more renewable energy being produced annually for the houses than their total energy consumption (EUI). However, the PV energy generation for the low-rise block of flats would require more than 40% of the ground floor area to match the EUI and create an energy balance.
- The Net zero carbon scenario is able to achieve an energy balance in all typologies tested. For the houses, less PV is needed than in the FHS scenario to create an energy balance. This can be attributed to the Net Zero scenario having smaller EUIs to balance against. However, it may be that homes are required to have at least 40% of the ground floor footprint area to meet Part L 2026, in which case the PV generation may need to exceed the energy balance for houses. This is to be determined when the implications of Part L 2026 is understood further.
- Where energy offsetting is considered, none of the homes modelled in the Net Zero scenario would require the use of the offsetting payments to meet an energy balance.

The specifications used to underpin the PHPP modelling have been included in Appendix 5.2.

On-site renewable energy generation – modelled data



Energy balance - On-site renewable energy generation vs energy use intensity (kWh/m² (GIA)) per performance scenario for each typology tested.

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Cost analysis

Cost analysis of the scenarios has been conducted for a detached house, a terraced house and a low-rise block of apartment flats.

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 East Sussex area (Index 108). 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 average mean rate over the past 15 years, with an uplift applied to reflect Part L 2021 requirements. The specifications costed are shown in Appendix 5.2.

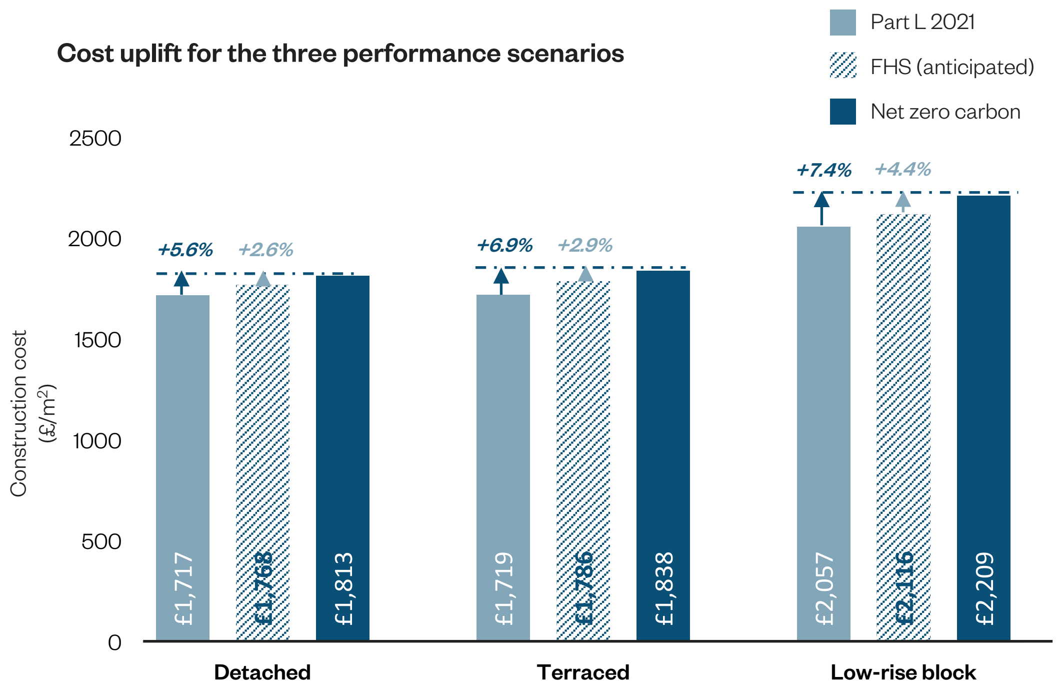
Cost analysis for residential buildings

The findings 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 the Net zero carbon building ranges from 5.6-7.4% dependant on typology.
- Much of the uplift in cost between the Part L notional specification and the anticipated FHS notional specification can be attributed to the inclusion of heat pumps (in place of gas boilers) and additional PV area.
- When the Net zero carbon scenario is compared to the anticipated Future Homes Standard (FHS) notional scenario, the cost uplift ranges from 2.6-4.4% dependant on typology. The difference in specifications can be broadly attributed to the introduction of an MVHR, additional insulation, triple glazing, and increased airtightness, all of which improve the space heating demand significantly.
- The detached house shows the smallest cost uplift to achieve the Net zero carbon scenario: 5.6% when compared to Part L and 2.5% when compared with the assumed Future Homes Standard (FHS scenario). This is likely to be due to the size of the houses modelled: the detached house has a larger GIA of 142m² compared to a GIA of 93m² for the terraced house, therefore cost uplifts are spread over a smaller area in the terraced houses.

Note: the capital cost uplifts may alter when the Future Homes Standard specifications and modelling outcomes are fully understood. For example the FHS requires 40% of the building footprint to be covered by PV, in some cases this is more PV than has been allocated in the Net Zero Carbon scenario.

Cost uplift for the three performance scenarios



Capital costs for three performance scenarios on the three typologies tested. Relative costs (%) of each case compared to the Net zero carbon scenario

Proposed policy requirement	Capital cost uplift over Part L 2021 (operational energy)		
	Detached house	**Terraced house**	**Low-rise block**
Baseline all in construction cost (£/m²)	£1,717	£1,719	£2,209
Part L 2021	0% (£0/m²)	0% (£0/m²)	0% (£0/m²)
FHS (anticipated)	+2.9% (+£51/m²)	+3.9% (+£67/m²)	+2.9% (+£59/m²)
Net zero carbon	+5.6% (+£96/m²)	+6.9% (+£119/m²)	+7.4% (+£152/m²)

Variation in capital costs from the three performance scenarios across the typologies tested for operational energy. Relative costs (% or £/m²) of each case compared to the baseline Part L 2021 scenario.

Running costs

Methodology and calculation

The analysis of running costs has been carried out for the three 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 and net zero 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 take into account:

- 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 (annual £/yr) and relative savings (%) to show the impact of lower EUIs on operational energy costs.

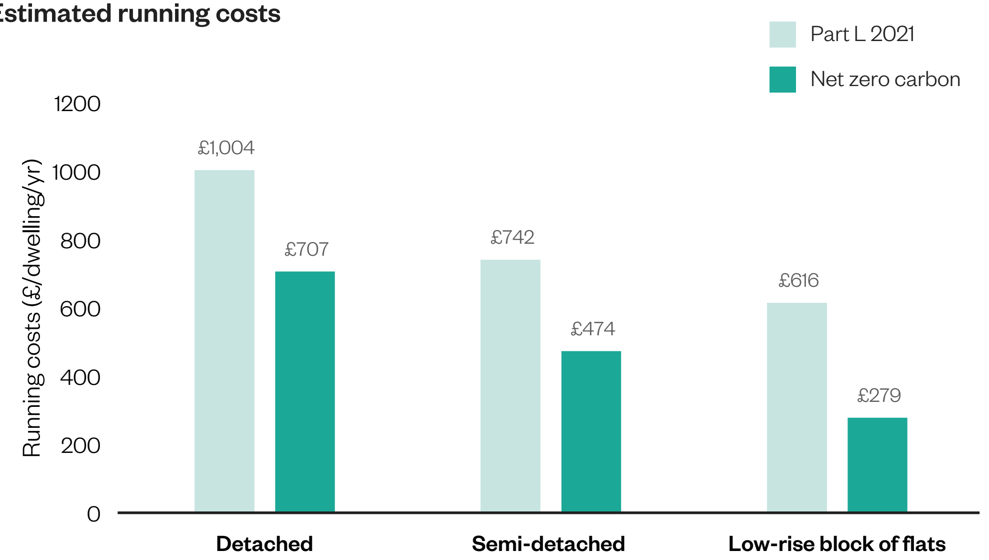
Analysis and comments

The results highlight the significant operational savings that can be achieved by improving energy performance. The flats are set to receive the greatest benefit from reduced running costs. However, all home types would significantly benefit. Further reductions could also be made with the use of dynamic tariffs.

Taken together, the results demonstrate that while the scale of savings varies by building type, all home types can achieve a meaningful cost reduction through higher energy efficiency, showing how investment in fabric and systems can deliver long-term reductions in operational expenditure.

Note: the running cost savings may alter when the Future Homes Standard specifications and modelling outcomes are fully understood. For example, the FHS requires 40% of the building footprint to be covered by PV, in some cases this is more PV than has been allocated in the Net Zero Carbon scenario, therefore it could make homes even cheaper to run.

Estimated running costs



Estimated annual energy costs for the three residential typologies across Part L 2021 and net zero scenarios. These costs include for the Ofgem energy price cap and effect of PV energy generation.

	Reduction in running costs (operational energy)		
	Detached house	Terraced house	Low-rise block
Net zero carbon	30% (£297/yr)	36% (£268/yr)	55% (£337/yr)

Reduction in running costs from building regulations 2021 to the net zero carbon scenario.

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Financial offsetting – incentivising improvements on-site and offsetting as a last resort

Moving towards energy offsetting

As the operational metrics in this evidence base are considering a move from carbon metrics towards energy metrics, it is logical for any offsetting mechanism to also change from the traditionally used carbon offsetting to energy offsetting.

Energy offsetting could be used as a mechanism to comply with an energy balance requirement, whereby applicants offset the shortfall in energy generation against the total energy consumption.

Offset price

As the basis of the energy offset is the shortfall between the renewable energy generated and the predicted annual energy use of the building, the offset tariff has been expressed in £/kWh.

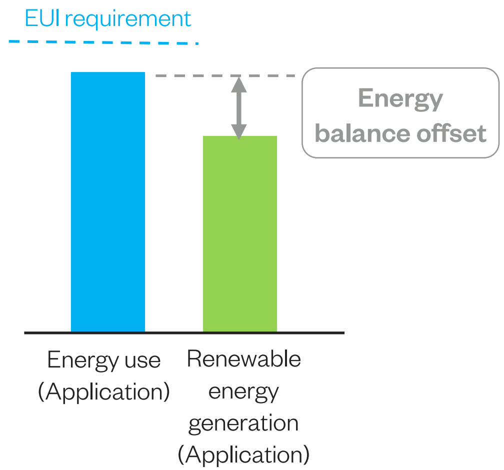
Where there is a renewable energy generation gap, the offset price can be set on the basis of the cost of PVs. This would result in a fair energy offset price for applicants. A cost of **£1.86/kWh** would ensure that offsetting does not impact viability as it would not add any additional cost on top of the renewable energy generation requirement. However, If the energy offset price is to incentivise more PVs on-site, it should be set at more than £1.86/kWh.

The energy offsetting price has been based on the deployment of medium sized PV arrays (10-50 kW). The capital cost per kWp of installing PVs has been based on the government solar photovoltaic (PV) cost data [1] (May 2024) and based on installations in the South of England. The calculations have been based on the median 10-50 kW installation cost of £1,376/kW for the year 2023/2024 and was adjusted for inflation for Q1 2026. The management cost for administering and managing the funding process has been assumed to be 10% of capital cost as typical practice. These calculations are assuming a conservative electricity generation rate for the PV system of 850 kWh/kWp.

It is suggested that this price is reviewed every 3 years as the costs of Solar PV may change. It is important to note that the energy offset price is much less sensitive to change than the current carbon offset price, which is sensitive both to cost changes and electricity grid intensity changes.

[1] *https://www.gov.uk/government/statistics/solar-pv-cost-data*

Example of energy offset payments based on a shortfall in PV to meet an energy balance



Energy offset price to meet an energy balance:

£1.86 /kWh

If the offset price is to incentivise more PVs on-site, it should be set at **more than £1.86/kWh.**

If offsetting is used as a flexible mechanism to comply with the energy balance requirement

- This would be fair between applications which comply with the energy balance requirement, e.g. low density low energy developments (and therefore pay for on-site PV) and those which cannot, e.g. higher energy or density developments.
- The scale of offsetting (and the associated responsibility of Local Authorities) would be much more significant

Low carbon heat

The need for low carbon heating systems in new buildings is clear and is being encouraged by the updates to Building Regulations Part L 2026. It is therefore very important that any 'low carbon and affordable heat' requirement in the SDNPA local plan has a clear purpose and is not effectively redundant.

Part L 2021

It is still possible under the current version of Part L of the Building Regulations to install a fossil fuel heating system. Therefore, until the full implications of the Future Homes Standard and Future Building Standard are understood (and the inability to comply with regulation with fossil fuel heating systems confirmed), it should be assumed that the South Downs National Park local plan should have low carbon heat requirements.

The heating revolution

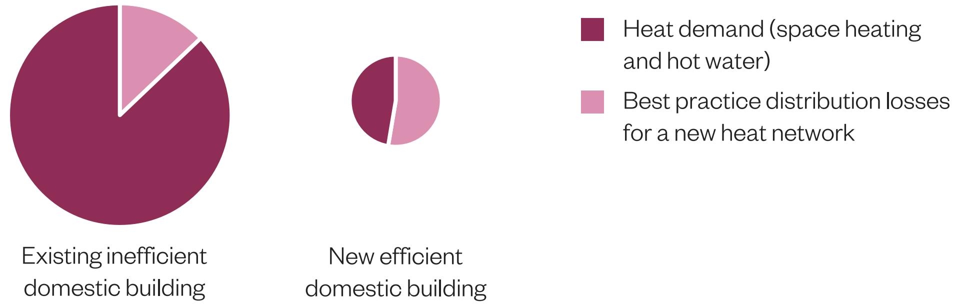
15 years ago, the challenge of decarbonising heat was mainly about how to prevent individual gas boilers from being installed in new dwellings as it would effectively 'lock-in' fossil fuel use and high carbon emissions for at least 20-25 years. The aggregation of heat loads in order to be able to install low carbon heating systems and the associated development of low carbon heat networks was considered to be essential to achieve this objective.

The underlying 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.

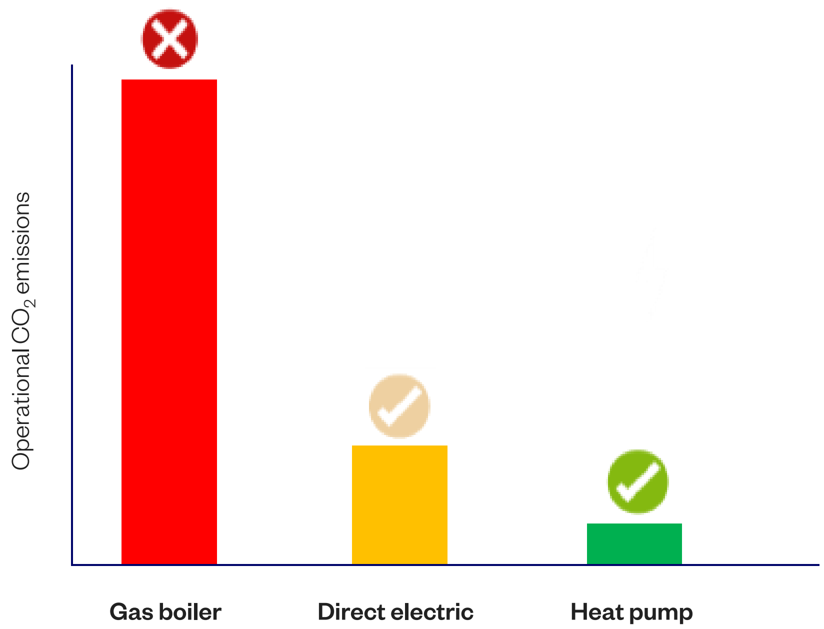
Low carbon alternatives that are available now include heat pumps and direct electric heating. Electricity can be provided through on-site renewables and through grid electricity, which is becoming increasingly de-carbonised.

Heat pumps use refrigerant to efficiently move heat from on place (outside the building) to another (inside the building). Heat source can include outside air, the ground or a local water source. Heat pumps can provide both space heating and domestic hot water and can serve individual homes or communal heating systems. The key benefit of heat pumps is their efficiency. Efficiencies vary but are typically around 250-400% for an Air Source Heat Pump (ASHP).

Direct electricity heating systems convert electricity directly into heat through resistive heating. It is typically 100% efficiency. The price of electricity can make this a relatively expensive means of heating building and providing hot water though, unless cheaper off-peak electricity is used.



As the heat demand of a building reduces, heat losses from distribution and standing losses can become disproportionately high. For new buildings with a space heating demand of 15-30kWh/m²/yr, distribution losses of heat networks may exceed space heating demand.



The choice of heating system will affect operational CO2 emissions over a long time. Electric forms of heating (direct electric and heat pumps) will emit a fraction of a gas boiler carbon emissions (see above the average over 2022-2050).

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Predictive energy modelling

Part L modelling – residential buildings

Standard Assessment Procedure (SAP 10.2) was developed to check compliance with 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. While HEM is being developed and during a transition period SAP 10.3 will be available for Part L 2026. This is very similar to SAP 10.2 and offers no accuracy improvements. .

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:

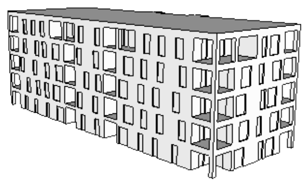
- Greater accuracy (e.g. specific weather file, more accurate shading assessment, ventilation duct heat losses taken into account)
- Inclusion of unregulated energy (e.g. cooking and appliances)
- Ability to assess the benefit of better building orientations, building form and window sizes early during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

Applicants should summarise their key modelling assumptions to make it easier for the local planning authority to review them. The use of PHPP is independent of meeting Passivhaus standards and certification.

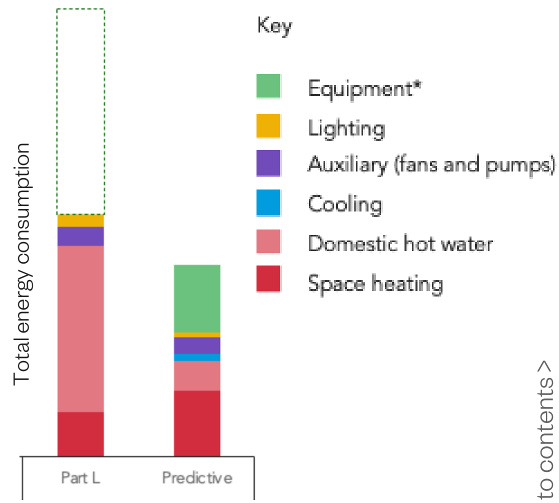
Reducing time and complexity through new metrics and fewer models

Using predictive modelling to generate space heating demand and energy use intensity means the results can be calculated in a single model for each building or block. Models do not need to be copied and edited/iterated to produce results for each stage of the hierarchy, instead the new metrics are collected for each building or block.

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 (it is also used to check compliance with Passivhaus Standard)	Will be used to check compliance with Future Home Standard
To be replaced by HEM in 2026-2028	Agnostic of building regulation methodology changes	To be introduced in 2026-2028
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



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 overestimates does not account for unregulated emissions, over estimates hot water energy consumption, while under-estimating space heating.

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Modelling conclusions and recommendations

Following the operational energy modelling, the recommendations are as follows:

Space heating demand limit for policy - 20 kW/m^2 GIA/yr

This ensures homes are comfortable and resilient, while reducing the amount of heating dwellings need to stay warm.

Energy use intensity limit for policy - 40 kW/m^2 GIA/yr

This aligns with current and upcoming targets and limits set by other local authorities in their local plans and the Net Zero Carbon Building Standard, while putting the SDNPA on track to meet their net zero carbon ambitions.

On-site renewable energy generation target – energy balance

All new residential development should achieve an energy balance. Meaning that net zero carbon should be achieved on-site by energy from renewables matching the buildings total energy consumption.

Implementing space heating demand, energy use intensity and on-site renewable energy generation limits in policy has been proven technically feasible in all three residential typologies tested, with a cost uplift from 5.5-7.3% over Part L 2021 notional specification and a 2.5-4.3% uplift when compared to the anticipated Futures Homes Standard.

Offsetting – £1.86 /kW to in-lieu of achieving an on-site energy balance

Where, for agreed technical reasons, there is a shortfall in matching energy consumed with energy generated. A financial contribution of £1.86/kWh to make up the shortfall can be used. The offset price has been set on the basis of the cost of PVs as a fair energy offset price for applicants.

Low carbon heat – fossil fuel free target

New buildings cannot continue to burn fossil fuels for heating if the SDNPA is to stay within local carbon budgets. Low carbon heat is therefore an essential component to fa Net Zero Carbon building and should be actively encouraged.

Predictive energy modelling

It is recommended that a nationally recognised predictive energy modelling tool is used to compliment the use of energy-based metrics (SHD, EUI and energy balance) for all new developments, such as Passivhaus Planning Package (PHPP). To ensure accurate energy predictions and assist on reducing the performance gap at design stage.

Space heating demand

≤ 20
kWh/m^2 GIA/yr

For all new residential developments

Energy use intensity

≤ 40
kWh/m^2 GIA/yr

For all new residential developments

On-site renewable energy generation

Energy balance

For all new residential developments

Offsetting

£1.86
/kW

To make up any shortfalls in energy generation to meet the energy balance

Low carbon heat

Fossil fuel free

All development should be fossil fuel free for heating, hot water and cooking

Predictive energy modelling

Require the use of predictive energy modelling for all new developments

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Can the energy modelling results be applied to other typologies?

The three residential typologies modelled in this study have been designed to cover the majority of site allocations in the SDNPA area for use class C3.

However, there are some other predominant use classes as part of site allocations in the new local plan. These include use classes:

- C1 - for boarding and guest houses
- C2 – for various forms of residential care homes *such as independent living extra care, and nursing*
- B2/B8 - for industrial or storage
- E – for mixed use schemes where commercial or business forms a part of the mix.

For these use classes some commentary has been provided below on how they might seek to align with Net Zero intentions:

New build holiday lets

Planning permission and regulatory compliance will be required for new temporary structures and holiday accommodation that have permanent utility connections or are in place for more than 28 days. This type of accommodation therefore becomes relevant to the new policy requirements for meeting space heating demand and energy use intensity if heated and serviced for much of the year.

However, under building regulations Part L they may fall under Part L1: Dwellings (for self catering cottages or cabins), or Part L2: Buildings other than Dwellings (for commercial style, short-term lets, holiday villages). At which point they will be subject to the limiting and notional thermal and system values within Part L.

For new build self contained dwellings used for holiday accommodation, the operational energy limits set through modelling in this study can be applied in the same way as a new dwelling. As the uses and specification can be very similar.

Residential care homes

For independent living schemes these will perform very similarly to a block of flats and therefore the tested limits could be applied to these buildings. However, nursing homes tend to have a more intensive energy use profile and so may find it more challenging to meet the limits modelled. For these buildings the SDNPA could require the calculation of space heating demand, energy use intensity and renewable energy generation using predictive modelling, and the avoidance of fossil fuels. With a view taken on whether their performance of individual fabric and systems specifications is in line with residential.

Non-domestic use classes

For non-domestic use classes, predictive modelling (PHPP or CIBSE TM54) should be required for the calculation of space heating demand, energy use intensity and renewable energy generation. By setting a space heating demand target of 20kWh/m2(GIA)/yr users energy bills will be protected by efficient fabric and ventilation. Avoidance of fossil fuels will ensure low carbon heating and cooling systems are installed. The Net Zero Carbon Building Standard also includes some useful limits for energy use intensity that can be referred to in policy to cover the variation of energy consumption across use classes.

Example holiday lets (use class C1) in the South Downs National Park which range from more temporary structures to let houses.

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Appendix

5.1
Glossary of terms and abbreviations

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 CO_2 emissions of the proposed dwelling in $kgCO_2/m^2/yr$. 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*

EUI - Energy Use Intensity expresses a building's energy use as a function of its size, typically expressed as energy consumption in kWh/m^2yr. 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).

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

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.

Glossary of terms

Offsetting – Carbon/energy offsetting consists of using finance to support projects to reduce CO_2 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 CO_2 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 CO_2 per m2 per year ($kgCO_2/m^2/yr$).

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.

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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

CO_2: 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

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5.2
Additional information on modelling specifications

Specifications

		Detached house			Terraced house			Low-rise block		
		Building Regulations Part L	**Future Homes Standard**	**Net zero operational carbon**	**Building Regulations Part L**	**Future Homes Standard**	**Net zero operational carbon**	**Building Regulations Part L**	**Future Homes Standard**	**Net zero operational carbon**
Building fabric and ventilation strategy	U-values (W/m^2K)	Part L energy fabric	FHS energy fabric	Ultra-low energy fabric	Part L energy fabric	FHS energy fabric	Ultra-low energy fabric	Part L energy fabric	FHS energy fabric	Ultra-low energy fabric
	Floor Walls Roof	0.13 0.18 0.11	0.13 0.18 0.11	0.12 0.14 0.10	0.13 0.18 0.11	0.13 0.18 0.11	0.12 0.15 0.10	0.13 0.18 0.11	0.13 0.18 0.11	0.10 0.15 0.10
	Windows (W) Doors (D)	Double glazing W - 1.2 D - 1.5	Double glazing W - 1.2 D – 1.0	Triple glazing W - 0.8 D – 1.0	Double glazing W - 1.2 D - 1.0	Double glazing W - 1.2 D – 1.0	Triple glazing W – 1.0 D – 1.0	Double glazing W - 1.2 D – 1.0	Double glazing W - 1.2 D – 1.0	Triple glazing W - 0.8 D – 1.0
	Air permeability (m^3/m^2h)	5	5	0.6	5	5	2	5	5	1.5
	Ventilation strategy	dMEV	dMEV	MVHR (88% efficiency)	dMEV	dMEV	MVHR (88% efficiency)	dMEV	dMEV	MVHR (88% efficiency)
Heating, hot water	Heating system	Gas boiler	ASHP Individual Monobloc	ASHP Individual Monobloc	Gas boiler	ASHP Individual Monobloc	ASHP Individual Monobloc	Gas boiler	ASHP Individual Monobloc	ASHP Individual Monobloc
	Hot water heating system	N/A	200l cylinder	200l cylinder	N/A	180l cylinder	180l cylinder	N/A	7 x 180l cylinder	7 x 180l cylinder
	Waste water heat recovery (WWHR)	Yes (36% efficiency)	No	No	Yes (36% efficiency)	No	No	Yes (36% efficiency)	No	No
Renewables	PV panels	8 PV panels 605 W each 4.8 kWp	11 PV panels 605 W each 6.7 kWp	6 PV panels 605 W each 3.6 kWp	5 PV panels 605 W each 3.0 kWp	7 PV panels 605 W each 4.2 kWp	6 PV panels 605 W each 3.6 kWp	16 PV panels 475 W each 7.6 kWp	23 PV panels 475 W each 10.9 kWp	42 PV panels 475 W each 20.0 kWp

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Authors:

Levitt Bernstein People.Design

Etude

Currie & Brown