Reading Borough Council net zero carbon policy support

Evidence for fallback TER-based ‘net zero’ buildings policy option and evaluation in comparison to originally submitted EUI-based policy

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Context

1. Reading Borough Council (RBC) submitted its draft local plan update to the Planning Inspectorate (PINS) in May 2025. As instructed by the Planning & Compulsory Purchase Act Section 19 and by the NPPF (both 2023 and 2024 versions), the submitted plan included policies taking a proactive approach to mitigating climate change in line with the objectives of the Climate Change Act, which include the transition to net zero.

2. Within the climate mitigation policy suite were Policies H5 and CC2, which would require that new buildings are net zero carbon, as defined by annually generating an amount of renewable energy at least equal to the building's annual energy use. It was explained[1] that this standard is considered a necessary component of the local area's proportionate contribution to the achievement of the legislated targets set by the Climate Change Act, which include not only the net zero 2050 goal but also the five-yearly carbon budgets between 2008 and 2050. This interpretation was reached in light of the analysis and recommendations from the Climate Change Committee (the expert body established by the Climate Change Act to devise the UK's carbon budgets and identify the changes that will be needed in order to achieve them) as well as from the consensus within the green building sector on what constitutes effective climate mitigation in building design.

3. Within the proposed policies' requirement for net zero, new buildings would need to include an amount of renewable energy generation capacity sufficient to annually equal their *total* energy use. In the vast majority of cases, it was (and is) anticipated that the suitable renewable energy generation technology would be rooftop PV. In light of third-party expert evidence, RBC understood that in order for rooftop PV at new builds to be able to equal the building's annual energy use, most new buildings would need to achieve a tighter standard of energy efficiency (including space heat demand) than is achieved by Building Regulations today (Part L 2021) and even the incoming Future Homes Standard[2]. RBC also understood that even if the on-site net zero energy balance were not part of the policy, the same energy efficiency improvement would still be necessary in order for new buildings to be compatible with the UK's legislated carbon reduction trajectory. Therefore, the policy included not only the overarching net zero target via 100% renewable energy on site, but also two crucial energy use limits on:

    a. Energy Use Intensity (EUI) limit: *Total* energy use per m^2 of floorspace, per year.

    b. Space heating demand (SHD) limit: Amount of heating energy input[3] that the building needs per m^2 of floorspace per year. This in turn feeds into the EUI.

4. With these limits in place, the building's energy use becomes low enough that it can be matched using an amount of PV provision that fits on the building's roof, in the vast majority of buildings (as per evidence cited later in the current report for simplicity). Aside from contributing towards the building itself being net zero, it was noted[4] that a 15-20kWh limit on space heat demand is one of the essential performance points in new homes from 2025 onwards as a necessary component of the achievement of the UK's legislated carbon budgets, as identified by the Climate Change Committee.

5. These metrics in RBC's proposed policy would need to be calculated using accurate calculation methods, as RBC had learned that the metrics used in Building Regulations had two shortfalls: Firstly the Building Regs metrics only cover a limited fraction of the building's actual total energy uses, and secondly their inaccuracy.

6. RBC provided justifications for its proposed approach via the following documents:

    a. Local Plan Viability Testing Report, December 2024 – Exam library item EV004. This identified sources of cost uplift data for the proposed policies, and for building regulations uplifts, and incorporated these into the assessment of viability.

    b. Local Plan Partial Update Background Paper, May 2025 – library item EV002 (which gave the rationale for the policies and outlined other policy options that had been considered why those were rejected in favour of the submitted policy)

    c. Response to Inspector's initial questions Part 1, July 2025 - library item EX002 (which clarified how EV004 had addressed carbon standards)

    d. Response to Inspector's initial questions Part 2, July 2025 - library item EX009

    e. Council Hearing Statements for Matter 3: Housing (library item EX046) and Matter 4: Cross-cutting policies (library item EX047).

7. The above key documents in turn drew on key facts from other parts of the document suite including Reading Climate Emergency Strategy 2020 (OP004), Reading Climate Change Adaptation Framework (2024) (OP006), the Borough's 2023-24 Annual Monitoring Report (PP008), the existing Sustainable Design & Construction SPD (PP012) and the Local Plan Review document 2023 (LP011).

[1] Including in Council statements submitted previously; see exam library items EX009, EX046 and EX0047.
[2] See section later in this report for why the current and incoming Building Regulations energy efficiency standards are insufficient for the UK's legislated carbon targets and the enablement of net zero carbon new buildings as per the definition used in RBC's proposed local plan policies CC2 and H5.
[3] The 'Space heating demand' metric takes into account how effective the building's fabric is at retaining heat (insulation, airtightness, glazing) and also the amount of 'passive' heat that the building will benefit from (heat gain from sunlight, heat that is a byproduct from appliance use, and even body heat).
[4] Including in the Council's response to initial questions part 2, July 2025; exam library item EX009.

8. However, in late 2025, RBC received a request from its appointed Planning Inspector that the Council draft some alternative policy option(s) wherein the energy efficiency requirement would be expressed as % reduction on the Building Regulations Target Emissions Rate (TER), along with further evidence. The alternative draft policies were provided in early January (examination library item EX056), while the current report represents the further evidence.

9. In light of the Inspector's MIQs, RBC understands that the Inspector's request relates to the Written Ministerial Statement December 2023 (WMS2023) which purports to require local plan energy efficiency standards to be expressed as % TER reduction. Still, as the request was in advance of the relevant hearings, RBC assumes that it does not imply a foregone conclusion that the original submitted policy cannot be found acceptable or must be replaced with the TER-based alternative, rather an intent to more deeply interrogate the rationale and merits of different options.

10. Therefore, while RBC's previous submissions EX009, EX046, EX047 (and to a briefer extent EV002) provided the Council's stance towards the WMS2023 and cited some evidence to support the originally proposed policies, the current report takes the opportunity to more clearly outline those arguments and evidence, as well as presenting the available evidence regarding the alternative TER-based polic(ies) and the relative merits of these in comparison to the original submitted policy.

Purpose of this document

5. In light of the context out lined above, the current report's purpose is to present the evidence of the relative merit of two possible policy approaches: an identified alternative TER-based policy, in comparison to those of the originally proposed policies CC2 and H5, as relevant to policy soundness.

6. RBC's previous submitted documents already provided commentary on rationale and key citations of evidence for the original proposed policy (EUI-based), but it is noted that these points may benefit from being presented in a more cohesive narrative all in one place for clarity, as well as for comparison to the new evidence associated with the alternative (TER-based) policy. This is especially cogent given that the two policy options share some foundational parts of their rationale. Within the overarching purpose of the current report, subcomponents are therefore to:

    a. Summarise/recap the evidence and rationale provided by RBC to date for its originally proposed policy – where necessary restating or representing this for clarity (for example in diagram form where this would aid communication) – and citing where these points appeared in the previously submitted RBC documents

    b. Where available and helpful, present any additional citations for points made in the rationale/evidence as above

    c. Present the available evidence (positive or negative) for the alternative TER-based policy, in terms that allow comparison of its relative merit compared to the originally proposed policy.

Scope of this document

7. The scope of this document is therefore to:

    a. Clearly recap/summarise the basis for having any kind of net zero carbon new buildings policy, including the local plan's legal duties and national policy expectations around climate change mitigation, and the legal powers available to the local plan to do this;

    b. Clearly recap/collate the available evidence on what standards would be necessary in a local plan new buildings policy in order to fulfil those legal and national policy expectations – including why improved energy efficiency must be a component of this, and the effectiveness of different standards and metrics for this purpose (including more clarity on the metrics TER and EUI);

    c. Recap (and where necessary, clarify) the status of the different conflicting pieces of national policy on this topic (the NPPF and WMS2023), and the Council's position on the relative weight that these should be given in determining the soundness of policies on buildings' energy and carbon performance;

    d. Clearly recap/summarise the available evidence on the feasibility, effectiveness, and cost uplift of the original proposed policy standard (EUI-based standard)

    e. Identify and summarise the available evidence/technical rationale for the alternative TER-based policy, in terms of feasibility and cost uplift.

    f. Clearly state RBC's conclusion on which policy option is now preferred.

8. As far as possible while avoiding excessive interruptions to narrative flow, this report will cite where specific points were already made in RBC's previously submitted report suite.

Glossary of terms and acronyms

BREDEM	Buildings Research Establishment Domestic Energy Model. A methodology to estimate the energy use and fuel needs of a home based on its characteristics. BREDEM is the basis for SAP, but BREDEM retains more flexibility by allowing the user to tailor some assumptions made in the calculations to better reflect the project.
Carbon, or carbon emissions	Short for 'carbon dioxide emissions' but can also include several other gases with a climate-changing effect, that are emitted to the atmosphere from human activities (see 'GHG', below).
Carbon budget	Amount of greenhouse gas that can be emitted by an individual, organisation or geographic area. Usually set to reflect a 'fair share' of the global amount that can be emitted before reaching a level of atmospheric carbon that causes severely harmful climate change.
Carbon intensity/ carbon factors	A measure of how much carbon was emitted to produce and distribute each kWh of grid energy at a certain point in time. For electricity, this has been falling as coal-fired power stations have been phased out over years. It also varies on an hourly basis: at times of high renewable energy generation, the carbon intensity is lower than at points where gas-fired electricity dominates the generation mix.
CIBSE	Chartered Institution of Building Services Engineers.
CIL	Community Infrastructure Levy. A charge that the local authority can levy on developers to provide necessary infrastructure.
Climate change adaptation	Adaptation to climate change – acting to make human or natural systems better prepared to continue functioning throughout the impacts of the climate change that is occurring, such as preparedness for heatwaves, droughts or heavier peak rainfall.
Climate change mitigation	Mitigation of climate change means acting to reduce the degree of impact that human activity has in changing the climate. This means reducing the total amount of greenhouse gas that is emitted or increasing the amount of that is sequestered.
CO_2	Carbon dioxide. Often shortened to 'carbon'.
CO_2e	Carbon dioxide equivalent. The sum of a mixture of gases, in terms of their climate-changing impact in a 100-year period expressed as the amount of CO_2 that would have the same effect. Often shortened to 'carbon'.
Embodied carbon	Carbon that was emitted during the production, transport and assembly of a building, infrastructure, vehicle or other product before the product is in use, and also emissions from maintenance/refurbishment across its use period and end of life demolition/disposal. As opposed to 'operational carbon' which is emitted due to energy use when operating the building / infrastructure / vehicle / other product.
EUI	Energy Use Intensity, a measure of how much energy a building uses per square metre of floor space. Expressed in kilowatt-hours per square metre of floor space per year.
FHS / FBS	Future Homes Standard / Future Buildings Standard. These are updated versions of Part L of Building Regulations, expected to be implemented from 2025.
GHG	Greenhouse gas (CO_2 and several other gases: methane, nitrogen dioxide, and fluorinated refrigerant gases). Often collectively referred to as 'carbon'; see above.
ICROA	International Carbon Reduction and Offset Alliance.
ICVCM	Integrity Council for Voluntary Carbon Markets.
IPCC	Intergovernmental Panel on Climate Change. An international entity set up via the United Nations, of which the UK is one of the 195 member states. The IPCC's role is to assess the consensus within the global scientific studies on climate change, including the extent and effects of climate change and future predictions about how much climate change will occur depending on how much greenhouse gas is emitted.
LETI	Low Energy Transformation Initiative. A coalition of built environment professionals working to establish and achieve the energy performance needed for net zero.
LPA	Local Planning Authority.
m^2	Square metre. In this context, m^2 refers to building floor space in most cases, but sometimes refers to building footprint area.
MIQ(s)	Matters, Issues and Questions. A set of queries raised by an appointed Planning Inspector to interrogate specific topics within a proposed local plan, as part of the local plan examination to determine whether the plan can be found sound and therefore adopted. MIQs are dealt with in writing in advance of examination hearings, but also guide the focus of the hearings themselves.
MVHR	Mechanical Ventilation with Heat Recovery

NPPF	National Planning Policy Framework. A central government document laying out how the planning system should function, including plan-making and decisions.
Operational carbon	Greenhouse gas emissions that occur due to operation of the building / infrastructure / vehicle / other product. Primarily associated with energy use.
Part L	Building regulations section that sets basic legal requirements regarding buildings' energy and CO_2 emissions, for a certain scope of buildings' energy use.
Performance gap	The difference between the amount of energy a building is predicted to use during design, versus the actual amount of energy it uses. The gap is due to poor prediction methodologies, errors in construction, and unexpected building user behaviour.
PINS	The Planning Inspectorate. The national body that, among other duties, examines proposed local plans to ensure that they are 'sound' before adoption.
PV	Photovoltaics: solar panels that generate electricity.
PHPP	Passivhaus Planning Package: A tool to accurately predict a building's energy use. It is used to design buildings that seek Passivhaus certification, but can equally be used to improve any building design process even without pursuing certification.
Regulated energy or carbon	Carbon emissions associated with energy uses that are 'regulated' by Building Regulations Part L. This covers permanent energy uses in the building, (space heating, space cooling hot water, fixed lighting, ventilation, fans, and pumps).
RIBA	Royal Institute of British Architects.
SAP	Standard Assessment Procedure – the national calculation method for residential buildings' energy and carbon, used to satisfy building regulations Part L. SAP is based on the BREDEM model, but with fixed assumptions and thus less flexibility.
SAP Appendix L	An appendix to the SAP (explained above) which estimates unregulated energy use, whereas the main body of SAP estimates only regulated energy use. Appendix L was created when it was anticipated that national regulations would require fully zero carbon homes from 2016, which in fact never was enacted. As Appendix L has not since been updated, it overestimates unregulated energy demand because it was based on older data about the energy efficiency of household appliances.
SBEM	Simplified Buildings Energy Model – the national calculation method for non-residential buildings' energy and carbon, used to satisfy building regulations Part L.
Section 106	A section of the Town & Country Planning Act 1990. Section 106 of that Act enables the Local Planning Authority to require contributions from developers towards projects that are necessary to mitigate the impact of that development. In 'net zero carbon' policy this has often been used to raise carbon offset funds where a new development is technically unable to reach net zero on site.
Sequestration	Removal and storage of greenhouse gases from the atmosphere, to prevent their harmful climate-changing role. Currently only achieved at scale by trees/plants/soil.
SHD or Space Heat Demand or Space Heating Demand	A measure of the amount of energy needed to heat a building to a comfortable temperature, as a result of the building's design and occupancy. Expressed in in kilowatt-hours per square metre of floor space per year.
TER	Target Emission Rate – a limit set by Part L of building regulations on CO_2 emissions per square metre of floor space, from regulated energy use in the building.
TPER	Target Primary Energy Rate – limit set by Part L of building regulations on 'primary energy' use per square metre of floor space. Unlike metered energy, 'primary energy' takes into account energy lost to inefficiencies during power generation and distribution.
TFEE	Target Fabric Energy Efficiency – limit on space heat energy demand per square metre of floor space, set by Part L of building regulations. Based only on fabric; not affected by building services like heating system, lighting, ventilation.
TM54 (or CIBSE TM54)	A method to accurately calculate buildings' energy use. Devised by CIBSE (see entry for CIBSE above).
UKNZCBS	UK Net Zero Carbon Buildings Standard. A voluntary standard devised by a coalition of all the major standard-setting organisations in the UK buildings industry. It sets targets for operational energy use, space heat demand, renewable energy, and embodied carbon, among other topics. Its targets are differentiated for new build, existing building retrofit, building type, and year. Its name reflects that it would make buildings' energy performance compatible with the UK's carbon reduction trajectory to net zero 2050, but please note that it does not necessarily make a building net zero carbon in itself simply by meeting the targets that are set within the standard.

Unregulated energy or carbon	Carbon associated with energy use in a building or development but which is not covered by Building Regulations Part L. Includes plug-in appliances, lifts, escalators, external lighting, and any other use not covered by Part L.
Up-front embodied carbon	(First, see 'embodied carbon') All of the embodied carbon emissions that occur up to the point of completion of a building, piece of infrastructure, or other product.
Whole-life carbon	The total greenhouse gas emissions that are caused by the creation of a new building (from material extraction to completion of the building), the entire period of its existence (including energy use, water use, and maintenance/refurbishment) and its eventual demolition. 'Whole-life embodied carbon' refers to all of the above excluding the emissions associated with operational energy use and water use.
WMS (for example, WMS2023)	Written Ministerial Statement. A statement of national policy made by a minister in writing. These can be part of the body of national policy with which Local Plan-making is expected to be broadly consistent. Where a number is attached, e.g. "WMS2023", this relates to the year in which a particular WMS was made. WMS2023, in this report, specifically refers to the Written Ministerial Statement of 13th December 2023.
ZEV mandate	Zero Emissions Vehicle mandate. A piece of national legal regulation that requires a certain proportion of new vehicles sold to have zero tailpipe emissions by certain dates (reaching 100% in 2035).

Why do we need a net zero carbon buildings policy, what powers does the local plan have and what evidence is there for what an effective policy would entail?

Planning & Compulsory Purchase Act 2004 (P&CPA)

12. Section 19 of the Planning & Compulsory Purchase Act 2004 makes the local plan legally obliged to include policies that mitigate climate change[5]. As a duty established in legislation, this cannot be overruled by national policy that does not hold the status of legislation.

Levelling Up & Regeneration Act 2023 (LU&RA)

13. This Act extends same obligation to other types of planning document including spatial development strategies, supplementary plans, and minerals/waste plans. This does not change, but underscores, the importance of the local plan's existing climate mitigation duty.

What degree of climate mitigation is justifiable in local plans – especially in buildings?

14. While the Planning and Compulsory Purchase Act 2004 and Levelling Up & Regeneration Act 2023 impose the legal duty for the local plan to mitigate climate change, neither establish the *degree* of mitigation that the local plan should deliver. We therefore refer to the NPPF below and dig into what the NPPF's instructions would mean in practice at new buildings.

Extent of mitigation stipulated in the NPPF

15. The NPPF confirms that the planning system should pursue "radical reductions" in carbon emissions[6]. More specifically, it instructs the local plan to "take a proactive approach to mitigating climate change … in line with the objectives and provisions of the Climate Change Act 2008".
    a. In the NPPF glossary, climate change mitigation is distinguished from climate change adaptation, where 'mitigation' is reduction in the impact of human activity on climate systems – by reducing emissions (whereas 'adaptation' is adjusting to the impacts of climate change). Proactive climate change mitigation therefore means actively reducing the total absolute amount of emissions that occur today, not simply slightly reducing the *additional* emissions that new development adds to that total.
    b. Therefore, the local plan's duty is not simply to minimise the amount of *new* emissions that new development adds to the borough, but rather to ensure that its local plan reduces the overall amount of carbon emissions of the borough.

16. As noted above, the objectives and provisions of the Climate Change Act 2008 include not only the net zero carbon goal but also the five-yearly legislated carbon budgets and the role of the Climate Change Committee in advising on what is feasible and necessary to meet those legislated carbon reduction targets. The NPPF is therefore instructing the local plan to include policies that proactively pursue the changes necessary to ensure the legislated carbon budgets are not exceeded and net zero carbon goal are met.
    a. Therefore **where a local plan policy is designed to deliver the changes necessary for those national legislated carbon budgets, especially where those changes are not being delivered effectively enough or fast enough by national regulation and industry standard practice, that policy would be justified by virtue of that NPPF instruction**, so long as it is a feasible standard and is supported by evidence of viability.
    b. We therefore next outline the extent of changes that have been identified necessary for the achievement of the UK's carbon budgets, with regards to the sectors that the local plan can influence and specifically the new buildings sector which is the focus of the carbon- and energy- standards within RBC's proposed policies H5 and C22.

Sectoral performance needed for mitigation in line with the Climate Change Act 2008

17. As noted above, the Climate Change Committee (CCC) is the body that devises the UK's carbon budgets before they are passed into law, and also identifies means by which those carbon budgets and net zero 2050 goal are most likely to be achieved, and reports on the UK's annual progress (both on the emissions limit, and on the changes needed in each sector).

18. The carbon budgets that have been devised involve a steep drop in the amount of emissions that the UK can emit in each five-year period, as shown in Figure 1 below. **It is important to note that these are absolute limits, not relative reductions on any baseline. This is relevant when considering possible standards within local policy** – as the WMS2023 prefers local standards to be expressed in relative terms, whereas Reading's proposed policy limits on EUI and SHD would be absolute and thus better aligned towards the ultimate goal.

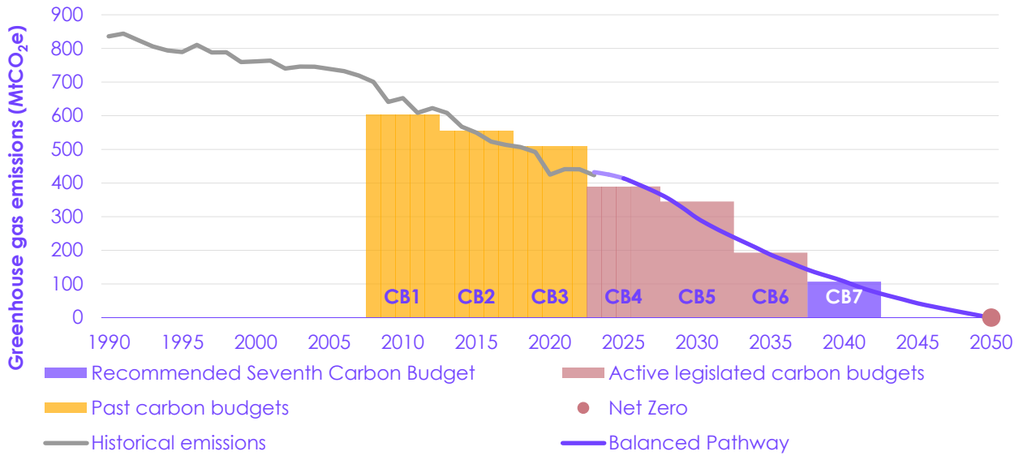

Figure 1: Committee on Climate Change (2025). The Seventh Carbon Budget.

[5] As noted in RBC's previously submitted documents including Hearing Statement for Matter 3 (library item EX046).

[6] As noted in RBC's previously submitted exam documents EV002 paragraph 4.1.0, 4.18.1; item EX046 paragraph 3.14.7, 3.14.12, 3.14.17, 3.14.19 and 3.14.2; and item EX047 paragraphs 4.2.3, 4.2.5, 4.3.5, 4.3.6.

19. The CCC identifies pathways towards achieving those legislated targets, of which the **most reasonable is termed the 'Balanced Pathway'**. That represents a combination of changes to all sectors in the UK between now and 2050. The Balanced Pathway sectoral trajectory shows that the **sectors of buildings, energy and transport – i.e. the sectors that the local plan can influence – will need to reach near-zero sectoral emissions at source by the mid-to-late 2040s** (see Figure 2 and Figure 3). This is because the vast majority of the UK's limited capacity for carbon removals via afforestation and carbon capture technology will be needed to balance the emissions of sectors that are not able to reach zero emissions (agriculture; aviation; waste; meaning effectively none of the carbon removals capacity is available for buildings). This is even including the optimistic assumption that carbon removal technology will be developed in future and deployed at scale (Figure 2 line 'Engineered removals'; and Figure 3 bars labelled 'including carbon capture'). If this technology does not emerge (or is late), then the UK will need even steeper reductions in the sectors where reductions are possible (including buildings, energy and transport).

20. Because previous carbon budgets were achieved largely through decarbonisation of energy supply, the CCC analysis shows that in the plan period (to 2041) much more of the reduction will need to come from buildings and transport (see column graph within Figure 2).

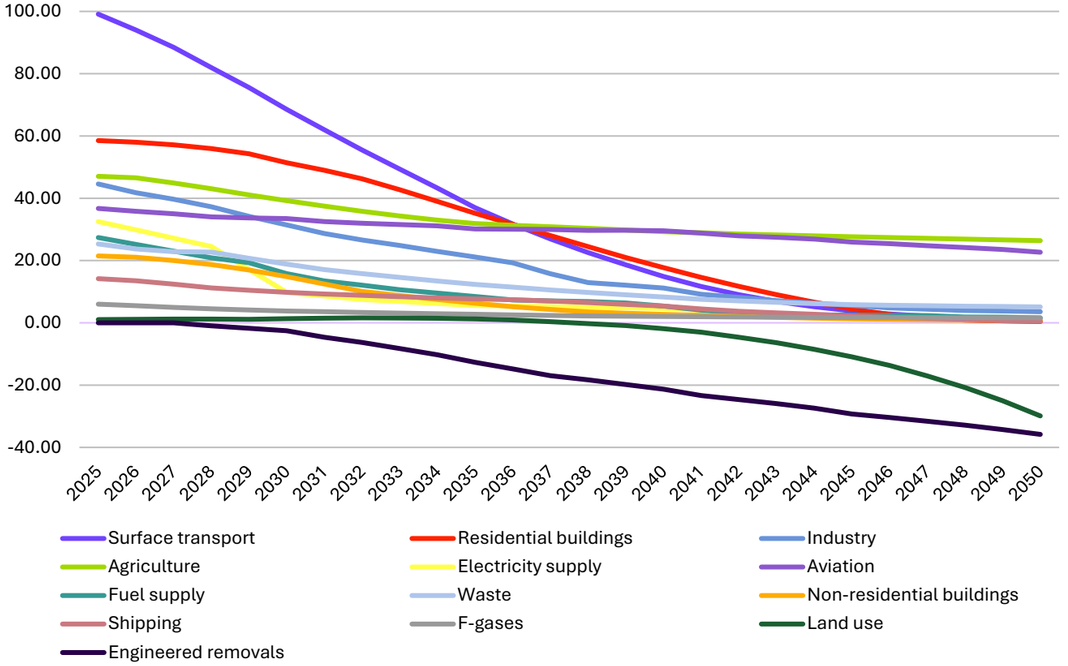

Figure 2: Sectoral emissions in the Balanced Pathway (to meeting the UK's legislated carbon budgets and legislated net zero 2050 goal). Adapted from: Climate Change Committee, The Seventh Carbon Budget (2025), Charts & data download tab 3.6.

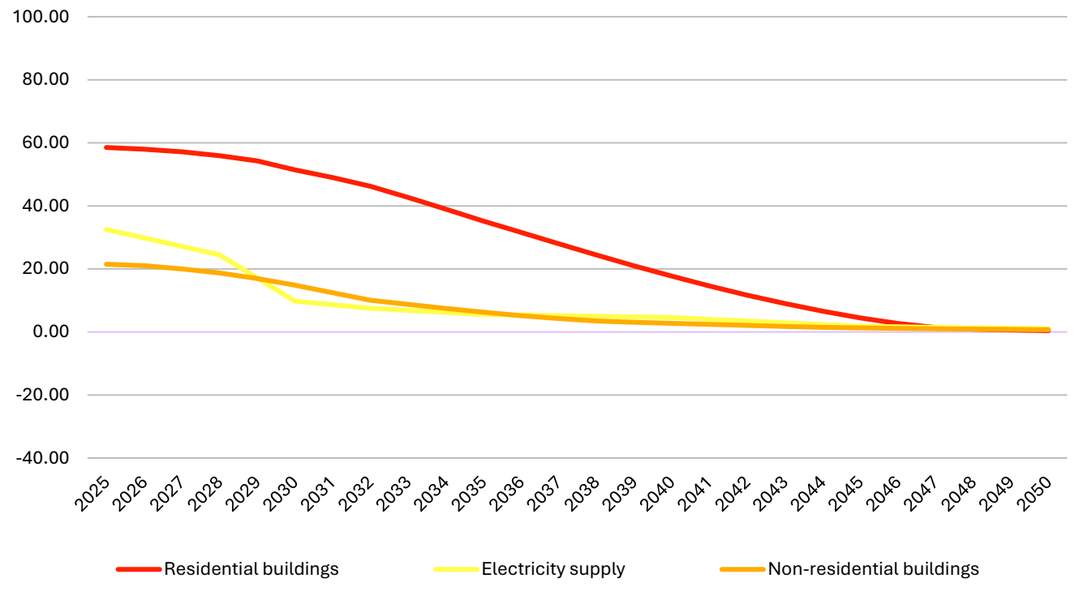

Figure 3: Extract of Figure 2 to more clearly show just the sectors relevant to local plan policy on building energy performance.

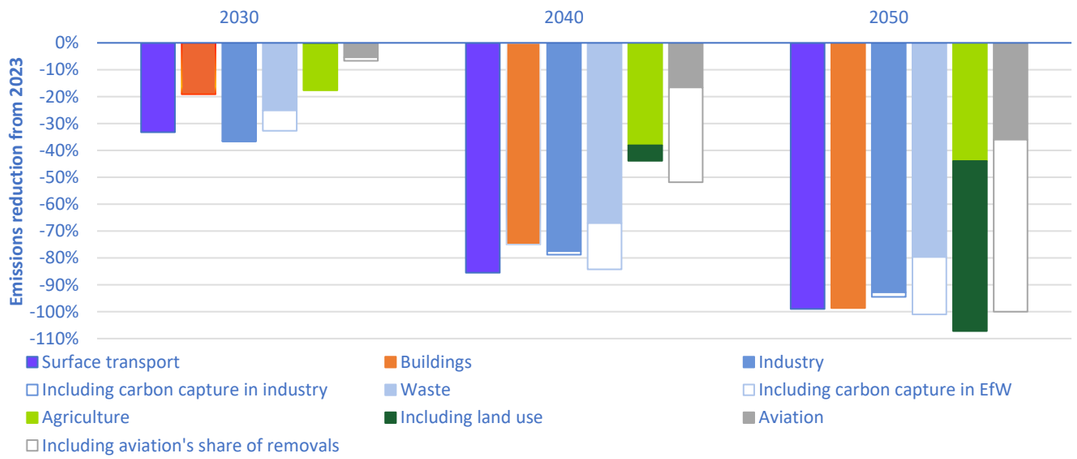

Figure 4: Chart illustrating the required emissions trajectories of each sector in order to meet national legally binding carbon budgets. Note that the 'carbon capture' and 'removal' bars only appear in industry, aviation and waste, meaning that other sectors, including buildings, are NOT allocated any of the UK's anticipated capacity for carbon removal technology. From: Climate Change Committee (2025), *The Seventh Carbon Budget – Charts and data*[ii], chart 3.10.

21. The CCC also identifies the **specific changes in practice and performance that would be needed for each sector to follow its Balanced Pathway trajectory and thus deliver the UK-wide legislated carbon goals**. We here summarise a few of these changes most relevant to the sphere of influence of the local plan (note that all of these are taken from the Sixth Carbon Budget[iii] unless signified by a different endnote reference):

    a. **New homes built from 2025 onwards to achieve**[iv]:
        - No more than 15-20kWh/m^2/year space heating demand[7]
            - [Note: Energy modelling[v] shows this would equate to a 69-82% reduction on the space heating demand of a building that meets Part L 2021, or a 59-78% reduction on that of the Future Homes Standard, even when assuming the indicative FHS fabric specification released by government in 2021 as opposed to the much weaker fabric in the two options in the most recent FHS consultation[vi]. This reveals the major gap between Building Regulations and the legislated net zero goals.]
        - No connection to the gas grid,
        - Have low-carbon heating system such as a heat pump,
        - Ideally be net zero carbon in operation[vii],
        - Reduced whole-life carbon impact including embodied and sequestered carbon.

    b. **Increased energy efficiency, material efficiency and substitution**, to achieve low carbon manufacturing and construction – reducing new builds' embodied carbon. The manufacturing & construction sector as a whole needs to hit a milestone of 70% emissions reduction by 2035 (within the local plan period) from a 2018 baseline[viii].

    c. **Dramatically increase the rollout of electrical heat/heat pumps to existing buildings**, so that 100% of heat system sales are low carbon from 2033.

    d. **Transport**[ix]**: Decreasing car travel** (6% reduction in car kilometres by 2030 and 17% by 2050) alongside increased acceleration of electric vehicle uptake, further rollout of rail electrification and linear increase in rail passengers and rail freight.

    e. **Increase in renewable energy generation capacity to reach 60% of total grid electricity generation by 2030 and 80% by 2050**, at the same time as meeting a doubling in the amount of electricity demand (occurring due to the aforementioned necessary switch from fossil fuel to electricity in existing buildings, transport, and many industrial processes), and phasing out unabated gas power stations by 2035.

    f. Forest cover to reach 18% by 2050[x], whereas the 2020 baseline was 13%.

22. It is vital to understand that for the 'balanced pathway' to be realised, **all of the above changes must be achieved in combination, not either/or**. This is because there are many interdependencies, and each sector faces such a large challenge in addressing its own emissions that **no sector can be reasonably expected to have reliable capacity to pick up slack from others that underperform**.

23. **Local plan policy that would effectively deliver any of these changes is thus justified** (in being a proactive approach to climate mitigation in line with the Climate Change Act, as per the NPPF mandate), so long as these policies are demonstrated viable and feasible. The **justification to go further than national actions is further strengthened by the following**:

    a. **Where the Climate Change Committee analysis shows**[xi] **that national progress has been insufficient to date**, which includes but is not limited to:
        i. Too slow rollout of heat pumps to homes and buildings, instead of gas (leaving even less space for new development emissions within the overall buildings sector's reasonable share of the national carbon budget)
        ii. Failure to address embodied carbon/material efficiency in building regulations
        iii. Too slow expansion of solar energy generation capacity

    b. **Where the Climate Change Committee analysis finds that nationally stated future policies are at risk of not delivering that performance**, including but not limited to:
        i. Need to reduce the relative cost of electricity compared to gas.
        ii. Government's cancellation of its prior commitment to phase-out gas boilers by 2035.
        iii. Unclear long-term incentives for heat pump rollout and building energy efficiency.
        iv. Delay in introducing and enforcing the Future Homes Standard. This risk clearly has risen since the CCC identified it, given that the FHS was meant to enter force in 2025 and still has not been published as of late January 2026.

    c. Where other evidence shows that current or future national policy/regulation (in particular the FHS space heat demand; see paragraph 50) will not deliver the performance needed in buildings: RBC's previous submissions[8] outlined such concerns at a general level, and the current report explores it in more detail, including the likely building standard that would arise if local policy adheres strictly to the energy efficiency metric stipulated by the Written Ministerial Statement 2023 national policy.

24. It is also relevant to note that, while developers' viability is a key consideration in local plans, **any new-builds that do not meet the necessary standards identified above will need to be retrofitted in coming years** in order to not compromise the legislated carbon goals. This cost would therefore not truly be 'saved' but merely postponed and amplified, as CCC evidence has shown that energy r**etrofitting costs three-to-five times as much as it costs to meet the same standards in new builds**[xii]. This larger cost would then be borne by the homeowner, or the taxpayer through national funding schemes (like the national Warm Homes Plan).

[7] Note this performance point was cited in RBC document EX009 paragraph 4.2.3, referencing Climate Change Committee (2019) https://www.theccc.org.uk/publication/uk-housing-fit-for-the-future/

[8] Including examination library items EX046 (paragraph 3.14.10 and 4.14.10).

Reading-specific context: Current emissions & resulting pathway to local net zero 2030 goal

25. RBC's previous document submissions[9] have explained that:
    a. The Council is committed to the established goal of making the entire Borough net zero by 2030, a goal not held unilaterally by the Council but shared in collaboration with local climate experts, communities and businesses, via Reading Climate Change Partnership, which co-authored Reading Climate Emergency Strategy 2020-2025[10].
    b. Reading Climate Emergency Strategy (OP004) established that as of 2018, 40% of Reading's emissions were from homes while a further 36% were from industry and commercial activities. This demonstrated a strong local need to put priority focus on buildings, especially homes, when devising actions to reduce emissions – including setting effective standards in local plan policy. In order to meet the established goal, it identified the urgent need to reduce buildings' energy demand via both existing building retrofit and also by "ensur[ing] that new property is constructed to net zero standards".

26. As OP004's local emissions data were from 2018, we here update the figures with the latest available data (Figure 5 & Figure 6). These are part a nationally published dataset by DESNZ[xiii]. **Residential buildings continue to dominate the area's emissions**, while commercial buildings also contribute significantly. This illustrates the local need for new-builds to be net zero so as not to worsen the challenge of reducing buildings' emissions to zero, as has above been shown necessary for Climate Change Act goals and Reading's 2030 goal. It also shows that sequestration in Reading is tiny, a result of being an urban area, thus very little woodland.

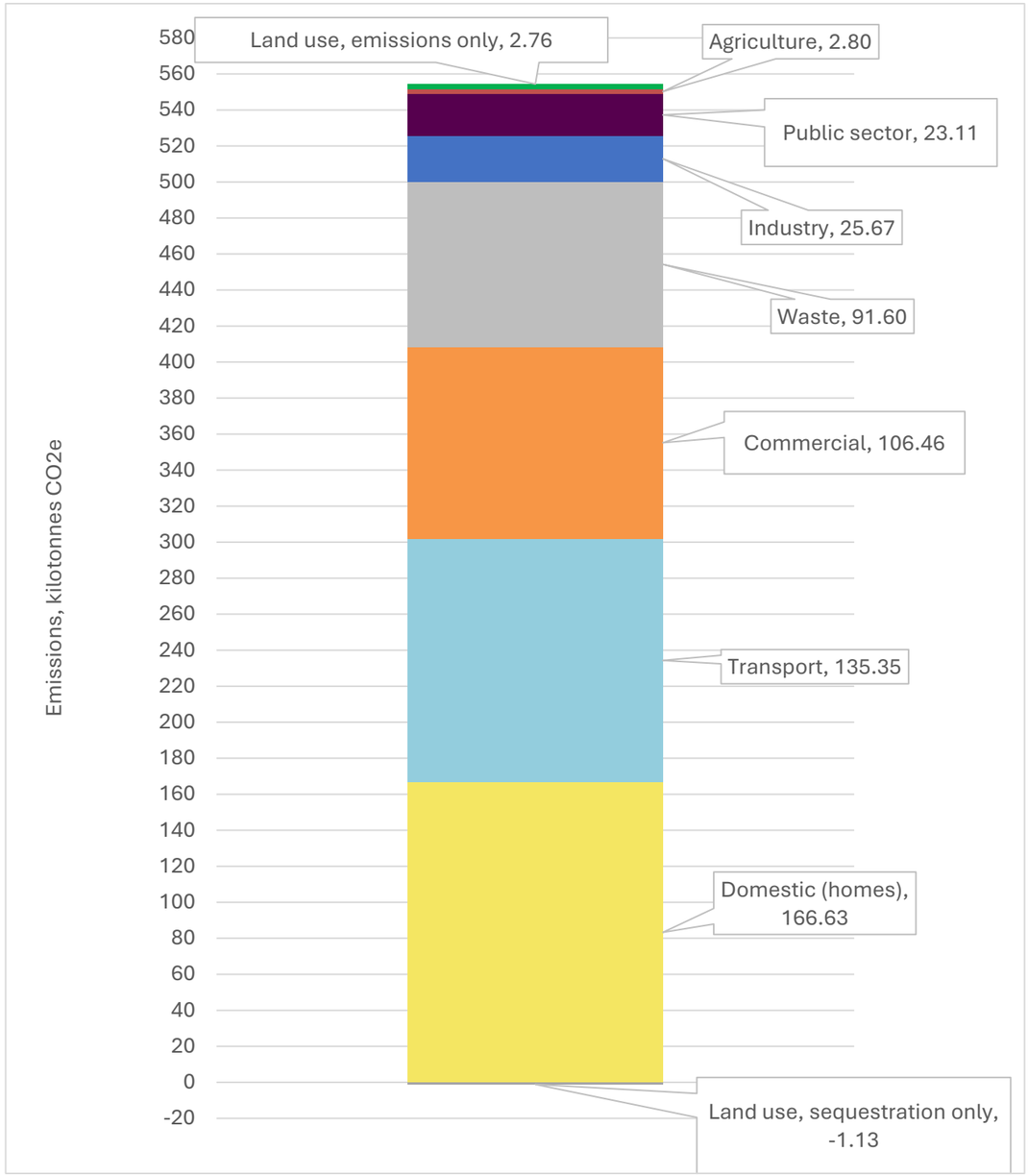

Figure 5: Sectoral emissions of greenhouse gas within Reading Borough area, in kilotonnes CO2e. Source: DESNZ (2025); latest available data year: 2023.

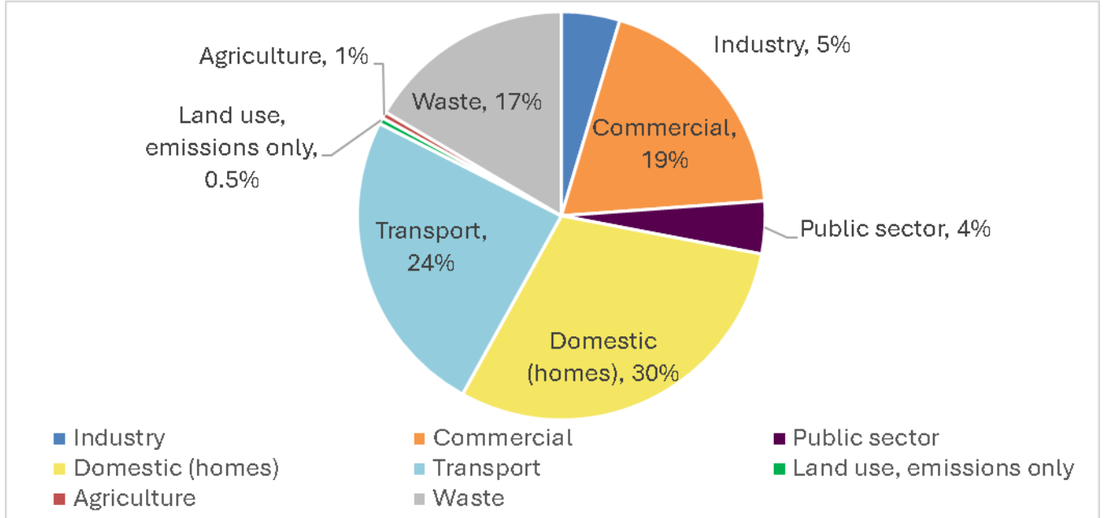

Figure 6: Sectoral emissions of greenhouse gas, as percentage of overall greenhouse gas emissions within Reading Borough area. Source: DESNZ (2025); latest available data year: 2023.

[9] Examination library items LP001, EV002, EX009, EX046, EX047, and OP004.

[10] Examination library item OP004.

27. Reading's Climate Emergency Strategy (OP004, as above) had observed that "If the Government policy changes referred to above are not forthcoming within the lifetime of this strategy (2020-25), then the gains required to reach net zero in the latter part of the decade will obviously need to be greater" and that "by calculating what the average annual emissions reduction for Reading would need to be to achieve net zero by 2030, we can give ourselves a benchmark against which progress towards that longer-term goal can be judged." We therefore present the average annual emissions reduction that would have been necessary from the date of that Strategy's baseline data year (2018) through to the established local goal of net zero 2030, alongside the actual emissions up to the latest available data (form the same DESNZ 2025 dataset as Figure 3 and Figure 4 above):

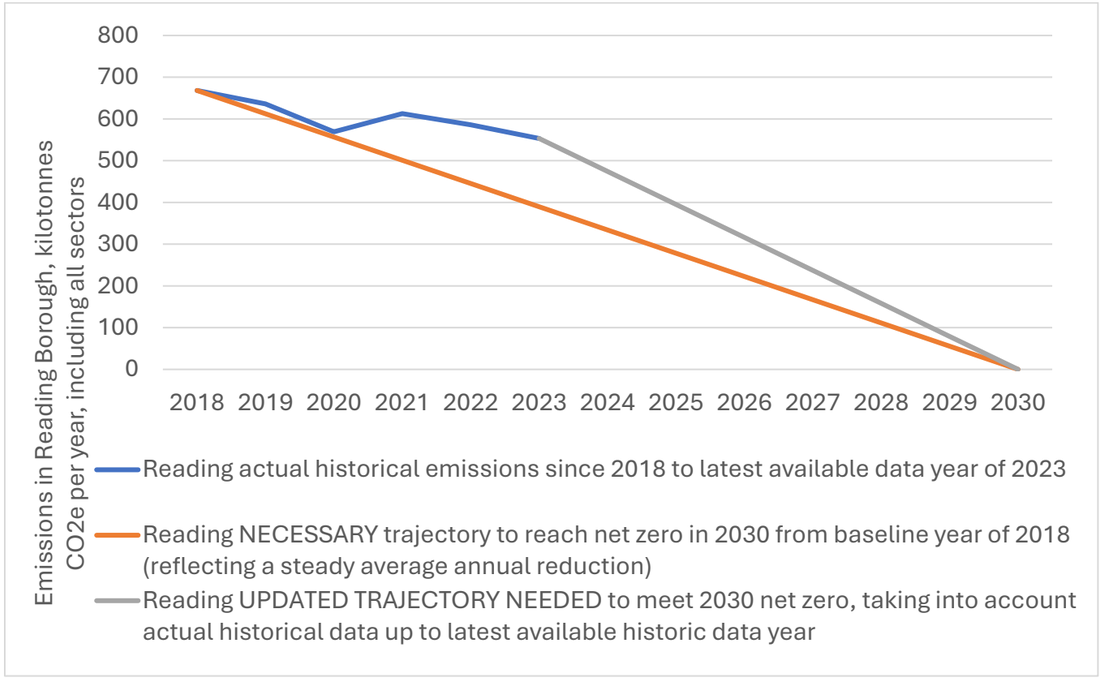

Figure 7: Illustration of how Reading's total annual emissions would need to fall in order to meet Reading's established local net zero carbon goal of 2030, in light of most recent available data on actual local emissions (2023 data year; source: DESNZ 2025) compared to the trajectory that would have been acceptable if emissions had fallen steadily starting from Reading Climate Emergency Strategy's baseline year of 2018.

28. This shows that Reading's emissions have not fallen fast enough to stay on track for the locally established target of net zero 2030, from the baseline of the latest available data in the year when that target was set (baseline year 2018 as used in analysis given in Reading Climate Emergency Strategy, examination library OP004 as noted above).

29. As a result, if Reading as a whole is to have any chance of meeting the 2030 target that is shared between the Borough and local civil society, emissions reductions will need to fall even more steeply between today and 2030.

30. The average year-on-year reduction in 2018-2023 would have needed to be approximately 10% in order to stay on track for Reading's net zero goal of 2030. In fact, the average year-on-year reduction achieved in that period was only 3.52%. The only year in which a sufficient reduction was achieved was in 2020, as a result of the global pandemic (an 11% drop), but emissions rebounded in 2021 by almost the amount that they had previously fallen. Within that total:

    a. The emissions of the domestic buildings sector fell by only an average of 5% per year, while in the commercial sector this figure was 6%. This is despite the introduction of new national building regulations (Part L 2021) which introduced some improvements to new buildings' fabric and also the introduction of solar panels as part of the regulatory standard new build.

    b. Meanwhile, the sector achieving the highest year-on-year average reduction was the public sector at 11%.

31. Because emissions did not fall fast enough in 2018-2023 as noted above, the fall from 2023 to Reading's goal of net zero 2030 would now need to be an annual average year-on-year reduction of 37%. As the domestic buildings is the largest-emitting sector in Reading today (30% of Reading's total emissions today as previously shown in Figure 3) and has only been achieving a 5% year-on-year drop in the period since Reading's Climate Emergency Strategy baseline of 2018 (which is mostly thanks to the decarbonisation of the electrical grid), this demonstrates that even more drastic action needs to be taken in the energy and carbon performance of buildings in Reading than has been taken in the past few years.

    a. Consequently, **this shows it will be vital that new homes must not add anything to the domestic sector's emissions**, given what a huge challenge lies ahead in the speed and scale of retrofit needed to address the emissions of existing homes, which dominate Reading's emissions profile today – and given the aforementioned national (CCC) data showing that retrofit to date across the UK has been too slow and that there are significant risks to the future delivery of retrofit.

    b. Similarly, as the commercial sector represents 19% of Reading's emissions today (and this sector in the DESNZ data essentially represents commercial buildings), it will be vital to take a similar approach to building retrofit and net zero new building standards in the non-residential sector.

How do national regulatory standards attempt to shape buildings' energy and carbon performance?

Scope, targets and mechanisms of Building Regs Part L (current and incoming)

32. Building Regulations Part L sets the minimum national standard of operational energy and carbon performance of new buildings. **It only covers "regulated energy uses": space heating, hot water, fixed lighting, fans, pumps and ventilation**. It does not address other energy uses in the building, for example appliances, plug-in lighting and any plug-in heating. These **unregulated energy uses can be 50% of a building's total energy use**[xiv], or between 23%-54% of a building's operational carbon[xv]. [11]

33. The current version of Part L in place is Part L 2021, which came into force in June 2022. Prior to this, Part L 2013 was in place from 2013-2022. The next update due to Part L is the Future Homes Standard (FHS) and Future Buildings Standard (FBS, non-residential) which Government had indicated will be published in 2025 but still unavailable as of late January 2026 and will have a further transition period of up to two years before being fully enforced.

34. **All calculations for Part L are done using either a methodology named SAP (for homes) or SBEM (for non-residential buildings).** Both of these are periodically updated. The current version of SAP is SAP10.2. When the Future Homes Standard comes into force, **SAP will be replaced with a new model, HEM (the Home Energy Model)** after a short transition period during which HEM will be used alongside SAP. The final version of HEM is not yet available.

35. **Part L sets the following targets, all of which completely ignore unregulated energy uses**:

    a. TER, Target Emission Rate: A carbon emissions metric (not an energy efficiency metric, as it takes into account onsite renewable energy and fuel choice as well as efficiency). All building types (residential and non-residential) are subject to a TER.

    b. TPER, Target Primary Energy Rate: A measure of regulated energy consumption of the building, taking into account the 'raw' energy used in generating and transmitting the energy (including the losses in converting one type of energy to another – e.g. burning gas in power stations to produce electricity – and the losses that occur in transmission of energy via the grid before it reaches the building). TPER also applies to all building types.

    c. TFEE, Target Fabric Energy Efficiency: A measure of energy demand for heating & cooling, based only on the building's fabric, irrespective of the heating system. Residential only.

36. Part L sets these targets by modelling an imaginary ('notional') building of the same shape and size as the proposed building, with a certain standard set of criteria applied to key building elements (such as the amount of insulation, airtightness, the type of heating system, and the amount of solar panels). The modelled performance of the 'notional building' defines the limits that the actual proposed building must not exceed. This creates consistency issues:

    a. It means **Part L's targets vary significantly from building to building**, as building shape and size strongly affect how much heat is lost through external walls, roofs and joins. Therefore, **Part L does not incentivise inherently thermally efficient building shapes**.

    b. Also, in *non-residential*, Part L does not specify a heating system type. The Part L non-residential 'notional building' has the same type of heating as the proposed building. Furthermore, the non-residential notional building solar panel amount disappears if there is a heat pump. **Thus Part L targets vary even more in non-residential**.

37. Additionally, the SAP or SBEM calculation methods can provide other estimated data points for a building, such as space heating demand or total energy use (for example, both of those were estimated using SAP 10.2 in the 2023 modelling by the Future Homes Hub[xvi]). However, these other data points are not compliance metrics that Part L requires.

What will the Future Homes Standard change within part L?

38. The FHS will update the standards in the Part L 'notional' building – including a heat pump instead of gas. Government's latest consultation on the FHS was in December 2023 – March 2024[xvii]. As a consultation only, with multiple options, it presumably does not yet constitute a formal statement of national policy with which a local plan would need to be consistent as per the NPPF tests of soundness. No response has been released as of 26th January 2026.

39. The FHS is intended to ensure new homes are:
    - "Zero-carbon ready" – although this simply means that they use only electricity and therefore will only reach net zero when the electricity grid is fully decarbonised, *and*
    - Built without fossil fuel heating systems.

40. Government has also claimed that the FHS will make new homes compatible with the UK's net zero 2050 target without future retrofit, but this is not realistic in light of the evidence explored later in this report (especially around fabric and calculation method).

41. While the final FHS is not yet released, the 2023-24 consultation and 2025 national comms[xviii] confirm that it will do all of the following:
    a. Remove gas boilers as default; encourage heat pumps and electric heating.
    b. Possibly very slightly raise minimum fabric standards (though far short of the best practice Passivhaus or LETI -aligned levels, thus far short of what is needed for the UK's carbon budgets as identified by the Climate Change Committee previously noted).
    c. Include some degree of solar panels, although it is not yet known whether this will be more or less than the amount that is already in today's Regulations (Part L 2021).
    d. Have the same target metrics that Part L does today (TER, TPER & TFEE) but calculated with the new calculation model (HEM) instead of today's model (SAP).

[11] This exclusion of unregulated energy, and the fact that it can be a significant proportion of buildings' overall energy use, was noted in Reading's submitted document EX009 paragraphs 2.4 – 2.4.2.(July 2025).

About the FHS transition from SAP calculation to Home Energy Model calculation

42. Government has announced a future transition from the SAP calculation method to a new tool, the Home Energy Model[xix] (HEM), as the compliance method for the new Future Homes Standard. Whereas SAP relies on monthly average data, HEM will use an hourly-based dynamic model, allowing more realistic simulations. In theory, HEM is also being designed to more accurately capture heat pump dynamics, solar generation, and occupant behaviour.

43. Consultation outcomes have indicated that HEM will continue to express *compliance targets* in terms of TER, TFEE, TPER. However, initial documentation (including the 2023-2024 HEM consultation document[xx]) indicates that HEM will also be capable of covering some unregulated energy uses as well as the regulated ones, in which case it might be able to generate performance-based metrics such as kWh/m^2/year like in Reading's submitted policies. However, as only an early-stage consultation version of HEM has been released, it is yet to be seen whether HEM will avoid the inaccuracies of SAP (below).

44. At present, the only option for TER-based policies is to utilise the SAP 10.2 software, as HEM is not yet available in a usable form. However, Government has also announced that there will be a further SAP update (SAP 10.3) and that both SAP 10.3 and HEM will be used to calculate compliance with the FHS for a limited but unspecified period after the FHS is introduced.

Are Part L 2021 or the Future Homes Standard suitable to sufficiently mitigate climate change – and if not, what are the best alternatives standards or metrics?

45. **Unfortunately, even for the regulated energy uses, SAP and SBEM are not accurate predictors of a building's actual performance**. Buildings have been repeatedly shown[xxi, xxii, xxiii] to use far more energy than the SAP or SBEM methods predicted. This difference between SAP/SBEM predictions and *actual* performance is termed the 'Energy Performance Gap'. Many developers are unaware of this inaccuracy, nor is it common knowledge for home renters or buyers, who rely on the EPC certificate which is based on the SAP calculation. Figures 7 and 8 illustrate the huge variation in actual energy use within each EPC band, while Figure 9 is a case study of an office whose actual energy use was triple the Part L estimate. in SAP/SBEM.

46. In particular, space heating demand is dramatically underestimated by SAP[xxiv,xxv]. This is a real problem for climate mitigation given the aforementioned importance of the 15-20 kWh/m²/year space heat demand within the UK's route to hit its legislated carbon goals.

47. Both Part L 2021 and the FHS compliance targets (TER, TFEE and TPER; see glossary) ignore unregulated energy use, which (as previously noted) can form up to 50% of the total energy use of a home, and the relative proportion of unregulated energy becomes ever larger as the thermal performance and other regulated systems efficiency is improved. **This exclusion of unregulated energy means that a TER target cannot make a building truly net zero carbon.**

48. While unregulated energy is not part of Part L targets, the SAP tool does also contain 'Appendix L' that estimates unregulated energy use for insight only, but this overestimates unregulated energy use[xxvi] as it is based on outdated data on appliances' energy use from years ago, not reflecting today's much more efficient typical appliances. SAP's *over*estimation of unregulated energy still does not balance out its *under*estimation of space heat demand and total energy.

49. These inaccuracies in SAP's energy performance predictions go directly against the Climate Change Committee's strong message[xxvii] of several years that, to be compatible with the UK's legislated carbon goals, building performance "metrics and certification [must be reformed] to reflect real-world performance … committing developers to the standards they advertise".

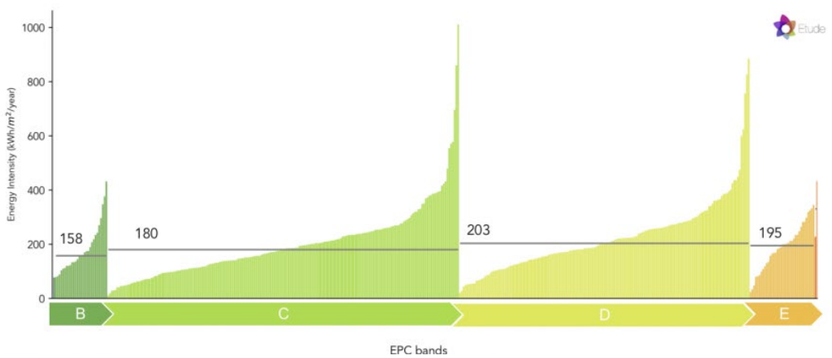

Figure 8: Energy intensity of 410 homes across an English local authority, in EPC bands B, C, D & E. Each vertical bar represents a single dwelling Credit: Etude, via Better Buildings Partnership.

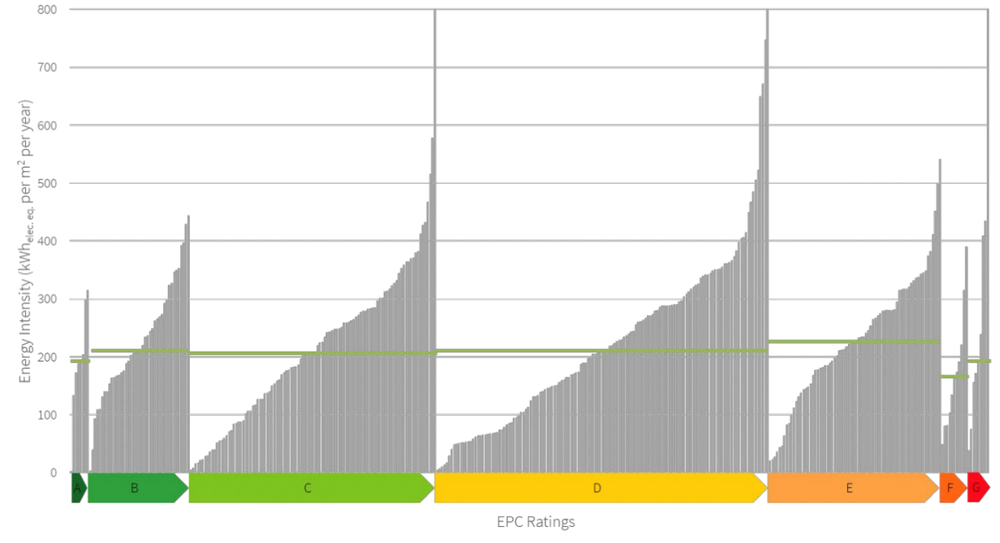

Figure 9: Energy intensity of office buildings, by EPC rating. Each grey bar represents a single office building's energy intensity over the course of a year (credit: Better Buildings Partnership).

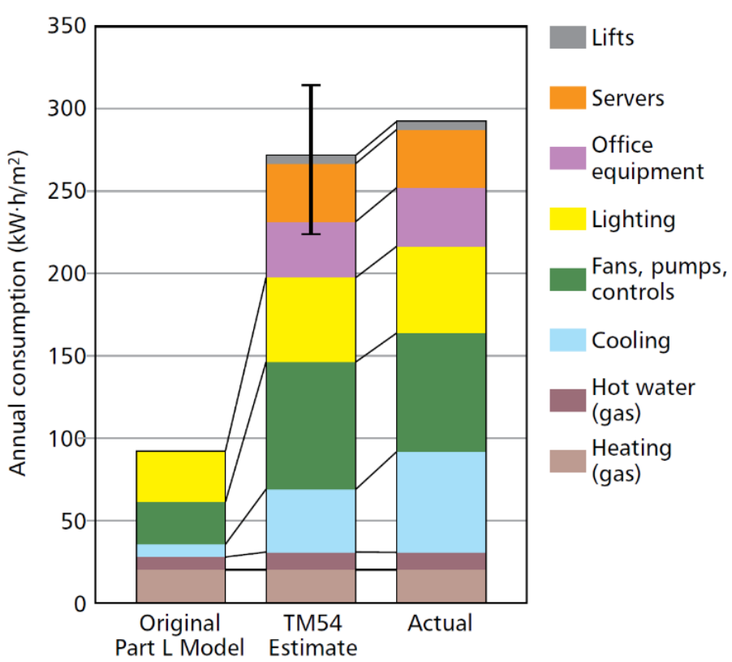

Figure 10: Comparison of Building Regs Part L prediction of an office's energy use ("Original Part L Model") versus an alternative prediction (CIBSE TM54), and actual metered use. Credit: CIBSE.

50. **The current Part L 2021 and FHS do not deliver the 15-20kWh/m²/year space heat demand found to be necessary by the Climate Change Committee** as previously noted. To achieve that limit, improved fabric would be needed. This is true whether calculated with SAP (for example see the Future Homes Hub 'Ready for Zero' report and appendix[xxviii]) or a more accurate energy prediction method[xxix,xxx]. That 'Ready for Zero' report appendix on SAP analysis shows that Part L 2021 fabric would result in a space heat demand of up to 47kWh/m² /year depending on home type, even before taking into account SAP's underestimation of this. As the most recent government consultation[xxxi] (2023-24) shows two possible FHS options which make little-to-no improvement to fabric, the FHS space heat demand cannot be assumed to be lower than that of today's Part L 2021 (up to 47kWh/m²/year as above). Concerningly, the 'Ready for Zero' report had also posited two further possible specifications with even worse fabric (resulting in a SAP-estimated space heat demand of up to 54kWh/m²/year), although government has given no indication of pursuing those.

51. **Despite the Committee on Climate Change recommendation for "rapid and forceful pursuit of zero-carbon new-build"[xxxii], the current Part L 2021 and the FHS do not result in net zero carbon buildings**. Government's referral to the FHS as "zero carbon ready" only means the building will be all-electric (no gas) and thus will eventually get to net zero only when the national electricity grid is entirely zero carbon.

    a. It is important to note that 'net zero carbon ready' does not address fuel poverty, climate adaptation or occupant health, as this all-electric status does not inherently mitigate overheating or indoor damp and mould. By contrast, highly efficient building fabric can help to mitigate those issues. Fuel poverty mitigation and the urgent need to combat the ever-heightening risk of overheating in Reading specifically, as an urban area in the South of England, was noted in Reading's previously submitted document suite[12] as part of the local justification for the proposed policies' use of EUI and SHD metrics, instead of TER.

52. The latest FHS consultation (2023-24, *ibid*) also shows that one of the FHS options would result in heating bills twice as high as a current new build home, due to switching from gas to electric heating without improving fabric. The table shown here provides an overview of performance in the existing building regulations and the two FHS options from the most recent consultation, compared to what is necessary in new build homes for the achievement of the UK's legislated carbon budgets. This table combines information from the 2023-24 FHS consultation, third-party analysis of building performance, and Climate Change Committee analysis of the necessary sectoral changes for the UK's carbon budgets. As shown in the table, FHS Option 1, despite being more stringent, still falls short of achieving net-zero.

Table 1: Comparison of current and anticipated future building regulations standards against what is known to be needed in new homes as part of the achievement of the UK's legislated carbon targets in the Climate Change Act.

Element	Current regulations (Part L 2021)	FHS Option 1	FHS Option 2	What is needed for national carbon goals?
Fabric	Basic levels of insulation, glazing & airtightness	All U-values (insulation & glazing) identical to Part L 2021. Small improvement to airtightness.	No improvement on Part L 2021	Significant improvement in U-values and/or airtightness to meet space heat demand target shown below
Heat system	Gas boiler + Wastewater heat recovery	Air-source heat pump + waste-water heat recovery	Air-source heat pump only	Low carbon heat – heat pump or similar from 2025
Solar PV provision	PV panel area m² equal to 40% of ground floor	Same as Part L 2021.	None *[note: ruled out by govt in 2025]*	Enough to match 100% of energy use thus make the building 'net zero' in operation (see 'zero carbon' citation below)
Resulting space heat demand in kWh/m²/year	13-47 kWh/m²/year (citation; before correcting SAP's underestimation of this metric)	Exact figure not known but would be slightly less than that of Part L 2021, due to gain in airtightness	Same as Part L 2021, as fabric is the same	≤15-20 kWh/m²/year from 2025, in actual performance (citation)
Resulting annual heat+hot water bill (citation)	£640	£520	£1,220	n/a
Resulting annual CO_2 emissions (citation)	1.4 tonnes/year average in 60-year period	0.05 tonnes/year average in 60-year period	0.1 tonnes/year average in 60-year period	Zero carbon (various citations)

[12] Examination library items EX0009 IQ47 paragraphs 1.2–1.5; EX046 paragraph 3.14.14; EX047 paragraph 4.3.9.

What effect will the introduction of the FHS mean for local plan policies that use current building regulations metrics?

53. Any local plan policy that is based on a % TER reduction will necessarily be tied to a specific version of SAP (or SBEM in nonresidential) and a specific version of Part L. Because SAP10.2 is the most recent available version of SAP, the Part L 2021 SAP10.2 TER would be the baseline from which a % reduction target would have to be expressed in the policy. But as previously noted, when the FHS replaces Part L 2021, SAP will be updated to SAP10.3 and HEM will also be introduced. There is currently no published methodology for converting or comparing the two baselines, and no available information to confirm equivalence between the TER set in SAP 10.2 (current) and the TER that will be set in SAP10.3 or HEM.

54. This means that any TER-based policy set today – which would have to be a % reduction on the TER of Part L 2021 SAP 10.2 – would become out of date on the introduction of the FHS and its accompanying methodologies (SAP10.3 and especially HEM). As the FHS and HEM are still unpublished as of late January 2026, assuming they are published some time in Spring 2026, they would be likely to come into force in Spring 2027. From that point on, developers would have to do two calculations – one for compliance with the FHS (using SAP10.3 or HEM) and one for compliance with Reading's policy.

55. Finally, planning policy guidance has not yet clarified how TER-based policies should be adapted or rescaled once the TER benchmark and calculation methodology changes. No guidance on this issue is currently available from the Ministry of Housing, Communities and Local Government (MHCLG) or the Planning Advisory Service (PAS).

    a. By contrast, Reading's submitted proposed policies H5 and CC2 utilise absolute metrics (EUI and SHD) that would be calculated using accurate energy prediction methodologies that remain valid throughout changes to Building Regulations. Thus the proposed EUI & SHD-based policies would have more longevity than a policy based on TER or any other Building Regulations metric. HEM may also[xxxiii] output more future-relevant metrics of total energy use (essentially, EUI as in Reading's policy) and space heating demand, even if these are not FHS compliance metrics.

    b. The local plan policy life cycle (e.g. to 2040 or beyond) will overlap more with the period when the new FHS and HEM will be in place than with the last few years of the incumbent Part L 2021, SAP and SBEM. As such, policies based on absolute energy performance using accurate calculation methodologies, such as CE3's kWh/m^2/year thresholds, are more likely to remain valid and comparable for the vast majority of the plan period. These policies also align more closely with longer-term climate change targets (as per the aforementioned Climate Change Committee stipulation that buildings' energy performance metrics should reflect real performance).

What alternatives are there to Part L/FHS and the national compliance metrics?

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

57. **The more accurate metrics, as used in Reading's proposed policies, are:**

    - Space heat demand (SHD) in kWh/m^2/year.
    - Total energy use intensity (EUI) in kWh/m^2/year.
    - As these metrics cover *total* energy use and would be calculated via an accurate method, **they reveal the actual amount of renewable energy generation that would be needed in order to match that total energy use and thus make the building net zero**.
        - As the most suitable form of renewable energy in urban areas is rooftop PV, this means the amount of renewable energy generation feasible at a building is limited by its roof space. **The main role of a tight EUI limit is to ensure that in the vast majority of cases, the building's energy use won't exceed the amount of rooftop PV generation it can achieve**. A tight EUI limit also ensures the use of a heat pump, which is vital in new homes to deliver the UK's legislated carbon goals as previously noted. The low SHD limit allows the heat pump to operate at maximum efficiency.
    - Reading's previous submission documents[13] noted that these metrics are today's best-practice means to understand the energy performance of buildings and thus their carbon emissions, as endorsed by LETI, RIBA and the UKGBC among others. Today we can highlight further endorsement of these metrics via their use as the basis of the UK Net Zero Carbon Buildings Standard (UKNZCBS) which was co-created by CIBSE, BRE, RICS, IStructE, BBP, LETI, RIBA, and UKGBC. This means **EUI and SHD are endorsed as best practice by all independent standard-setting bodies in the UK construction industry**.
    - Arguably, the **metric of total energy use has been indirectly endorsed by government via the National Design Guide[xxxiv] and National Model Design Code[xxxv]**.The Guide defines good design by three pillars (of which one is climate) and ten characteristics, of which one is 'Resources'. In 'Resources', it states that good design inherently includes using the energy hierarchy and specifically to "follow the principles of whole life carbon assessment". The National Model Design Code echoes this, stating that sustainability standards "can be incorporated into … policy (and) might include … Whole life-cycle carbon". The only standard for whole-life carbon assessment is EN15978, for which the only established meth in the UK is RICS Whole Life Carbon Assessment (WLCA). RICS WLCA instructs that operational energy should be calculated via CIBSE TM54, NABERS, ASHRAE or PHPP and specifies that *"the results of Part L 2021 calculations must not be used under any circumstances, as they are not a prediction of energy consumption"* [xxxvi].

[13] Including examination library items EV002 paragraph 4.1.5, 4.1.6, 4.18.10; item EX009 paragraphs 4.2.1, 4.2.2, 4.2.3, 4.4.3.1 – 4.4.3.3; item EX046 paragraphs 3.14.14; 3.14.16; and item EX047 4.3.8, 4.3.14.

58. **Two accurate prediction methods suitable for calculating the above metrics at planning application stage are**:

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

59. Other acceptable methods may include NABERS or ASHRAE, on the basis that they too are endorsed by RICS WLCA (as cited above) as being suitably robust for operational energy accounting within whole-life carbon accounting for buildings. Again, whole-life carbon assessment has been endorsed by national government as a sustainability standard for inclusion in policy, via the National Design Guide and National Model Design Code, as previously cited above, and RICS WLCA is the only well-established methodology for this.

60. The use of PHPP outside the cutting-edge of the sector is in the minority, but growing. Government has recently acknowledged[xxxvii] that PHPP is regarded as "demonstrably accurate for modelling of high-performance homes in the field". This comment was made in the context of a national consultation document on the emerging national HEM tool (the new national calculation for use with the Future Homes Standard), whereby PHPP was used as a validation tool during the development of HEM.

61. While CIBSE TM54 is not part of the core compliance methodology in Part L, it is referenced in **Part L 2021 guidance** as an appropriate method for the 'energy forecasting' that is now mandatory[xxxviii] for non-residential buildings of 1,000m^2 or greater size. This means TM54 has been 'set out, or referred to … or endorsed … by the Secretary of State' in 'regulations … or … national policies or guidance', as per the wording of the Planning & Energy Act regarding energy efficiency standards.

62. As previously noted, the new national calculation methodology HEM is expected to be able to account for unregulated energy as well as regulated, and to be able to account for buildings' total energy use more accurately than the current national methodology SAP does. If HEM eventually does include that capability to reveal total energy use in kWh/m^2/year (as anticipated from the HEM consultation documents), and if HEM's accuracy does prove to be sufficient, then HEM may represent an additional method by which compliance with Reading's proposed EUI and SHD targets could be demonstrated.

How is the local plan empowered to go beyond building regulations?

Planning & Energy Act 2008 (P&EA)

63. The Planning and Energy Act[14] empowers the local plan to set 'reasonable requirements'[xxxix] for:
    - Energy efficiency standards higher than those set by building regulations,
    - Renewable or low carbon sources 'in the locality of the development' to supply a proportion of energy used at the development.
64. The Act defines 'energy efficiency standards' as standards for the purpose of energy efficiency that are set out or endorsed by the Secretary of State. This may imply the methods used for compliance with Part L of Building Regulations (SAP or SBEM despite their aforementioned shortcomings, or TM54). However, other standards may also meet the 'endorsement' criterion:
    a. CIBSE TM54 is one of the energy calculation methods endorsed by Part L as of 2021, thus it appears the Act would permit local energy efficiency to account for *total* energy use, not just regulated (see glossary).
    b. As previously noted, the government's National Design Guide and National Model Design Code implicitly endorse the use of metrics/methods other than Part L SAP and SBEM, in that they confirm local policies can address "whole life-cycle carbon", for which the industry's only established method (RICS WLCA) prohibits the use of Part L 2021 calculations and instead endorses alternative calculations reflecting total energy use.
    c. Building Regulations Part L TER metric is "Target Emissions Rate" expressed in annual CO_2 emissions. Therefore, TER is not an energy efficiency standard, but rather a carbon emissions standard. Arguably therefore, to express an energy efficiency target as a TER reduction would be inconsistent with the way the powers are expressed in this 2008 Act.
65. The Act does not define 'energy used at the development'. It thus appears to empower the local plan to require renewable energy to meet a proportion of the new building's *total* energy, not just 'regulated' energy (see glossary). The Act also does not define 'renewable energy', 'low carbon', or 'locality of development'; thus presumably the local plan is free to define these[15].
66. Therefore, local policy can require renewable energy to supply a 'reasonable proportion' of the total energy use of a development, not just the share that is 'regulated' by Building Regulations Part L. This could be a 100% proportion, if it is shown why this is 'reasonable' – for example in its necessity or effectiveness to meet the local plan's climate mitigation duty, with evidence of its technical feasibility and its cost for viability testing. A requirement for a development's total energy use to be matched by renewable energy will be most effective in conjunction with requirements to first minimise energy demand, such as RBC's proposed the EUI targets.

Implicit powers flowing from Planning & Compulsory Purchase Act (P&CPA) 2004

67. Published expert legal advice[xl] notes that aside from the P&EA powers, the climate change mitigation duty laid on the local plan by the Planning & Compulsory Purchase Act (previously explained) implies the power to take the required steps to fulfil that duty:
    a. "The [Planning & Energy Act] is not the only power on which [local planning authorities] can rely, nor does it circumscribe other powers or foreclose other legislative routes by which LPAs are obliged or empowered to act. Quite the opposite …There are other legislative routes by which LPAs have different or more ambitious powers, such as the general power flowing from the duty in section 19(1A) of the Planning and Compulsory Purchase Act 2004 … which requires that [local plans] must …include policies designed to secure that the development … contribute[s] to the mitigation of … climate change. … This is reinforced by the requirements in the [NPPF] that plans must take a proactive approach to mitigating … climate change and … support the transition to net zero … including … radical reductions in … emissions.[…] Where there are two different, overlapping ways of achieving a local authority's objective, it is open to the authority to choose the power on which it relies. Accordingly, LPAs can choose the power under which they bring forward local energy efficiency policies."
68. That open legal advice was cited in RBC's previously submitted documents[16] although not citing that specific passage.

Town & Country Planning Act 1990 (T&CPA) Section 106 and regulations on its use

69. Section 106 empowers the local authority to raise payments from developers. Regulations[xli] establish that these must be directly related to the development, fair and reasonably related in scale to the development, and necessary to make the development acceptable.
70. As noted by RBC previously (EX047 paragraph 4.3.7), Section 106 is the mechanism by which offsetting payments would be raised if a development is unable to meet the net zero standard on site. This is a well-established approach in local planning. The payments can be directly and proportionally related to the extent by which a development falls short of the required net zero performance, where net zero is Reading's bar for 'acceptable in planning terms'. The payment would remedy that unacceptable impact by funding other carbon reductions locally.

[14] As noted in several of RBC's previous submitted documents including exam library item EX009 paragraph 3.6; item EX046 paragraphs 3.14.17 and 3.14.19; item EX047 paragraphs 4.3.7 and 4.3.10.

[15] Unless such a definition is established in case law. This consultant team is not aware of any such case law but please note this team does not claim to be qualified legal professionals.

[16] EX009, paragraphs 3.2 and 3.7.

Written Ministerial Statement of 13th December (WMS2023)

71. The WMS2023 purports to require that local plan *energy efficiency* standards beyond those of Building Regulations should be expressed in terms of % reduction on Part L TER using a specific version of SAP. However:

    a. As explained above, TER is not an energy efficiency standard but rather a carbon standard and as such does not appear to align with the definitions within the Planning & Energy Act as cited above.

    b. A national policy like the WMS2023 cannot impede the function of legislation[17], such as the powers granted by the Planning & Energy Act 2008 and more importantly the climate mitigation duty set in the Planning & Compulsory Purchase Act 2004 (and implicit powers flowing from that duty as noted above).

        i. The previously cited open legal advice from Dehon KC clearly lays out that "[local planning authorities] and planning inspectors cannot lawfully interpret the 2023 WMS in a way that removes or frustrates the effective operation of the power that LPAs still have, via sections 1-5 of the [Planning & Energy Act] 2008. Nor can it be read to remove or frustrate [the local plan's legal duty to mitigate climate change as expressed in] section 19(1A) of the 2004 Act".

    c. SAP is a methodology that applies only in residential buildings, therefore the WMS2023 cannot logically be followed in non-residential policy.

    d. Expressing a policy in a way that is only valid for a "specific version of SAP" would mean that the policy goes out of date as soon as SAP is updated – as is about to happen in the form of SAP10.3 and HEM, as previously noted in this report's section on Building Regulations. This would clearly make policy less effective, as superseded versions of SAP do not remain available for use indefinitely[18].

    e. Case law establishes that local plan policies can deviate from national policy guidance where there are "local **or** exceptional circumstances" to justify that[xlii].

72. The WMS2023 also says that any enhanced local plan policy energy efficiency standards should have a "robustly costed rationale that ensures … development remains viable, and the impact on housing supply and affordability is considered in accordance with the [NPPF]". Reading's evidence suite has already shown this[19] and further detail is given later in this report.

73. The WMS2023's stated purpose relates to a purported concern that a "proliferation of … local standards" could add "costs and complexity", with the implication that this could inhibit housing delivery. Yet there is no evidence of that effect. To the contrary, where local plan policies have use EUI (rather than TER), application rates did not slow down[xliii]. Presumably applicants do not submit proposals for schemes that they do not believe they can build.

[17] Additionally, RBC document EV002 paragraph 4.18.11 pointed out that the WMS itself failed to recognise this fact (the primacy of local authorities' legislated powers to reduce emissions).

What does it mean to be justified in light of circumstances?

74. As cited above, it is established in case law that local policy can deviate from national guidance (like the WMS2023) if there are local **or** exceptional circumstances to justify this.The previously explained urgency of the need for climate change mitigation is arguably an exceptional circumstance – especially in light of the presented evidence that:

    a. The buildings and electricity sectors must reach net zero emissions at source (with the vast majority of reductions within the plan period) in order to be compatible with the Climate Change Act carbon reduction trajectory, without relying on other sectors doing more work to 'offset' buildings' emissions (see extent of mitigation Figures 2, 3, and 4)

    b. Reading's emissions are heavily skewed towards buildings, including buildings' use of electricity (see Reading context). The local plan therefore *must* address these effectively.

    c. The rate of energy performance improvement in *existing* buildings across the UK has been too slow (and there is no evidence that Reading is any exception to this) thus must drastically accelerate from today to get on track for the legislated carbon trajectory as above. This challenge is already huge and analysis shows national future plans to deliver retrofit are risky or lacking. Therefore it would be irrational to allow new buildings to add any carbon emissions to the existing burden. Thus new builds need to be zero carbon in their *total* operational energy (not just regulated TER) including via a level of energy efficiency that minimises their demand on the UK's finite renewable energy growth.

75. 'Local circumstance' does not necessarily mean 'unique to the local area', especially in the case of climate action. On the contrary, the urgent need for climate change mitigation spans local, national and global scales – and the required performance in new buildings for the UK's legislated carbon goals is applicable nationwide yet is not delivered by building regulations. Instead, 'local circumstances' regarding standards for buildings' energy/carbon performance relates more logically to the local *feasibility*, local *viability* of those local standards, and superior *effectiveness* in mitigating the local area's largest sources of carbon emissions.

Conclusion on the impact of the WMS2023 on what standards local plans can set

76. The WMS' stipulation to use TER would inhibit fulfilment of the plan's legal duty to mitigate climate change and the NPPF expectation to support "radical [carbon] reductions … tak[ing] a proactive approach … in line with the … Climate Change Act". This is because, as explained above, TER is not an effective metric for energy efficiency nor to fully mitigate the carbon emissions of development, certainly not to the extent needed for Climate Change Act goals. As above citing Dehon KC, rigid application of the WMS thus would not be a lawful interpretation.

77. Different pieces of national policy pull in different directions. As the WMS' stipulations inhibit consistency with priorities expressed in the wider body of national policy e.g. the NPPF's clearly expressed prioritisation of climate mitigation in line with the Climate Change Act, it

[18] Previously explained in RBC exam library item EX009, paragraphs 3.1 – 3.7.
[19] Within RBC exam library item EV004, the viability report.

thus may not be possible to achieve full consistency with *every* relevant piece of national policy. Therefore RBC's rationale for the proposed local policies (including EUI and SHD targets, not TER) is to seek consistency with the more clearly-stated and well-established climate priorities in the NPPF and Climate Change Act, in order to fulfil the local plan's legal duty to mitigate climate change as well as Reading's own local committed goals on carbon reduction in the Borough.

Comparing evidence of feasibility and viability of the two potential policy approaches (TER-based policy option, versus RBC's original proposed EUI-based policy)

Two options for expressing policy for operational carbon: EUI-based (true net zero) or TER-based (Building Regulations metric)

EUI-based policy (Reading's proposed policies H5 and C22)

78. The proposed 'net zero' standards in the policies in Reading's proposed plan would require the achievement of the following standards at new development:
    - Policy C22, non-residential: Site average space heat demand no more than 15-20kWh/m^2/year; site average total energy use intensity (EUI) no more than 70kWh/m^2/year (and not exceeding 90kWh/m^2/year in any individual unit). Renewable energy generation on site sufficient to annually equal the total energy demand, thus 'net zero' on annual basis.
    - Policy H5, residential: Site average space heat demand no more than 15-20kWh/m^2/year; site average total energy use intensity (EUI) no more than 35kWh/m^2/year (and not exceeding 60kWh/m^2/year in any individual unit). Renewable energy generation on site sufficient to annually equal the total energy demand.
79. Both of the proposed policies include 'exceptional basis' clauses which allow the on-site targets to be fully or partially waived if the developer can demonstrate that it has not been feasible or viable to fully meet the standard. In this case, the following would instead apply:
    a. Demonstrate that the policy's energy performance targets have been pursued as far as feasible and viable, and
    b. In major developments: Offset either by contributing to offsite renewable energy generation of an amount equal to the shortfall not met on site, or by financial contribution to Reading's carbon offset fund
        i. Or connect to a heat network OR meet any level of Passivhaus standard or equivalent (residential; policy H5)
        ii. Or achieve BREEAM Excellent or Outstanding (non-residential; policy CC2)
80. The policy's targets specifically reflect the new-build energy performance that the previously cited independent analysis has shown to be necessary for the UK's legislated carbon goals. Space heat demand of 15-20 is a specific performance point that the Committee on Climate Change has shown to be needed for those goals. The EUI target ensures the use of heat pumps (which is another identified necessary element) and makes the energy demand low enough to be met by PV on the building's own roof in most cases (see feasibility later in this chapter).
81. The use of EUI (and renewable energy to match that) means that total energy use, and thus total operational carbon emissions of new buildings, are addressed (unlike Building Regulations TER). This makes the building truly 'net zero' thus not adding to the overall carbon emissions burden of Reading's building stock. Without this standard, new builds would not 'mitigate' climate change, as any 'non net-zero' new build would add to the overall emissions.
82. The policy's use of metrics from accurate energy prediction methods, and its use of post-completion checks, ensure that development delivers on the required standard, thus minimising the 'energy performance gap' that is typical in industry due to Building Regulations calculation methods and lack of requirements for in-use performance.

Alternative TER-based policy

83. As provided in exam library item EX056, the draft fallback policy provided at the Inspector's request seeks to pursue carbon reductions as far as is practically possible when expressing them as a percentage improvement on the Building Regulations TER metric (supplemented by a subtarget of an improvement on fabric expressed in terms of the Building Regulations TFEE metric, which in turn would contribute towards the overarching TER improvement target).
84. The draft fallback policy uses TER and TFEE to express its energy efficiency requirement, and beyond those it also requires additional renewable energy (or else offsetting) to match *total* energy demand, including unregulated as well as regulated energy uses within the building (see glossary and previous section on Building Regulations). This is because Building Regulations metrics (TER and TFEE) are by definition unable to account for a building's total energy use, as they only deal with regulated energy, yet unregulated energy still contributes significantly to carbon emissions of new buildings (as previously noted). As the goal is still to design the alternative policy in a way that mitigates climate change as far as possible, it is necessary to include unregulated energy use in the policy too. As the WMS2023 instruction is to express *energy efficiency* requirements in terms of TER, the unregulated energy use could only be addressed in terms of additional *renewable energy* beyond the TER. This is the approach taken in RBC's submission EX056.
85. Reading's draft alternative policy is based on the findings of a very recent study[xliv] by Reading's neighbour Wokingham Borough Council, which explored four possible standards for TER-based policy in residential buildings. To get as close as possible to the standard that Reading's EUI-based policy would have achieved, Reading's draft alternative residential policy reflects the most ambitious of the four possible standards that had been explored in the Wokingham study. It would require:
    c. New residential buildings to achieve 'net zero' total operational energy emissions through meeting all of the following:
        a. 100% reduction on Part L 2021 TER (net zero regulated emissions)
            i. 10% reduction on Part L 2021 TFEE (which is a step towards the TER reduction)
        b. Provide sufficient onsite renewable energy generation to match the building's annual *unregulated* energy use in addition to the 100% TER reduction, such that the building's total annual energy demand is matched with renewable energy.
        c. The originally proposed 'exceptional basis' clause remains, but now with clarity that 'offset' contributions would directly reflect the onsite shortfall in renewable energy.

86. In non-residential buildings, in the time available since the Inspector's request it has not been possible to identify any available published analysis to reveal a TER improvement that would be universally feasible through energy efficiency measures in non-residential buildings and the costs involved in this. This is partly because of the variability in Part L 2021 baselines for non-residential as previously described. Therefore in Reading's TER-based alternative for policy CC2 (non-residential), no specific % reduction targets were set for non-residential buildings but the policy would simply require non-residential developers to:

    a. Achieve 'net zero' (still defined as having on-site renewable energy generation equal to total annual energy use), and

    b. Demonstrate having achieved any degree of reduction on Part L 2021 TER,, showing what % reduction was achieved at each step of the hierarchy.

87. Furthermore, in the TER-based alternative versions of both Policy CC2 and Policy H5, amendments were made to clarify that all of the specific 'net zero' targets only apply to new buildings, not to conversion to residential.

Relevant evidential criteria for evaluation

Effectiveness in mitigating climate change

88. The relevant evidence about climate mitigation effectiveness of each policy standard (TER-based or EUI-based) must logically regard:

    a. Whether the standard is directly aligned with the energy performance that is necessary in order to make the buildings sector compatible with the Climate Change Act carbon goals

    b. Whether the energy efficiency requirement in the standard is expressed using an effective energy efficiency metric

    c. Whether the scope of the metrics used would be able to cover the full scope of the building's energy use

    d. Whether the standard will deliver a verifiable outcome in reality rather than just on paper (and indeed whether the standard is expressed in terms that can be measured in reality)

    e. Whether, as a result of all of the above, the standard would deliver truly operational 'net zero' new buildings: This is the only rational definition of 'climate change mitigation', as 'mitigation' means actively reducing overall emissions, whereas any new build that does not have truly net zero operational emissions would instead *add* to Reading's overall buildings sector emissions

Feasibility/deliverability in the local circumstances

89. To understand whether any particular standard is feasible to deliver, it is relevant to consider:

    a. Sources of evidence on whether the standard can be technically met, which should include identification of what elements would be needed in typical new builds in order to achieve the required outcome that the standard expresses (the outcome is either EUI and energy balance, a certain % reduction on Part L 2021 TER).

        i. The relevant local characteristics on this topic would be the regional climate (as outdoor temperatures affect space heat demand and sunlight levels affect the feasible amount of solar PV generation), and the typical type of new buildings in the local area (as the shape and size of a building affects its space heat demand and amount of roof space available for solar panels). Where a cited evidence source assumes a climate and typical new building types that are reasonably similar to Reading, this means the evidence is equally valid in Reading's local circumstances.

    b. Standards that are already being delivered locally or in similar contexts – e.g.evidence of continued application rates before/after the adoption of similar standards elsewhere

    c. Evidence that national government considers certain elements of the required building specifications to be universally feasible by virtue of their inclusion in incoming Building Regulations (Part L 2025; the Future Homes/Buildings Standard).

Cost uplift, flowing into viability

90. Sources of credible cost data for the respective policy standard would need to have been taken into account in the whole-plan viability study. For each of the policy options described here, we cite the relevant credible data and compare these to the cost uplift already allowed for in Reading's existing viability report[20] which was finalised in December 2024.

91. Reading's viability assessment already allowed for a 15% cost uplift to reflect the requirements of Reading's submitted policy suite, including policy H5. The viability study's baseline cost was based on a 15-year sample of actual building costs from BCIS database[21]. Presumably for that reason, their 15% cost uplift also included allowances for changes to building regulations that came into force during or after that sample period, as well as the cost of Reading's proposed policies. The total 15% cost uplift allowance was stated to cover:

    d. Building regulations standards that came into force in mid-2022:

        i. Building Regulations Part L 2021 (energy and carbon): Cost uplift between 1.8% and 7% in older estimates; only 2.8% in the most recent estimate

        ii. Part F 2021 (ventilation): Cost uplift 0.4%

        iii. Part O 2021 (overheating risk mitigation; residential only): Cost uplift 0.7%

[20] EV004 in examination library. Dated December 2024. https://images.reading.gov.uk/2025/05/EV004-Whole-Plan-Assessment-of-Viability-Reading-Local-Plan-BPS-Chartered-Surveyors.pdf

[21] EV004 paragraph 4.30

iv. Part S 2021 (EV charging standards): Cost uplift 0.8%.

e. Reading policy costs:

i. Provision of rooftop green infrastructure: £100/m2 (not given as a %; also not stated whether this is per m2 of roof or floorspace). (Source: DEFRA)

ii. Biodiversity net gain: £208/unit brownfield; £948/unit greenfield. (DEFRA).
1. Please note: This was described as a local policy cost; yet BNG is a national legal requirement since early 2024[xlv] via the Environment Act 2021, therefore may have already been present to some degree in the baseline costs. Additionally, the green roof already accounted for above would count towards BNG.

iii. Accessibility standards M4(3) and/or M4(4)(a) and (b), for which all cost uplifts were sourced from national government estimates:
1. 0.54 - 10.77 % cost uplift in market homes, or 0.54 – 23.8% in council schemes, depending on home type and accessibility standard.
2. Policy H5 requires the costlier standard only on 10% of homes in schemes over 20 homes, and for market homes this enhanced standard is a less costly one than in council-led housing. It is not specified what % weighted average cost uplift this translates into across all new developments anticipated in Reading, but this is indicated to have been part of the overall 15% uplift noted above.

iv. Electric vehicle charging for proposed Policy TR5: £1,000 per house or £2,500 per 4 flats (which would equal £625/flat). The data source was a published study by the national government department for transport.
1. Please note: This would in fact be largely a duplication of the Building Regulations Part S cost already accounted for above. This is because Reading's proposed policy TR5 does not in fact set any requirements for *residential* EV charging, and Part S 2021 already requires 1 EV charging point to be provided at any proposed dwelling that has associated open-air parking, and 1 EV charging point at any proposed non-residential development that has 10 or more associated parking spaces (albeit the non-residential requirement in Part S does not appear to increase proportionally the more parking is provided). Reading's proposed policy TR5 does impose a requirement for 20% of *non-residential* parking spaces to have EV charging if there are 10 or more off-road parking spaces. which somewhat exceeds the Part S requirement, but the extent of this exceedance depends on how much parking is provided.

v. Net zero carbon/net zero energy new buildings standard: A range of costs from 6% to 7.7%, within which the 6-6.1% range reflected detached homes and the range above 6.8% is reflective of semi-detached and apartment blocks. The data source was cited as being two different reports by cost experts Currie & Brown, one of which is a net zero policy report commissioned by 18 London Boroughs[xlvi] and the other is unspecified. The viability report recognised that in Reading, as a more urbanised area, development would be more likely to reflect detached houses and apartments, while detached homes would be less prevalent.

92. While some of the above were stated as absolute figures in the viability assessment rather than % uplifts, all were wrapped together into the overarching 15% uplift estimate.

93. The viability assessment found that the policy costs would not have a significant impact on housing delivery. Hence, any "net zero" policy requirement whose cost uplift falls within the "net zero" policy costs tested as part of that 15% (i.e. 6 – 7.7%) can be reasonably assumed to be at least equally viable.

f. Please note: The viability assessment's overall 15% uplift may have even been an over-estimate of the total policy cost uplifts, assuming the separate itemisation of residential EV charging costs in "Policy TR5" and "Part S" indicate that they were counted additionally, when in fact TR5 does not add any EV charging requirements in residential and while TR5's non-residential EV charging requirements t are not entirely 'additional' to what Part S already requires. **Therefore, if the stated TR5 'uplift' was counted on top of the Part S cost uplift within that overall 15% uplift which was found viable,** this indicates there is some headroom for the net zero carbon policy costs to even be slightly greater than the 6-7.7% that was allowed for in the viability study**.**

Key takeaways for considering viability

- **Reading's viability study (EV004) allowed for a 15% cost uplift**, which included credible expert data on the cost of on-site compliance with 'net zero' building standards identical to those of Reading's Policy H5
- **As part of that 15%, the cited credible data on 'net zero' buildings standards was a build cost uplift of 6% to 7.7% depending on home type,** and this was part of the overall 15% as stated above.
- **Thus the findings of Reading's viability study (EV004) will be valid for any 'net zero' standard whose cost uplift is 6% to 7.7%.**
- **Within the viability study's 15% cost uplift allowance, the cost of residential EV charging may have been double-counted**, thus it is reasonable to imply there is likely to be room for 'net zero' policy costs to slightly exceed 7.7% without causing the total to exceed 15%.

EUI-based policy (Reading proposed policies H5 and CC2): Evidence on the feasibility, cost uplift, and effectiveness

EUI policy effectiveness in fulfilling the legal and policy duty to mitigate climate change

94. Reading's proposed use of EUI and SHD targets in policies C22 and H5 is directly designed to remedy the unacceptable climate mitigation failure that would otherwise result due to the shortcomings of Part L, as outlined throughout the previous parts of this report and in Reading's previous evidence items EX009[22], EX046[23] , EX047[24] and EV002[25]. The policy overcomes these by:

    g. Utilising energy metrics that cover the entire scope of buildings' energy use (whereas the Part L TER metric would by definition only cover the regulated energy uses and the Part L TFEE metric is inaccurate in predicting actual energy performance; previously evidenced)

    h. Utilising an accurate space heat demand metric to ensure that buildings are in line with the 15-20kWh/m2/year heat efficiency that was specifically identified by the Committee on Climate Change to be necessary in all new homes from 2025 onwards for the achievement of the UK's legislated carbon targets as previously explained

    i. Setting the total energy use metric low enough that it would necessarily involve the use of a heat pump and the achievement of the space heat demand metric.

    j. Setting the total energy use metric low enough that it becomes possible to match the building's annual total energy use with rooftop solar panels (this is what makes the building 'net zero' but the prior steps are necessary to make this final step feasible).

    k. Requiring the targets' achievement to be demonstrated using an accurate energy use prediction methodology and be updated on completion of buildings, would get closer to ensuring that buildings actually perform in reality as they do on paper (addressing the previously explained energy performance gap).

95. Together, this suite of requirements within the 'net zero' section of policies CC2 and H5 would mean that new buildings in Reading would:

    l. Add nothing to the local plan area's existing emissions – thus proactively enabling Reading's housing targets to be delivered without going against the legal duty to mitigate climate change and NPPF instruction to proactively align with the Climate Change Act (i.e. legislated carbon budgets and net zero 2050), nor inhibiting Reading's local 2030 goal of net zero 2030.

    m. Avoid adding to the burden of retrofit needed in Reading's existing buildings in order to make them compatible with the UK's legislated carbon goals. All buildings that are not yet fossil-fuel free and low-energy will need to undergo such retrofit as part of the fulfilment of the UK's carbon budgets and net zero 2050 – and this burden is even greater in areas like Reading that have a significant proportion of older homes whose energy efficiency tends to be lower. For the UK's legislated carbon goals to be met, any homes that are not built to the optimal standards now would also have to undergo retrofit before 2050, which would compete with Reading's existing building stock for the labour, materials and funding available for retrofit in that period (and it is three-to-five times as costly to retrofit to optimal energy efficiency standards as it is to build up front[xlvii]). The proposed EUI-based policy standard would avoid that situation.

    n. Contribute to increasing the supply and use of renewable energy.

    o. Minimise the stress placed on the electricity grid by the delivery of Reading's new buildings (compared to if built to Building Regs standards), thanks to the reduced energy use of the buildings and in particular the low space heat demand which means these buildings can be heated 'low and slow' instead of having extreme peaks in heat demand.

    p. Be in line with the consensus on best practice among the green building industry and planning sector[26], and the recommendations of the UK's built environment standard-setting bodies (as per the UKNZCBS coalition previously noted) with regards to best practice in setting building energy performance standards for effective climate mitigation, especially if the goal is to be 'in line with the Climate Change Act' as per the NPPF[27] (NPPF September 2023 paragraph 153/footnote 53; same wording in later versions of NPPF).

18. Even in instances where the overall net zero status could be waived due to site-specific obstacles or other material considerations, the policy would still align with the following performance points that the Climate Change Committee has identified to be necessary components of the UK's legislated carbon reduction trajectory:

    a. Space heat demand of 15-20kWh/m^2/year

    b. Use of a heat pump (as the EUI target of 35kWh/m^2/year cannot be achieved without this)

    c. Accurate calculations and post-completion checks to ensure that the development actually delivers the performance committed to.

[22] Reading exam library item EX009 paragraphs 2.4, 2.4.1, 2.4.2, and 4.1.4.2/footnote 12
[23] Reading exam library item EX046 paragraphs 3.14.9, 3.14.14-16, 3.14.19, and 3.14.21
[24] Reading exam library item EX047 paragraphs 4.3.5 and 4.3.8.
[25] Reading exam library item EV002 paragraphs 4.1.3, 4.1.8, 4.18.10, and 4.18.15 – 4.18.18.
[26] Reading exam library item EV002 (ibid); paragraphs 4.1.5 – 4.1.6
[27] NPPF September 2023 paragraph 153/footnote 53; or December 2023 paragraph 158/footnote 56; or 2024 paragraph 162/paragraph 61.

Feasibility and cost uplift evidence for EUI-based net zero policy

96. As noted above, Reading's whole-plan viability report (exam item EV004) already cited the following cost data from cost experts Currie & Brown regarding the net zero standard (which were part of the overarching 15% uplift, as previously described):
    a. Detached homes: 6.0 – 6.1% cost uplift
    b. Semi-detached homes: 6.8 – 6.9% cost uplift
    c. Blocks of flats: 6.9 – 7.7% cost uplift.

97. The viability assessment (EV004) states that this data came from two separate Currie & Brown sources: One being a report jointly commissioned by eighteen London boroughs from 2023, and the other not specified. However, these costs reflect the range shown in the 2024 evidence base of Wokingham local plan which is now at examination. We cite Wokingham report that in more detail, and several other sources of data on similar standards, below.

Wokingham 'net zero' technical feasibility and cost report[xlviii], September 2024

98. As Wokingham is the immediate neighbour of Reading and thus has near-identical annual outdoor temperatures and sunlight levels and is likely to have significant overlap in housing markets, the analysis produced for Wokingham is highly applicable to the Reading context.

99. The Wokingham report took a methodical, logical approach to identify the following:
    a. **The typical new build residential archetypes** in the local area. These archetypes were: detached house, semi-detached house, and a 4-storey block of flats. It also covered two variations in form that each archetype might take (e.g. shape of roofs or windows).
    b. **Optimal energy performance targets that would make new homes 'net zero'** in operation, reflecting green building industry consensus on best practice (which in turn reflects the performance needed in new builds for the UK's carbon goals). These were as follows, which directly match the targets in Reading's Policy H5:
        i. Space heat demand (SHD) of no more than 15-20kWh/m^2 floorspace/year.
        ii. Total* energy use intensity (EUI) ≤35kWh/m^2 floorspace/year. (*All energy uses in the building – regardless whether 'regulated' or 'unregulated' – but not vehicle charging).
        iii. Renewable energy generation at least equal to the building's total energy demand.
        iv. All of the above to be calculated using an accurate energy prediction methodology.
    c. **The specification of building elements that would be needed** in each archetype in order to achieve those energy performance targets. This was done using PHPP, a modelling methodology with a proven track record of accurately predicting buildings' real performance. That modelling takes account of the weather patterns in each region (as average outdoor temperatures affect space heat demand, and average annual sunlight affects the amount of energy generated by solar panels). Reading is in the same region as Wokingham, the findings would be identical if the modelling were repeated for Reading.
    v. The study found that all of the specified energy performance targets could be met using the identified building element specifications, thus the policy's standard is feasible**.** Via plausible upgrades to insulation, glazing and airtightness; switching from a gas boiler to a heat pump and adding heat recovery ventilation, the buildings were able to meet the EUI and SHD targets. Thanks to this improved reduced energy demand (expressed by the EUI), this meant that it was possible to meet that annual energy demand using an amount of solar panels that would fit on the building's roof.
        1. As all of these building elements were based on actual products and skills available in construction markets today, this demonstrated that the feasibility of the net zero carbon standard in typical residential buildings in this region.
        2. Some of the key elements in this 'net zero' specification are about to become 'business as usual' through the Future Homes Standard – in particular, the use of an air-source heat pump instead of a gas boiler. As previously noted, the FHS notional building will have a heat pump. Similarly, solar PV panels are already present in Building Regulations Part L today – and the Wokingham modelling shows that in most cases, the net zero standard would need no more PV than Part L, because the tight EUI target makes energy use so low that it can be equalled by the amount of PV generation that the Part L standard contains.
        3. Most other building elements in the 'net zero' specification are very simple to achieve – such as improved U-values for walls, floors and roofs. These simply require a greater amount of the same insulation that developers already use. Other elements, such as triple glazing, heat-recovery ventilation and improved airtightness, are available in the market and this standard would stimulate their uptake. As space heat demand is the result of all fabric elements (insulation, glazing, airtightness), if one product were difficult to access then developers may instead adjust the building form or increase other elements.
    d. **The build cost uplift for the net zero standard**, compared to today's baseline costs:
        vi. Detached house, form 1 (no dormers; simple roof): 6.1% uplift.
        vii. Detached house, form 2 (has dormers on roof): 6.0% cost uplift.
        viii. Semi-detached house, form 1 (no bay window): 6.8% cost uplift.
        ix. Semi-detached house, form 2 (with one bay window): 6.9% cost uplift.
        x. Low-rise apartment block, form 1 (flat roof): 7.7% cost uplift.
        xi. Low-rise apartment block, form 2 (more complex roof): 6.9% cost uplift.

100. These identified cost uplifts are identical to the cost uplifts cited Reading's viability study (EV004, graph 11.1). These were therefore part of the overall 15% cost uplift that the Reading viability study found "would not significantly impact housing delivery" (EV004, para 6.16).

101. Based on this highly relevant feasibility and cost evidence from immediate neighbour Wokingham for an identical 'net zero' performance standard in new builds, Reading's Policy H5 carbon/energy targets have thus been demonstrated to be feasible and viable**.**

Essex Net Zero Evidence Suite – supporting two approved local plan documents to date

102. An evidence suite was commissioned by Essex Planning Officers Association in collaboration with Essex County Council. Its function is to provide a set of model policies suitable for adoption into the local plans of any of the various local planning authorities within Essex, along with the feasibility evidence to support them, and the cost uplift evidence to be tested in the viability assessments of the respective local plan.

103. The feasibility and costs evidence[xlix] includes:

    a. Accurate energy modelling of what 'net zero' energy performance standards can be achieved in typical Essex new buildings (using products and techniques that are available today), taking into account Essex's climate conditions (as this affects space heat demand and PV generation as noted above in the Wokingham case)

    b. Expert costing of the building specifications necessary to meet the identified net zero standard, as identified by the modelling, for testing in each local plan's viability study

    c. Outline viability testing of the policy costs across the Essex context

    d. A suite of draft policies recommended for adoption based on the modelling, with some attached resources to aid implementation such as checklists.

104. The Essex evidence suite also contains open legal advice on the powers and duties imposed by different pieces of legislation and national policy. These contain general legal advice applicable to any location, not specific to the Essex context. That legal advice, from Estelle Dehon KC, has been quoted earlier the current report and in previous Reading exam library items (cited elsewhere in this current report).

105. The recommended standards for new buildings from the Essex evidence suite, reflecting their energy modelling evidence showing that these standards were feasible, were:

    a. Space heat demand (SHD):

        i. 15 kWh/m^2 floorspace/year in non-residential buildings and dwellings other than bungalows

        ii. 20 kWh/m^2 floorspace/year in bungalows.

    b. EUI (total energy use intensity):

        i. Dwellings:35 kWh/m^2 floorspace/year

        ii. Offices: 70 kWh/m^2 floorspace/year

        iii. Schools: 65 kWh/m^2 floorspace/year

        iv. Light industrial: 35kWh/m^2 floorspace/year

    c. Renewable energy generation on-site to equal or exceed the building's predicted energy use (thus reaching 'net zero' status on an annual basis).

106. The Essex evidence suite therefore directly reflects Reading's proposed residential energy performance targets, and are equal or more stringent than Reading's non-residential targets (whereby the Reading's non-residential EUI target is 70kWh/m^2/year while Essex's EUI target is the same for offices but more stringent for other types of non-residential).

107. The Essex cost modelling found the cost uplift of meeting these standards to be as follows, from today's baseline build cost:

    a. Low rise block of flats: 7% cost uplift

    b. Mid-rise block of flats:4% cost uplift

    c. High-rise block of flats: 5% cost uplift

    d. Terraced house and semi-detached house: 7% cost uplift

    e. Bungalow: 4% cost uplift

    f. Office: 4% cost uplift

    g. School: 2% cost uplift

    h. Industrial: 13% cost uplift.

108. To date, the Essex net zero suite has been the basis for the successful examination of the following local plans that included EUI-based net zero standards similar to that of Reading:

    a. Tendring & Colchester Borders Garden Community DPD – Examined in 2024; then approved via the Inspector's examination report in March 2025[l]. The DPD was then formally adopted by both relevant councils in mid-2025[li].

    b. Uttlesford Local Plan – examined in June 2025; approved by the examination report in January 2026[lii].

109. As this evidence was the basis for policy soundness verdicts by three separate inspectors across two examinations, it must be considered that this evidence is suitably robust. These Inspectors acknowledged the fact that these policies diverged from the Written Ministerial Statement 2023 in that they use the EUI and SHD energy efficiency metrics instead of the WMS2023's preferred TER metric, but the Inspectors came to the conclusion that the policy standards were nevertheless sound due to their effectiveness in pursuing the ultimate legally binding objective of climate change mitigation. Here are extracts of their reasoning:

    a. In Tendring & Colchester Inspector's report:

        i. "[The policy] uses three metrics to separately measure each of the key attributes needed to achieve Net Zero. This is in comparison to the single performance metric of the Target Emissions Rate, which amalgamates into one metric a buildings effort in terms of energy efficiency, low carbon, heat, and renewable energy generation. Consequently, GC Policy 8 does go further than current or planned Building Regulations … However … [the policy] builds on all the work that has been done by the Councils and ECC … [and] has also been subject to … viability testing. […] There is no evidence to suggest that … the highest standards of sustainable design and

construction measures would therefore make the development unviable or undevelopable over the plan period."

ii. "In reaching this decision I have had regard to the [WMS2023] … However, whilst the WMS is a material consideration of significant weight, the Councils must prepare development plan documents that, in accordance with Section 19(1A) of the 2004 Act, include policies which contribute to the mitigation of, and adaption to, climate change. Additionally, Section 1 of the Planning and Energy Act 2008 states that local planning authorities may in their development plans include policies imposing reasonable requirements for development in their area to comply with energy efficiency standards that exceed the energy requirements of building regulations. Consequently, in this particular case, I am satisfied that GC Policy 8 Part A is appropriate and justified".

iii. The only relevant modification that the Inspector required was to add an option for developers to "agree a strategy to achieve Net Zero within five years of occupation of a building, rather than immediately following occupation" rather than necessarily having to achieve this on first completion. This modification was only to reflect that this specific Garden Town was expected to come forward in phases (for example, it could be that excess renewable energy generation provision on a later phase could compensate for a shortfall in an earlier phase).

b. In Uttlesford's Inspectors' report:

i. "The [WMS2023] requires that any additional energy efficiency requirement … be expressed as a percentage uplift of the Target Emissions Rate (TER). Core Policy 22 does not use the TER metric but rather adopts alternative metrics, as noted above. We have therefore given careful consideration as to whether a departure from the WMS is justified in this case. [Uttlesford's] Climate Change Evidence Base (CC1) … point[s] out that because TER does not measure the actual energy performance of buildings, it would be difficult to show exactly what proportion of TER reduction would be justified in policy terms. The alternative space heating demand and EUI metrics would not have this shortcoming and would as a result be a more effective and appropriate measure for delivery of net zero operational carbon development. Furthermore, judging by a number of local plans that are either recently adopted or emerging … the EUI metric is becoming more common nationally."

ii. "We … are satisfied that realistic build-cost uplifts have been factored into Viability Assessment Stages 1 and 2 (INF7 and INF8). In the light of this, we accept … that there is reasonable prospect of the Plan's strategic allocations coming forward viably. [The policy also] allows for the possibility of a site-wide residential average approach to EUI limits for dwellings on larger sites, but only in exceptional circumstances. We are satisfied that this provides proportionate flexibility."

iii. "While undoubtedly an ambitious approach, the [EUI-based net zero policy] would help design buildings in ways that contribute to significant reductions in greenhouse gas emissions, which is consistent with the approach to mitigating and adapting to climate change in the [NPPF]. Given the above conclusions we find that there is a justified rationale for the approach taken … Although the use of alternative metrics to TER means that it departs from the WMS, that departure is justified by the evidence presented to us and the objectives of the Plan in addressing climate change."

iv. These inspectors also considered it relevant to note the local political commitments to climate change mitigation as part of the local plan's context; specifically Uttlesford District Council's climate emergency declaration and commitment to net zero in its own operations by 2030 and Essex Climate Action Commission's adoption of more stretching carbon reduction targets than those of national government.

Other sources of feasibility and costs evidence for similar or identical EUI-based energy performance standards

110. While we do not here reproduce the findings of the following additional studies for reasons of brevity and time constraints, please note that the following studies took similar approaches and reached similar conclusions with regards to the feasibility and cost uplift of achieving EUI-based net zero policy standards for new builds. All of the following evidence pieces have been the basis for successful examination of such policies in which they were found sound in light of that evidence, justifying divergence from the TER metric.

a. **Winchester:** Feasibility & costs evidence[liii] produced in 2023. Plan examined in Summer 2025 and provisionally approved via the Inspector's post-hearings note[liv] in September 2025.

b. **Salt Cross, West Oxfordshire:** Feasibility evidence[lv] dated 2020. Plan examined originally in 2021 but rejected by their first Inspectors; however, those Inspectors' decision was overturned in the High Court in 2023 because the rejection was found to have been based on an unlawful interpretation of a 2015 WMS. The policy was re-examined in 2025 and approved via the new Inspector's report[lvi] in January 2026. (Please note that this Salt Cross evidence report did contain cost uplifts too, but those are no longer valid today as they were from the baseline of 2019 which was before the introduction of today's Building Regulations Part L 2021 and Parts S, F and O which were also updated in 2021).

111. As both Winchester and West Oxfordshire are in the South of England, their climate will also be broadly similar to that of Reading. Therefore their feasibility findings are likely to be broadly valid for the Reading situation. If anything it may be even easier to achieve tight space heat demand and EUI targets in Reading because more urban areas (like Reading) tend to have slightly warmer average outdoor temperatures.

TER-based policy options

Feasibility and cost uplift evidence for TER-based net zero policy

112. The TER-based standard described in RBC's submission item EX0056 is based on very recent evidence from neighbouring local authority Wokingham. Wokingham, like Reading, proposes an EUI-based policy but produced evidence to explore what a TER-based policy could entail. As with the EUI-based policy evidence, Wokingham's similarity in climate conditions and housing market makes this study's findings similarly valid in Reading's local circumstances.
113. Wokingham's evidence[lvii] on the potential TER-based policy options, feasibility and cost was conducted in Autumn 2025 and published in January 2026. It followed the following steps:
    a. **Identified three levels that a TER-based policy could seek** versus Part L 2021 baseline:
        i. A 100% TER reduction with no further requirements (regulated net zero)
        ii. A 100% TER reduction and as a step towards that, a 10% improvement on TFEE (regulated net zero carbon with an element of improved fabric)
        iii. A 100% TER reduction and as a step towards, a 10% improvement on TFEE, and then also address unregulated energy via either additional onsite renewable energy or via offset payments. (This reflects Reading's alternative in EX0056).
    b. **Identified the specifications required to meet each TER-based option** in the same archetypes as the Wokingham EUI study (detached, semi-detached, and 4-storey block).
    c. **Identified the build cost uplift** of the specification for each TER-based policy option.
114. As previously noted, Reading's TER-based alternative policy shown in EX0056 is based on option (iii) above – the most ambitious option shown in the Wokingham study. That is because it is the closest to Reading's originally preferred EUI-based policy option in that it addresses total energy use, albeit using less effective metrics (TER) and calculation methods (SAP) than Reading's EUI-based policy would do, thus being less effective in real outcomes.
115. The Wokingham study found that the TER and TFEE targets were feasible in the modelled archetypes. In the houses, it was possible to also fit enough PV on the available roof space to meet the renewable energy target. However, it observes that taller or denser typologies like flats and terraces, which have less roof space per floor area, may struggle to fully meet the renewable energy target and would have to be permitted to partially offset.
116. The cost uplifts identified in the Wokingham study for the standard expressed in Reading's selected TER-based policy option (as per document EX0056) were as follows:
    a. Detached: 4.5% uplift. This is slightly lower than the cost uplift of the EUI-based policy.
    b. Semi-detached: 7.4% uplift. This is higher than the cost uplift of the EUI-based policy.
    c. Block of flats: 8.0% cost uplift. This is higher than the cost uplift of the EUI-based policy.
117. Therefore, the TER-based policy cost uplift is similar to the costs already tested in Reading's viability study cited previously (EV004). The TER-based policy would not *improve* viability compared to the EUI-based policy, and would complicate policy implementation in that more developments would need to involve an element of offsetting.

TER policy effectiveness in fulfilling the legal and policy duty to mitigate climate change

118. Evidence that the TER metric is not sufficiently effective in mitigating climate change in line with the legislated goals of the Climate Change Act has been summarised in previous sections on:
    a. The building performance required for Climate Change Act legislated carbon goals;
    b. Current and incoming Building Regulations' failure to reflect that required performance;
    c. The insufficient scope and inaccuracies of the Building Regulations calculation methods that generate the TER metric.
119. To recap specific points from earlier in the current report:
    a. TER is not an energy efficiency standard but rather a carbon standard and therefore is an imprecise, inappropriate tool to use to express energy efficiency metrics.
    b. TER's scope is too limited: TER and all other Building Regulations metrics, by definition only cover regulated energy uses. This means they neglect the energy use and resulting carbon emissions of all 'unregulated' energy uses in buildings, which make up as much as 50% of energy use and between 23-54% of operational carbon emissions (link to previous citation). This means TER is incapable of expressing a target that makes new buildings fully net zero.
    c. TER is calculated using the methodologies SAP (in dwellings) and SBEM (in non-residential) – and evidence has repeatedly shown that both SAP and SBEM are extremely inaccurate in predicting buildings' actual total energy use (link to section)
    d. A policy based on SAP TER will go out of date very early in the plan period, as SAP is soon being placed by a new calculation method named HEM (see relevant previous section). This would clearly make policy less effective, as superseded versions of SAP do not remain available for use indefinitely. As HEM is not yet available in a usable form, it is yet not possible to set a policy based on HEM.
    e. The UK's legislated carbon budgets are expressed in absolute terms, not in terms of relative reduction. Consequently, the Climate Change Committee and others have identified absolute levels of energy and carbon performance needed in buildings in order to be compatible with those legislated carbon budgets. By contrast, TER (and all other Building Regulations targets) vary by the shape and size of the building, and in non-residential buildings they also vary by the proposed type of heating system. Hence, a "% reduction on TER" will always have variable outcomes and is thus unable to directly relate to the absolute outcomes needed for the Climate Change Act carbon budgets, even if TER did not suffer from inaccuracy and limited scope as noted above.

120. Wokingham's January 2026 evidence report[lviii] found that the most ambitious possible residential TER-based policy option, including a TFEE % reduction target, as echoed in Reading's document EX056, would perform as follows:

a. In the detached house:

i. Space heat demand would be 43.4 kWh/m^2 floorspace / year (whereas in the EUI-based specification it would have been 19.2).

ii. Total energy use could be 30.4 kWh/m^2 floorspace / year (whereas in the EUI-based specification it would have been as low as 25.8).

iii. Renewable energy generation would be 58.8 kWh/m^2 *footprint*/year (while the EUI-based policy would only need 46.6).

b. In the semi-detached house:

i. Space heat demand would be 47.2 kWh/m^2 floorspace / year (whereas in the EUI-based specification it would have been 19.5).

ii. Total energy use would be 35.7 kWh/m^2 floorspace / year (whereas in the EUI-based specification it could be as low as 31).

iii. Renewable energy generation would be 83 kWh/m^2 *footprint*/year (while the EUI-based policy would only need 57.2).

c. In the 4-storey block of flats:

i. Space heat demand would be 36.6 kWh/m^2 floorspace / year (whereas in the EUI-based specification it would have been only 12.1).

ii. Total energy use would be 44.1 kWh/m^2 floorspace / year (whereas in the EUI-based specification it would be 29.6).

iii. Renewable energy generation would be 95 kWh/m^2 *footprint*/year, but this would not be enough to cover the building's energy demand, thus the building would not be truly net zero.

d. As a result, the maximum amount of solar PV panels that could fit on the building's roof would not always be enough to match the total energy demand. This is because the TER and TFEE metrics are not able to ensure the reduction of energy demand to a level that could be met with on-site renewables. This would result in many more buildings having be accompanied by developer contributions to offset this mismatch between demand and generation, compared to Reading's proposed EUI-based policies. Meanwhile, the TER-based policy's failure to minimise energy use would also:

i. Fail to minimise running costs for occupants as effectively as the EUI-based policy would.

ii. Fail to minimise demand placed on the energy grid by new development, compared to the EUI-based policy. Because the TER-based policy is less effective in minimising space heat demand, the homes will have comparatively larger spikes in heat demand compared to those in the EUI-based policy. The TER-based policy therefore would result in higher peak demand on the grid. At the same time, because energy demand is much higher in the TER-based policy than in the EUI-based policy, the TER-based policy needs much more renewable energy generation on site in order to match that. But because the peak renewable generation would happen at a different point in time (summer, middle of day) to the peak energy demand (typically, winter mornings and evenings), the grid would also come under increased strain from energy export at peak PV generation times. The increased PV provision required in the TER-based policy (compared to the EUI-based policy) means higher peak export.

113. **To conclude:**

a. The TER-based policy is no less costly overall than the EUI-based policy.

b. The TER-based policy would involve more developments having to involve an element of offsetting, compared to the EUI-based policy. This is because the TER-based policy is less effective in minimising energy demand and therefore requires more renewable energy provision to reach net zero, which in many cases exceeds the amount that can fit on a building's own roof (whereas the EUI-based policy requires an amount of rooftop PV provision not dissimilar to that of today's Part L 2021 in most cases).

i. This increased incidence of needing to offset would complicate policy implementation and increase the administrative burden on the Council, as well as capturing fewer developments, as the offsetting component of the policy is only proposed to apply to major developments.

c. The TER-based policy does in theory address total energy use, although it does this in a less accurate and less effective way than the EUI-based policy, with less certainty of the on-paper performance translating into actual real-life performance. Thus it is significantly less effective in fulfilling the legal duty, and national policy imperative, of combating climate change.

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