South Oxfordshire and Vale of White Horse Joint Local Plan: Net Zero Carbon Study

Addendum: Demonstrating Local Circumstances

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Introduction

In 2023, Bioregional, Transition by Design and Currie & Brown were appointed to provide South Oxfordshire and Vale of White Horse District Councils (South and Vale) with an assessment of options available within the local planning system to achieve net zero carbon development in South Oxfordshire and Vale of White Horse to inform the emerging South and Vale Joint Local Plan.

This original suite of reports that collectively make up the Net Zero Carbon Study consists of six key elements:

1. **Scoping Report**
2. **Carbon Reduction**
3. **Feasibility Assessment**
4. **Costs Report**
5. **Offsetting Report**
6. **Renewable Energy Spatial Assessment**

Bioregional has been commissioned by South and Vale to produce an addendum to the Net Zero Carbon Study produced throughout 2023 and 2024 to support the Joint Local Plan. The purpose of this addendum to provide a reasoned analysis and evidence base to justify the retention of Joint Local Plan Policy CE2: Net Zero Carbon Buildings (Policy CE2) and demonstrate that it is a necessary policy approach in order for South and Vale to remain in line with their net zero target date of 2045.

This addendum builds upon information presented in Tasks 1-4 from the initial evidence base to directly address the impact the 13 December 2023 Written Ministerial Statement entitled 'Planning – Local Energy Efficiency Standards Update' (2023 WMS/WMS) has on Joint Local Plan Policy (JLP) CE2: Net Zero Carbon Buildings.

Policy CE2 requires net zero operational emissions for new buildings using absolute energy metrics, which depart from the requirements of the 2023 WMS. This study concludes that there are demonstrated local circumstances to justify departing from the 2023 WMS, as the policy approach set out in Policy CE2 is necessary for South and Vale to achieve the local net zero target of both districts by 2045.

To determine whether local circumstances are demonstrated, this study sets a carbon budget for the specific scope of operational carbon of new build housing in South and Vale. Estimated carbon emissions during 2025-2045 associated with Policy CE2, emerging policy in the JLP, and the two potential Future Homes Standard (FHS) specifications, which represent 2023 WMS-compliant policies, have been modelled to conclude whether the carbon budget has been exceeded in any of the three policy scenarios. Where the carbon budget for the operational emissions of new build housing has been exceeded by a policy scenario, a conclusion is drawn that the policy is not aligned with the net zero district targets of South and Vale. This is important to understand as all sectors and associated subsectors in South and Vale must not exceed their proportion of emissions from the overall district-wide carbon budgets, in order to avoid a scenario whether certain sectors must overcompensate for sectors that produce excessive carbon emissions. Although sectors in South and Vale are not strictly limited to designated emissions limits, it is important to set indicative limits to avoid imbalances when determining what policies are appropriate to remain in line with net zero district targets.

In addition to the carbon budget assessment and energy modelling, an analysis of the 2023 WMS has been undertaken, alongside the production of technical arguments to further support why Policy CE2 is necessary to support a net zero South and Vale.

South and Vale as leaders in the low carbon sector

There is a high level of climate ambition present in the districts, and across Oxfordshire more widely, to work together to be at the frontier of addressing climate change. The Oxfordshire Strategic Vision sets out the joint ambition that by 2050 Oxfordshire 'will already be carbon neutral and accelerating towards a carbon negative future'. Raising the sustainability standards of allocations, including requiring net zero carbon buildings to be delivered through Policy CE2, is an essential step towards delivering this vision. The Viability Report supporting the Joint Local Plan has demonstrated that this policy is viable in the districts, and therefore can be successfully implemented.

Oxfordshire has and continues to make a significant contribution to global climate goals through its innovation and research expertise. Vale of White Horse is home to Harwell Campus which hosts the Energy Tech Cluster, which plays a critical role in supporting the climate change agenda and the national net zero ambitions. The Campus also contains the Harwell Living Lab which allows new technologies to be piloted in a real-world environment, including connected and autonomous travel, green fuel solutions, and integrated energy systems which will help to accelerate the adoption and accessibility of these pioneering technology solutions. Additionally, the Campus hosts The Faraday Institution (in which central government has invested £65m), charged with tackling the global energy and battery storage challenge. In South Oxfordshire is Culham Campus, which includes the Culham Centre for Fusion Energy, the national research organisation for the development of fusion energy. This research will support the national ambition to provide clean energy, and therefore help to meet national net zero targets.

There are also other leading businesses and research institutions in the County that contribute towards national and global climate goals, including two universities in Oxford. The Pathways to a Zero Carbon Oxfordshire (PAZCO) report recognises this and provides further detail on

how Oxfordshire ‘is clearly at the forefront of low-carbon innovation, pioneering technologies and business models with global rollout potential’. The report identified an ‘Oxfordshire Leading the Way’ scenario where Oxfordshire would go ‘further and faster’ than other areas of the UK in achieving zero carbon emissions. Subsequently an Oxfordshire Net Zero Route Map and Action Plan was commissioned, based on delivering this scenario.

This builds upon the county’s leadership position in the low carbon sector, driven also by the high level of public support locally for local action and strong policy. This public support can be demonstrated by reflecting on South and Vale’s Regulation 18 Part 2 consultation results. At the Regulation 18 Part 2 Preferred Options consultation stage, 80% of respondents agreed or strongly agreed with the Joint Local Plan raising standards to achieve net zero carbon development across South and Vale. 75% of respondents also preferred Policy CE2: Net Zero Carbon Policy to other policy options, including the ‘do nothing’ approach which would leave the delivery of net zero carbon to the Future Homes Standard/ Future Buildings Standard.

Given the level of ambition and expertise present in the districts and Oxfordshire more widely, and the demonstrated viability of Policy CE2, it is clear that South and Vale, as well as Oxfordshire as a whole, is an ideal place to be the national leader in Local Plan policy on net zero.

1. Summary of the 13th December 2023 Written Ministerial Statement

Introduction

As mentioned, this study explores the impact of the 2023 WMS on Joint Local Plan Policy CE2: Net Zero Carbon buildings, and ultimately demonstrates through establishing relevant local carbon budgets and undertaking energy modelling, that there are local circumstances to justify departure from national policy (the 2023 WMS). This section of the report sets out the necessary context of the 13th December Written Ministerial Statement, and its impact on the Joint Local Plan Policy CE2: Net Zero Carbon Buildings.

Background context

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

Content of the 13th December 2023 Written Ministerial Statement

The WMS places stringent new limitations on the existing powers held by local planning authorities to require improvements in the energy and carbon performance of new buildings in their area. The WMS does not remove the ability to set improved local standards, but it limits them in the following ways:

- **Energy efficiency policy must be expressed as percentage reductions on the Building Regulations Part L TER (Target Emissions Rate)**, using a "specified version of SAP".
- Policies that exceed building regulations should be "**applied flexibly … where the applicant can demonstrate that meeting the higher standards is not technically feasible**, in relation to … local energy infrastructure … and access to … supply chains."

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

Several recent adopted local plans that used other (more effective) metrics to deliver buildings suitable for the UK's carbon goals, such as energy use intensity and space heat demand (Cornwall, Bath & North-East Somerset, and Central Lincolnshire). Importantly, these are the same energy metrics used in Joint Local Plan Policy CE2: Net Zero Carbon Buildings, and therefore the 2023 WMS has a direct impact on Policy CE2.

The WMS emphasises that **any such policies must have a "well-reasoned and robustly costed rationale that ensures that development remains viable, and the impact on housing supply and affordability is considered** in accordance with the National Planning Policy Framework". This is not 'new' – as we would expect any new policy on any topic to need to provide such justification, and there is extensive evidence in the public domain of the costs and feasibility of meeting various types of enhanced energy standard (to be found in the evidence bases of precedent local plans that have adopted such policies). In this document we provide a summary of the local circumstances and justification for Policy CE2 in the Joint Local Plan.

Although the WMS uses the terms "homes" and "buildings" interchangeably, its accompanying documentation (Environmental Principles Assessment and Public Sector Equalities Assessment) makes it clear that the additional requirements the 2023 WMS sets out **is focused on homes specifically**.

What impact does the 13th December 2023 Written Ministerial Statement have on local climate mitigation efforts?

For new buildings, the stipulations of the 2023 WMS make it much harder to fulfil local authorities' legal duty to mitigate climate change (Planning & Compulsory Act 2004) and the expectation laid on them to support "radical reductions in greenhouse gas emissions … [taking] a proactive approach … in line with the objectives and provisions of the Climate Change Act 2008" (National Planning Policy Framework).

The main reasons the WMS makes this duty harder to fulfil are:

1. **The use of a carbon metric, when contrarily the goal is energy efficiency**. The WMS asks for energy efficiency policies to be expressed using the Building Regulations Part L TER (Target Emissions Rate) metric – but TER is not an energy efficiency metric. As the acronym suggests, TER is instead a carbon emissions metric. It is unclear why this choice was made in the WMS, given that the Building Regulations Part L methodology (Standard Assessment Procedure, or commonly known as SAP) also contains two energy efficiency metrics: the TFEE (Target Fabric Energy Efficiency) and TPER (Target Primary Energy Rate).
2. The SAP methodology is perceived by the industry to be **poor at estimating the actual energy performance of a building** – space heating demand in practice can be up to 4 times higher than estimated within SAP – and therefore any of the SAP metrics would not reliably ensure that buildings have the absolute energy efficiency performance that is known to be a necessary part of the UK's legally binding carbon goals. Moreover, SAP fails to account for unregulated energy, which essentially neglects up to 50% of a building's energy use and associated carbon emissions. The unsuitability of SAP metrics is why several recently adopted precedents (Cornwall, Bath & North-East Somerset, and Central Lincolnshire), as well as Joint Local Plan Policy CE2, use

alternative metrics that are effective for delivering energy efficiency and measuring whether a building is 'net zero' – see Section 2 for explanation as to why Policy CE2 is a solution to the downfalls outlined above.

3. **Forcing the use of a 'specified version of SAP' for the required metric:** Standard Assessment Procedure (SAP) is the method used to calculate all target metrics set by Part L of Building Regulations, including the TER metric named by the WMS. SAP is updated more often than Part L. SAP updates can include anything from changes to the assumptions about the baseline building characteristics, to the performance of standard types of equipment to changes in the carbon intensity of grid electricity. The current version is SAP10.2. Some precedent local plans had previously overcome this issue by stating that calculations must simply use "the latest available version" of SAP. That way, the policy does not go out of date each time a new version of SAP is released.

    a. The WMS does not make clear whether it would be acceptable to say, 'the latest version of SAP', or if it would have to be 'SAP10.2' or similar. If the latter, then the WMS would create a scenario where policy would be at risk of going out of date very quickly.
    b. SAP is due to be replaced with a new model, HEM (Home Energy Model) in 2025 when the Future Homes Standard (FHS) is introduced. This too would put local policy out of date unduly quickly if written only for a 'specified version of SAP' to placate the WMS. The HEM recently underwent consultation alongside the FHS consultation – therefore HEM's final form, function and outputs are not yet known. Thus, it is not yet possible to write a policy that uses HEM metric for targets, as it could not currently be robustly assured that these would be feasible or their cost uplifts assessed, even if the WMS had acknowledged HEM's imminent introduction.

How does a Written Ministerial Statement affect the planning system?

Written Ministerial Statements are one of the 'statements of national policy' that local plan-making must take into account, according to the NPPF.

The NPPF forms the overarching set of principles by which the Inspector will conduct the Examination in Public of the submitted local plan, to see if the plan can be considered 'sound', before it can be adopted. The 2023 WMS includes a sentence self-confirming its own status as a relevant statement of national planning policy. The NPPF is also taken into account in individual planning decisions, alongside the local plan itself. The NPPF establishes that, to be 'sound', the plan must pass four tests (with detail here where relevant to carbon):

- **Positively prepared:** Proactively aiming to meet objectively assessed needs.
- **Justified:** Having considered reasonable alternatives, with proportionate evidence.
- **Effective:** Deliverable within the plan period and based on cross-boundary joint working.
- **Consistent with national policy:** "enabling the delivery of sustainable development in accordance with [the NPPF] and other [relevant] statements of national planning policy".

Alongside the 'four tests of soundness', the NPPF also instructs that:

- "National policy statements form part of the overall framework of national planning policy, and may be a material consideration in preparing plans" (Paragraph 5)
- "Other statements of government policy may be material when preparing plans or deciding applications, such as relevant Written Ministerial Statements" (Paragraph 6)
- Specifically, requirements for the sustainability of buildings are expected to "reflect the Government's policy for national technical standards" (Paragraph 159)

Therefore, this WMS is a 'material consideration', i.e. *one of the relevant considerations that the plan must take to account* in order to be found sound and adopted. However, a WMS (like the NPPF) can be departed from if it can be sufficiently justified. Open legal advice notes that case law establishes that a WMS "cannot lawfully countermand or frustrate the effective operation of any … relevant statutory power" (such as the duty to mitigate climate change and the power to require higher local standards) and that "any WMS must lawfully be applied subject to relevant statutory powers, and … justifiable local exceptions, rather than in a blanket fashion".

To deviate from the WMS may be possible if an argument can be made that identifies other material considerations that hold more weight than the WMS. The 2015 WMS on a similar topic had sometimes caused Inspectors to find local plans unsound where the content of those local plans went against that WMS, sometimes years after the WMS was made and overtaken by other pieces of policy. However, at least one high-profile example of such a rejection was overturned in the High Court in 2024 on the basis of having unlawfully interpreted the WMS in question (Salt Cross AAP's energy metric based policies, rejected on the basis of the 2015 WMS).

What is the status of the Written Ministerial Statement versus other national policies or legislation?

Legislation (and the powers it grants or duties it imposes) holds primacy over national policy statements.

If interpreted literally and rigidly, the **WMS' stipulations would make it much harder to fulfil the local plan's legal duty to mitigate climate change** (duty set by the Planning & Compulsory Act 2004, section 19) and the expectation laid on them to support "radical reductions in greenhouse gas emissions … [taking] a proactive approach … in line with the objectives and provisions of the Climate Change Act 2008" (NPPF, paragraphs 157-158 and footnote 56).

The main way the WMS makes this duty harder to fulfil is that its stipulated metric, TER, is not suitable to ensure a building has the energy efficiency performance needed for the UK's

legally binding carbon goals as previously described. That unsuitability is why several recently adopted precedent local plans elsewhere had used alternative metrics that are much more effective for delivering energy efficiency and defining whether a building is 'net zero'.

The government has not indicated how the WMS would affect the ability to fulfil those mandates, nor advised which should take priority where they are in conflict. Case law establishes that there is no legal reason why a WMS cannot contradict the NPPF, and that a WMS is not necessarily 'lesser' than the NPPF, but does not confirm which should be followed when one contradicts the other (for example where the WMS' stipulations inhibit the ability to meet the NPPF expectation for carbon reduction *in line with the Climate Change Act*).

Legislation holds significantly more weight than a WMS. Thus, it should be possible to diverge from the WMS if a strong case can be made that following the WMS would prevent the local authority from fulfilling its legal obligation to 'contribute to the mitigation of climate change' set by the Planning & Compulsory Purchase Act, or where the WMS would inhibit the Climate Change Act.

The most robust way to make such a case would be to produce modelling to evidence the difference that would occur as a result of following the WMS stipulations as opposed to using the more accurate energy metrics – that is both of the following:

- The difference in carbon emissions, and whether this moves the buildings sector's carbon reduction trajectory even further from what it needs to be within the 'Balanced Pathway to Net Zero' as analysed by the Committee on Climate Change to comply with the UK's legislated carbon budgets (set under the aegis of the Climate Change Act)
- The difference in energy efficiency compared to what the Climate Change Committee has shown to be necessary as part of the UK's wider energy system transition needed for all sectors (not just buildings) as part of those legislated carbon budgets as above.

For clarity, it is the purpose of this addendum to provide a reasoned analysis and evidence base to justify the retention of Joint Local Plan Policy CE2: Net Zero Carbon Buildings and demonstrate that it is a necessary policy approach in order for South and Vale to remain in line with their net zero target date of 2045.

Legal challenges against the 13th December 2023 Written Ministerial Statement

A legal challenge to the 2023 WMS has been brought by the same community organisation that successfully won the Salt Cross AAP case, the Good Law Project. The challenge put forward that the WMS 2023 is unlawful on the following grounds:

1. Failure to fulfil the duty (Environment Act 2021) to have regard to the Environmental Principles Policy Statement (EPPS), as no EPPS assessment was released until after the WMS was made and a separate pre-action letter challenged that lack
2. That the WMS 2023 unlawfully purports to restrict local authorities' exercise of powers granted to them by statue (specifically the Planning & Energy Act, but also the Planning & Compulsory Purchase Act which establishes the climate mitigation duty and the statutory presumption in favour of the application of adopted development plan policies)
3. That the 2023 WMS unlawfully misleads the reader about decisionmakers' legal powers.

This case was heard at the High Court on 18 June 2024 but was not successful:

- Ground 1 was rejected because the judge followed other case law that had established that the assessment can come after the national policy itself so long as the assessment is still "done in substance, with rigour and an open mind".
- Grounds 2 and 3 were rejected because the Planning & Energy Act contains a clause within it that local policies must not be inconsistent with relevant national policy, therefore as the WMS is such a relevant national policy, it is in accordance with the Act. However, the judgement does not evaluate the point about whether the WMS' stipulations inhibit the ability to fulfil the separate legal duty to mitigate climate change.

Despite the unsuccessful legal challenge, it is our view that LPAs should remain committed to developing ambitious net-zero policies for new buildings. There should be an emphasis on the importance of robust, evidence-based approaches that demonstrate the effectiveness of stricter energy efficiency standards. While the WMS is a factor to be considered during policy development, LPAs can justify alternative approaches when supported by compelling data.

Existing legislation, such as Schedule 7 (15C) of the Levelling Up and Regeneration Act 2023, mandates LPAs to contribute to mitigating climate change, and the Planning and Energy Act 2008 explicitly grants them the power to set stricter energy efficiency standards than those dictated by Building Regulations.

In conclusion, the WMS is a material consideration for plan-making. However, our view is that it can be departed from if the evidence demonstrates and justifies an alternative approach that is more appropriate to local circumstances, as this report ultimately concludes for South and Vale.

This was confirmed in correspondence between a coalition of local authorities and the Secretary of State for Levelling Up, Housing and Communities, who confirmed that, "Section 38(6) allows for material considerations to be taken into account in the application of development plan policies. The 2023 WMS is simply "a material consideration that the decision maker can consider and apply as he or she sees fit in the particular circumstances of a case".

This communication clarifies the role of evidence in local authority net zero policies. Local development plans must still be informed by robust carbon reduction evidence, such as the Joint Local Plan Net Zero Carbon Study. Net zero building policies using energy-based metrics

(such as Policy CE2) can be a key component of a plan's emissions reduction strategy, aligning with national carbon budgets. Therefore, the retention of Policy CE2 within the Joint Local Plan is important.

As set out in recent legal advice from Estelle Dehon KC, "the 2023 WMS is policy guidance to which regard must be had, but from which deviation can be justified in so long as there is clear evidence which provides the reasons for so doing, and which demonstrates the viability of policies based on [LETI metrics]".

What can the Local Plan still do if the 13th December 2023 Written Ministerial Statement were strictly interpreted?

The WMS only relates to energy efficiency policies, not to policies on renewable energy, embodied carbon, or overall carbon reductions. Therefore, policies on renewable energy could still:

- Require a certain proportion of energy use to be met with on-site renewable energy provision.
    - Define 'energy use' to mean total energy use, not just the regulated energy use as calculated by building regulations
    - Support this with feasibility and cost evidence – noting that several other local plans' similar requirements have been shown to be feasible, albeit those required that energy efficiency targets were met before calculating the amount of renewable energy needed.
- And policies on embodied carbon could still (with suitable feasibility and viability evidence):
    - Require reporting of embodied carbon, and/or
    - Require new development to stay within certain target limits on embodied carbon
- Support this with suitable feasibility and cost evidence – either from the local context or pointing to suitably relevant data from other recent local plans' evidence bases.
- These embodied carbon requirements might need to apply over a certain threshold to ensure the cost of the embodied carbon assessment itself is not prohibitive and that smaller sites are not held back by any shortage of professionals able to undertake the calculation.

2. Comparison of policy scenarios

Scenarios tested

The first step of this study was to undertake energy modelling to produce outputs that will determine which policy scenario results in carbon emissions that are aligned to a net zero South and Vale by 2045.

To test what the emissions of a fully WMS-compliant policy will be, the two policy specifications proposed in the Future Homes Standard (FHS) 2023 consultation are selected as two of the three policy scenarios to be tested against alignment with South and Vale's 2045 net zero district targets. Future Homes Standard Options 1 and 2 (FHS1 and FHS2) both include a heat pump, but it is only FHS2 that specifies on-site solar PV.

In contrast, Joint Local Plan Policy CE2: Net Zero Carbon Buildings (net zero operational carbon), which does not wholly align with the requirements of the 2023 WMS because it does not use the Target Emissions Rate metric, is tested as a policy scenario that is expected to more effectively assist meeting the local net zero targets for South and Vale. Policy CE2 is aligned with industry best practice absolute energy metrics and represents a true net zero operational carbon policy by requiring that on-site renewable energy generation is equal to total energy consumption.

Energy modelling for Policy CE2: Net Zero Carbon Buildings has been undertaken previously in Task 3 of the Net Zero Carbon Study which forms part of the Joint Local Plan evidence base.

For the purpose of this study, it is assumed that all policy scenarios are delivered entirely on-site and there is no use of offsetting to compensate for a lack of on-site mitigation measures.

	FHS Option 1	FHS Option 2	Policy CE2
Metrics used	Target Emissions Rate (or similar under Home Energy Model[1])	Target Emissions Rate (or similar under Home Energy Model)	Energy Use Intensity (EUI) and space heating demand
On-site renewable energy generation (i.e. solar PV panels)	40% of ground floor area	None	To match EUI (i.e. total energy consumption)
Net zero building?	Once grid is fully decarbonised	Once grid is fully decarbonised	Yes, from year 1
Fully aligned with the 2023 WMS?	Yes	Yes	No

WMS-compliant approach (FHS1 and FHS2)	Policy CE2 approach
• Target Emissions Rate metric based on % improvement, not absolute values, which makes comparison difficult due to different baselines used • Only considers emissions of regulated energy only (heating, cooling and lighting), not unregulated energy (plug-in appliances) • SAP is a compliance tool and does not accurately model energy use • Cannot be verified during operation to understand potential energy performance gap between designed and as-built building • Not fit for development of true net zero buildings due to modelling inaccuracy	• Uses absolute energy-based targets that directly limit energy consumption, which are measurable post-construction by the building occupier at the meter • Uses a predictive energy modelling tool (Passivhaus Planning Package) that is proven reduce energy performance gap • Supported by industry evidence as a best-practice approach to deliver true net zero buildings • Easier to predict impact of design and construction choices on resident's energy bills • Prioritises renewable energy on-site, rather than through standalone renewable energy schemes (e.g. solar farms)

[1] It is proposed that SAP will be replaced by the Home Energy Model once the Future Homes Standard is implemented. It is not yet clear whether the Home Energy Model will retain the Target Emissions Rate or not. Whatever the metric used, both FHS options will represent national technical standards.

Energy modelling process

Operational energy calculations have been undertaken in order to compare the emissions of the three policy scenarios against the carbon budget set out later in this report (see section 3). The calculations are made by testing different inputs of building elements for each policy scenario, as set out in the 'envelope performance' and 'building services' tables below. The outputs of energy consumption have then been applied against projected grid decarbonisation factors during 2025-2045.

The following section focuses on the modelling process which has been carried out using Passive House Planning Package (PHPP) to ensure that accurate predictive energy modelling is used. If Policy CE2 was tested using PHPP, whilst FHS1 and FHS2 used SAP as would occur in practice, inconsistency between the modelling tools would result in an inaccurate comparison of emissions between the three scenarios.

PHPP is a modelling tool used to accurately calculate a building's energy use. It is typically carried out to support the design of Passivhaus homes as it provides wide functionality through a range of input variables to determine heat loss, energy and broader comfort metrics. However, the use of PHPP is not limited only to Passivhaus homes and can be used as a generic modelling tool.

Modelling includes both regulated and unregulated energy use of each of the dwelling types to provide a detailed picture of home energy use[2]. An annual energy balance is calculated through the tool, based on heat balance (heat losses through conduction in the homes fabric and air movement) as well as other heat gains associated with solar gains, and internal gains from occupants and equipment.

In order to compare the calculated carbon budgets for South and Vale against the emissions from FHS1 and FHS2, PHPP modelling has been completed using two archetypes: an apartment block (10 dwelling units) and a semi-detached house. The same archetypes have been used as was for the modelling completed to test the feasibility of Policy CE2 from Task 3 of the original evidence base. The modelling outputs then allow a direct comparison of emissions from the three different policy scenarios against the carbon budget for operational carbon of new build housing.

The following tables provide a general summary of modelling inputs referencing both options. These inputs represent different specifications set for different policy scenarios, which are the key factors that influence space heating demand, energy consumption and carbon emissions of buildings. The FHS1 and FHS2 inputs are the exact specifications set out in the FHS 2023 consultation document, whilst the Policy CE2 inputs were set as part of Task 3 of the original evidence base.

[2] In practice, a 2023 WMS-compliant policy, i.e. the FHS, would not assess unregulated energy as the metric it required – Target Emissions Rate – only considers regulated energy.

Envelope performance

Building element	FHS Options 1 and 2	Policy CE2	
		Apartment	Semi-detached
Roof U-value (W/(m^2.K))	0.11	0.10	0.11
External wall U-value (W/(m^2.K))	0.18	0.10	0.15
Floor U-value (W/(m^2.K))	0.13	0.10	0.11
Door U-value (W/(m^2.K))	1.00	1.00	0.80
Glazing U-value (W/(m^2.K))	1.20	0.80	0.80
Air permeability (m3/(h.m2) @ 50Pa)	Option 1: 4, Option 2: 5	0.60	0.60

Building services

	FHS Option 1	FHS Option 2	Policy CE2
Wastewater heat recovery	Yes	No	Yes
Heat source	Air-source heat pump		
Ventilation	Decentralised mechanical vent. (dMEV)	Natural ventilation with intermittent extract	Mechanical ventilation with heat recovery (MVHR)
Renewable energy	Apartment: 38 kWp Semi-detached: 4 kWp	None	Apartment: 47 kWp Semi-detached: 3 kWp

Energy modelling results

		Apartment (one unit)			Semi-detached		
Metric	Unit	FHS 1	FHS 2	CE2	FHS 1	FHS 2	CE2
EUI balance after PV (year 1)	*kWh/yr*	*411*	*3,903*	*0*	*1901*	*4236*	*0*
Net annual carbon (year 1 - 2025)	kg CO_2/yr	64	608	0	296	660	0
Total operational carbon emissions (2025-2045)	**kg CO_2/yr**	673	6,390	0	3,113	6,935	0

As expected, the energy modelling shows that both FHS policy scenarios result in a degree of carbon emissions, with FHS2 resulting in significant emissions. Since Policy CE2 is a true net zero policy, the modelling shows that zero emissions are produced from both archetypes. Due to there being some amount of solar PV on-site for FHS1, precisely 40% of the ground floor area, the EUI balance once solar PV has been considered is considerably closer to net zero than FHS2. Emissions arising from FHS2 are excessive due to the absence of solar PV on-site, and therefore shows the importance of requiring some degree of on-site renewable energy generation, which is not constrained by the 2023 WMS.

To determine the relative contribution from semi-detached and apartment archetypes to the overall carbon emissions in South and Vale from the three policy scenarios from 2025-2045, a % split of emissions from both archetypes is set based on the existing housing type split in South and Vale.

For the purpose of this exercise, the semi-detached archetype is assumed to be representative of semi-detached, terraced and detached housing because the latter two house types have not been modelled in PHPP for this study. Semi-detached housing can be considered an average of house size and carbon emissions between the three housing types. Bungalows and maisonettes are not considered.

According to 2011 census data for accommodation type (no data available by local authority area in 2021 census), 11.2% of residents in South Oxfordshire and 13.4% in Vale of White Horse live in apartments, averaging 12.3% across South and Vale. This study assumes the remaining % of residents live in semi-detached, terraced and detached housing.

[3] Capital costs for the policy scenarios were derived from the FHS 2023 consultation document for FHS1 and FHS2, whilst the costs for Policy CE2 are taken from Task 4 of work previously undertaken for South and Vale.

According to the housing projection figures in South and Vale (see Section 3 for year-on-year data), there will be an additional 1,097 apartments, whilst an additional 7,822 semi-detached, detached and terraced houses will be developed.

		Apartment			Semi-detached		
Number of new dwellings (2025-2045)		1097			7,822		
Metric	Unit	FHS 1	FHS 2	CE2	FHS 1	FHS 2	CE2
Total operational carbon emissions from one dwelling (2025-2045)	**kg CO_2/yr**	673	6,390	0	3,113	6,935	0
Total operational carbon emissions from new housing (2025-2045)	**kt CO_2**	0.74	7.01	0	24.34	54.25	0

	FHS1	FHS2	CE2
Total operational carbon emissions from new housing (2025-2045) (kt CO_2)	**25.08**	**61.26**	**0**

Cost uplift of policy scenarios tested

	FHS1	FHS2	CE2
Capital cost uplift from Part L 2021[3]	**4%**	**1%**	**5.75%**

The table above sets out the % cost uplifts for each policy scenario. Whilst Policy CE2 results in a cost uplift 1.75% higher than FHS1, the draft policy achieves significant carbon savings over the WMS-compliant option. Additionally, Policy CE2 has been tested in the Viability Report and is shown to be viable across both districts and can therefore be successfully implemented from a viability and delivery perspective.

3. Setting a carbon budget for South Oxfordshire and Vale of White Horse

Importance of setting a carbon budget

The exercises undertaken in this section are crucial to determine whether Policy CE2 is a necessary policy approach for South and Vale to meet their local net zero target date of 2045.

To address the scope of the 2023 WMS, the estimated emissions of three policy scenarios assessed in Section 2 can be compared against what the emissions available are for the operational emissions of new build housing in South and Vale, as set by the carbon budget in this section, to align with the district-wide 2045 net zero targets.

Through testing these policy scenarios against the carbon budget, it can be determined whether Policy CE2 is justified and required for the new build housing sector to sufficiently contribute to the achievement of net zero by 2045 in South and Vale. If it is found that CE2 remains in line with the carbon budget, whilst FHS1 and FHS2 do not, then this demonstrates clear local circumstances to justify departure from the WMS and retain Policy CE2.

Net zero context for South Oxfordshire and Vale of White Horse

South and Vale both declared climate emergencies in 2019 and set targets to become carbon neutral districts by 2030 and 2045, respectively. However, both districts are in the process of aligning their district-wide net zero targets to 2045[4]. 2045 is therefore the target net zero date used for the exercises undertaken in this study. For the specific scope of this study, net zero operational carbon in new build housing[5], it is important to consider what policy requirements are aligned with both districts achieving net zero by 2045.

The Balanced Pathway to Net Zero, (set out in the 6th Carbon Budget, linked to the legally binding Climate Change Act 2008 that sets the UK's 2050 net zero target), clearly states that all new build housing must be net zero by 2025 and achieve a space heating demand of 15-20 kWh/m^2/yr. Joint Local Plan Policy CE2: Net Zero Carbon Buildings requires that all new housing achieves exactly these two requirements, and is therefore aligned with policy requirements for a net zero UK by 2050 and subsequently a net zero South and Vale by 2045.

Although the 2045 net zero target for South and Vale is not legally binding as the Climate Change Act 2008 is for the UK, it is crucial that local authorities fulfil their duty to contribute to the national target. It is the responsibility of local authorities to maximise policy ambitions to balance out for less progressive areas of the UK that may not be able to set ambitious policy due to local constraints on viability and supply chain.

Carbon budget methodology

The first step in determining whether a policy, either aligned to the 2023 WMS or alternatively Joint Local Plan Policy CE2, would allow the new build housing sector to fulfil its contribution to achieving the local net zero target by 2045, is to set a specific carbon budget for the operational carbon of new build housing in South and Vale. For reference, the carbon budget for housing (existing and new build), 6,313 kt CO_2, represents 31% of the overall carbon budget for the districts, 20,169 kt CO_2.

The following top-down methodology is based on a previous carbon budget study, Oxfordshire Net Zero Route Map and Action Plan (City Science, 2022), undertaken at an Oxfordshire county wide scale. The carbon budget exercises and analysis do not assume any level of policy ambition and instead represent the maximum allowable emissions to align with South and Vale achieving their local 2045 net zero emissions targets.

Since the 2023 WMS has a specific scope that does not apply to embodied carbon, existing buildings, and non-residential buildings, the final carbon budget only represents the maximum allowable emissions apportioned to the emissions of operational carbon from new build housing.

Baseline carbon budget

As set out in the City Science study, the housing carbon budget does not achieve full decarbonisation to zero emissions. Instead, 37 kt CO2 of residual emissions remain in 2045 across South and Vale. To achieve net zero, the use of carbon removal or offsetting to achieve negative emissions of this magnitude will be required. In practice, the built environment is expected to eventually achieve zero emissions with little or no input from carbon removal or offsetting. However, due to the data available from the City Science report, the assumption that some residual emissions are present in 2045 is made.

The first step to determining the final carbon budget of operational carbon from new build housing is to determine what the overall carbon budget for South and Vale is from the Oxfordshire-wide budget. Although not published, district-level carbon budgets were calculated as part of the Oxfordshire Net Zero Route Map and Action Plan. For housing (existing and new build), these were as follows for 2021-2050:

[4] Vale of White Horse District Council reaffirmed the 2045 district-wide net zero target at the Cabinet meeting on 27/09/204. South Oxfordshire District Council are expected to make a decision to revise its district-wide net zero target to 2045 at the Cabinet meeting on 10/10/2024.

[5] The 2023 WMS only applies to the operational carbon of new build housing and does not apply to embodied carbon, on-site renewable energy, existing buildings or non-residential buildings. Operational carbon is any carbon emitted during the occupancy of a building.

A. South Oxfordshire: 3,375 kt CO_2

Budget Period	Five-Yearly Cumulative Budget (kt CO_2)	Average Annual Budget Within Five-Year Period (kt CO_2)	Percentage Reduction Required against Base Year (235 kt CO2) to Achieve Average Annual Budget
2021 - 2025	1,067	213	9%
2026 - 2030	855	171	27%
2031 - 2035	630	126	46%
2036 - 2040	460	92	61%
2041 – 2045	263	53	78%
2046 - 2050	100	20	92%

B. Vale of White Horse: 2,938 kt CO_2[6]

Budget Period	Five-Yearly Cumulative Budget (kt CO_2)	Average Annual Budget Within Five-Year Period (kt CO_2)	Percentage Reduction Required against Base Year (205 kt CO2) to Achieve Average Annual Budget
2021 - 2025	929	186	9%
2026 - 2030	744	149	27%
2031 - 2035	548	110	46%
2036 - 2040	401	80	61%
2041 – 2045	229	46	78%
2046 - 2050	87	17	92%

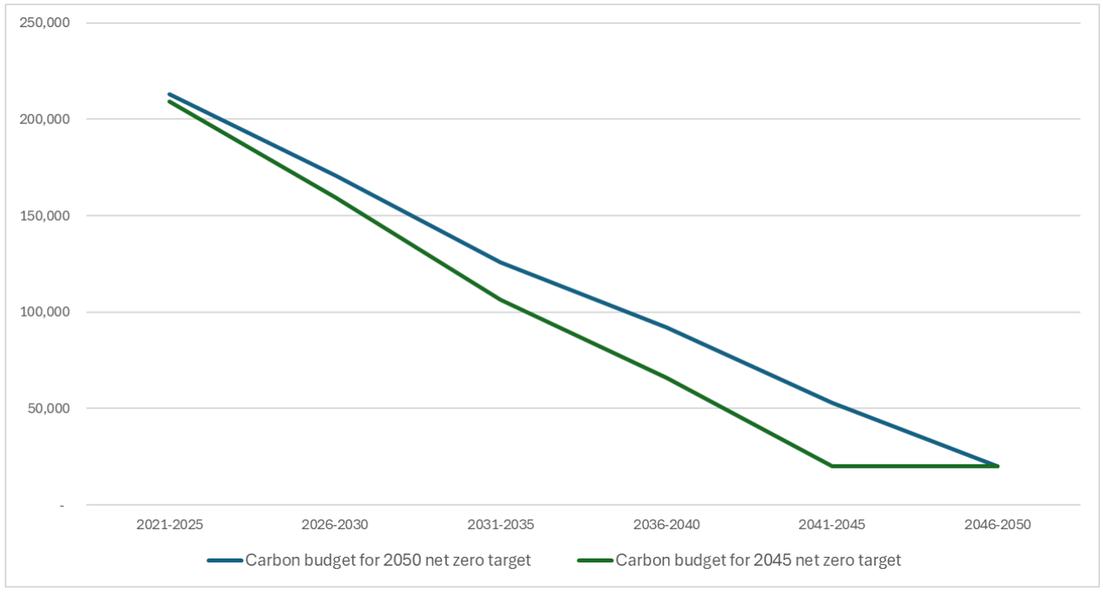
Aligning timescales of policy adoption and net zero target date

The 2022 City Science study assesses carbon budgets according to a 2050 net zero target, aligned with the national and Oxfordshire-wide net zero target. To align with the more rapid trajectory to net zero by 2045 for South and Vale, the carbon budgets set by the City Science study for the Oxfordshire 2050 target date must be amended.

The carbon budget for housing in line with net zero by 2045 is set by applying a more rapid reduction to the residual emissions value by 2045. This has been set in line with the relative equivalent reduction between the 5-year budget periods from the original 2050-compliant budgets.

A. South Oxfordshire

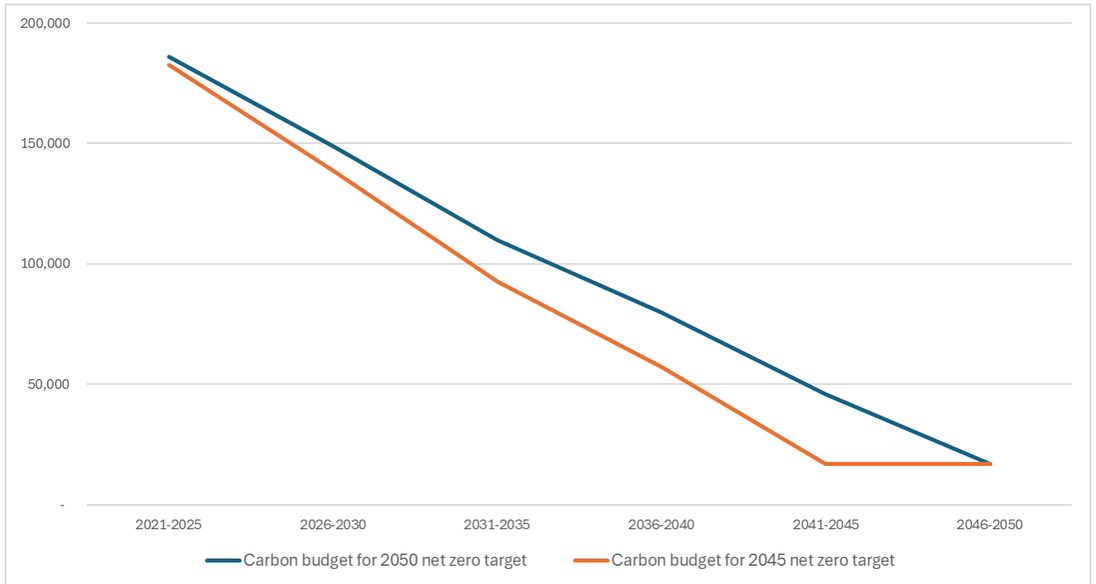
South Oxfordshire	Original budget, net-zero by 2050		New net-zero by 2045 carbon budget	
Budget period	Average annual budget within 5-year period, 2050 target	% reduction against base year	Average annual budget within 5-year period, 2045 target	% reduction against base year
2021-2025	213,000	9.4%	209,011	11.1%
2026-2030	171,000	27.2%	159,396	32.2%
2031-2035	126,000	46.4%	106,236	54.8%
2036-2040	92,000	60.9%	66,071	71.9%
2041-2045	53,000	77.4%	20,000	91.5%



[6] Please note that the county-wide budgets were disaggregated by district, based on the respective share of emissions in the base year period. The district level carbon budgets were a post-processing step completed after the county-wide modelling was completed and was not part of the original specification of the City Science report. Therefore, the approach taken to disaggregate the county-wide modelling done to district level was not extensive but still represents a fair representation of each district's respective carbon budget in line with net zero by 2050.

B. Vale of White Horse

Vale of White Horse	Original budget, net-zero by 2050		New net-zero by 2045 carbon budget	
Budget period	Average annual budget within 5-year period, 2050 target	% reduction against base year	Average annual budget within 5-year period, 2045 target	% reduction against base year
2021-2025	186,000	9.3%	182,535	11.0%
2026-2030	149,000	27.3%	138,786	32.3%
2031-2035	110,000	46.3%	92,673	54.8%
2036-2040	80,000	61.0%	57,201	72.1%
2041-2045	46,000	77.6%	17,000	91.7%



Determining contribution of operational carbon emissions

With the carbon budgets aligned to a 2045 net zero target for housing (existing and new build), the next stage of the study was to determine what proportion of emissions from the budgets should be allocated to operational carbon emissions, and then new build housing in particular to align with budget with the scope of the 2023 WMS.

To determine the allocation of emissions to operational carbon, the split between operational and embodied carbon was calculated based on estimates from the UK Green Building Council's Whole Life Carbon Pathway to Net Zero. As the grid decarbonises through increased installation of renewable energy, the relative impact of operational carbon decreases, whilst the relative impact of embodied carbon increases.

Currently, over 80% of emissions are from the operational use of buildings with the rest of embodied emissions from materials used to construct the houses. By 2045, it is expected that embodied emissions will account for the higher share of a carbon figure that has reduced in absolute terms. Estimates for the split of operational versus embodied emissions are as follows:

Category	2025	2030	2035	2040	2045
Embodied – domestic buildings (Mt CO_2e)	11.7	27.4	9.4	4.5	3.1
Operational – domestic buildings (Mt CO_2e)	67.2	35.1	11.7	5.7	2.6
Total emissions (Mt CO_2e)	78.9	62.5	21.1	10.2	5.7
% emissions embodied	15%	44%	45%	44%	54%
% emissions operational	85%	56%	56%	56%	46%

A. South Oxfordshire

Budget period	Average annual budget within 5-year period, 2045 target	Operational emissions % - average across 5 years	Carbon budget operational emissions 2045
2021-2025	209,011	84%	176,107
2026-2030	159,396	68%	108,070
2031-2035	106,236	56%	59,259
2036-2040	66,071	56%	36,828
2041-2045	20,000	50%	9,944

B. Vale of White Horse

Budget period	Average annual budget within 5-year period, 2045 target	Operational emissions % - average across 5 years	Carbon budget operational emissions 2045
2021-2025	182,535	84%	153,798
2026-2030	138,786	68%	94,097
2031-2035	92,673	56%	51,693
2036-2040	57,201	56%	31,884
2041-2045	17,000	50%	8,452

To fully align the carbon budgets with the likely adoption date of the Joint Local Plan/Policy CE2 (assumed and anticipated to be 2025) and South and Vale's 2045 net zero target, the carbon budget values associated with 2021-2024 are removed. The assumption made here is that the carbon budget values have been met during these years. The subsequent carbon budget value for operational carbon emissions from housing during the period of 2025-2045 is as follows:

A. South Oxfordshire: 1247 kt CO_2

B. Vale of White Horse: 1084 kt CO_2

Determining the contribution of carbon emissions from new build housing

Year	South Oxfordshire	Vale of White Horse
2021/22	977	1,210
2022/23	1,359	1,359
2023/24	980	1,168
2024/25	841	1,025
2025/26	1,118	1,238
2026/27	1,135	1,204
2027/28	1,381	1,366
2028/29	1,067	1,453
2029/30	906	1,299
2030/31	753	1,093
2031/32	782	1,049
2032/33	1,121	1,071
2033/34	1,277	1,074
2034/35	1,246	953
2035/36	963	754
2036/37	935	679
2037/38	957	536
2038/39	839	536
2039/40	839	407
2040/41	839	305
2041/42	839	305
2042/43	839	305
2043/44	688	305
2044/45	485	305
Total	23,166	20,999

The final remaining stage was to determine the proportion of emissions attributed to existing buildings and new build housing. To determine what a fair and reasonable emissions carbon budget value for the new build sector is, expected emissions from 2025 to 2045 have been calculated for both existing households and new build housing under a business-as-usual no intervention scenario.

For existing housing, energy consumption data has been assessed and applied against grid decarbonisation factors. This is necessary, as to calculate carbon emissions, energy

consumption as kWh must be multiplied by the carbon factor of the energy source that is used. The grid carbon factors used for existing and new build housing are sourced from National Grid (electricity, location-based - FES 2023 "Falling Short" grid carbon intensity).

The average energy consumption for South Oxfordshire and Vale of White Horse in 2023 for all properties was 24,674 kWh. 2023 was selected instead of 2024 to account for a full year of energy consumption fluctuations that occur due to seasonal variation of energy consumption.

The energy consumption data does not distinguish between gas and electricity consumption. Therefore we can determine what the likely split between the two energy types is from average gas and electricity consumption data, which concludes that approximately 81% of all energy used is from gas. With the appropriate carbon factors applied for gas and electricity, with the latter representing grid decarbonisation, the average carbon emissions arising from an average home during 2025-2045 can be assumed to be 88 tCO_2.

According to 2021 census data, there were 61,497 homes in South Oxfordshire in 2021 and 57,498 in Vale of White Horse, totalling 118,995 homes.

Combining the existing households from the 2021 census data and the housing projections for both districts, which are based on the expected number of homes to be built according to the housing growth levels set for South and Vale, we can assume that there will be approximately 127,914 households in South and Vale in 2025, the anticipated year of policy adoption.

To determine a fair proportion of the overall housing carbon budget to new builds, the expected emissions for existing buildings and new builds have been calculated. For this exercise, we have assumed a semi-detached building.

For new builds, the higher emissions Future Homes Standard scenario (FHS2 – see section 2) has been used to calculate what the expected emissions of new households from 2025-2045 are. This assumption has been made as FHS2 represents a no-intervention scenario at local policy level because once the Future Home Standard (FHS) has been implemented, we expect it won't be replaced by a more stringent national policy. FHS2 has been selected rather than FHS1 as this is the more emissions intensive scenario. If FHS1 was selected, this would have reduced the carbon budget set for the new build sector and represented a potentially overly optimistic scenario.

For existing buildings, we have tested three scenarios to produce a range of carbon budgets appropriate for new build housing, which are determined by the level of emissions reductions that could occur in the existing housing subsector.

The first, a no-intervention scenario that only accounts for grid decarbonisation and no retrofit measures, the second, a 40% CO_2 reduction scenario from the no-intervention scenario that could be delivered from extensive various retrofitting, and the third, a scenario that assumes all existing buildings have a heat pump installed from 2030. It is important to account for retrofitting in determining a fair split of carbon budget between existing buildings and new builds, so that the new build operational carbon budget is not limited due to a high level of expected existing buildings emissions.

Existing housing scenario 1: Number of existing households (127,914) x average carbon emissions of one household from 2025-2045 with no interventions (88 tCO_2) = 11,213 kt CO_2

Existing housing scenario 2: Number of existing households (127,914) x average carbon emissions of one household from 2025-2045 with 40% reduction due to various retrofit measures (57 tCO_2) = 6,728 kt CO_2

Existing housing scenario 3: Number of existing households (127,914) x average carbon emissions of one household from 2025-2045 with heat pump installed in 2030 (48 tCO_2) = 4,800 kt CO_2

New build homes built to Future Homes Standard (Option 2) scenario: – Number of new builds 2025-2045 (8,919) x emissions of FHS2 scenario = 62 kt CO_2

Please note that the existing housing scenarios variants are not based on robust data and have been exercised to estimate a rough range of expected emissions from 2025-2045. An additional study could be commissioned to understand which scenario is most likely to occur from 2025-2045.

The % contribution of the existing buildings scenarios for expected emissions from 2025-2045 ranges from 98.72 – 99.45%.

The combined budget for South and Vale for housing from 2025-2045 is 2,331 kt CO_2, therefore the new build housing carbon budgets for operational carbon are as follows based on each existing housing scenario:

Scenario 1 (no intervention): 13 kt CO_2

Scenario 2 (40% CO_2 reduction): 21 kt CO_2

Scenario 3 (heat pumps by 2030): 30 kt CO_2

Scenario 1 represents the most realistic scenario, particularly given that grid decarbonisation is already accounted for, yet no further retrofit measures are considered. Scenarios 2 and 3 represent high ambition scenarios where significant retrofitting occurs during 2025-2045.

4. Conclusion to determine alignment with 2045 net zero targets

The aim of this conclusion is to determine which of the two policy approaches, Joint Local Plan Policy CE2 or a WMS-compliant FHS policy, will not exceed the remaining carbon budget for operational carbon of new build housing in South and Vale to ultimately help achieve their local 2045 net zero targets.

	FHS1	FHS2	CE2
Total operational carbon emissions from new housing (2025-2045) (kt CO_2)	**25.08**	**61.26**	**0**

For reference, the carbon budgets from Section 3 are again listed below:

Scenario 1 (no intervention): 13 kt CO_2

Scenario 2 (40% CO2 reduction): 21 kt CO_2

Scenario 3 (heat pumps by 2030): 30 kt CO_2

As expected, the total carbon emissions from new housing during the period of 2025-2045 results in zero emissions, as the policy represents true zero carbon development and therefore is aligned to all three carbon budget scenarios.

The FHS2 policy scenario for new housing results in carbon emissions that significantly exceed the emissions required to align with all three carbon budget scenarios. FHS2 is therefore not an appropriate policy to align with South and Vale's 2045 local net zero target.

Carbon emissions resulting from the FHS1 policy scenario is aligned to the required emissions to remain in line with scenario 3 carbon budget emissions. However, FHS1 emissions exceed the budget value for scenarios 1 and 2.

It is important to note that it is highly unlikely that all homes in South and Vale will have heat pumps installed by 2030 and scenario 3 therefore represents a high ambition scenario that the districts are currently not on track for. At a national level, approximately 60,000 heat pumps were installed in 2022, which would not be enough to cover 50% of all existing housing across South and Vale. Therefore, the task of installing a heat pump across all housing in South and Vale by 2030 requires a vastly improved rollout rate than is currently occurring in the UK.

Scenario 2 is technically achievable in the 2025-2045 period, but still represents a high ambition scenario that is also unlikely to occur within the 20-year period assessed. Buildings emissions in the UK have dropped by approximately 30% over the last 10 years, yet this has primarily been due to grid decarbonisation, which is already accounted for in the emissions analysis for each scenario. Therefore, the 40% reduction would have to occur on top of grid decarbonisation through electrification and increased on-site renewable energy provision.

The purpose of the scenario testing for existing buildings is to show the scale of action required to justify a larger carbon budget for new housing in South and Vale. The key driver for carbon emissions reductions in existing buildings is grid decarbonisation, which is already accounted for in scenario 1. Although scenario 1 does not account for any additional retrofit measures, it represents the most realistic current scenario. The carbon budget for new build housing associated with scenario 1 is therefore the most reasonable and justifiable. Under this assumption, neither of the FHS policy scenarios are likely to be aligned with the 2045 local net zero target for South and Vale.

Clearly, every possible 2023 WMS-compliant policy scenario has not been tested in this study. However, the wider point must be focused on that all the existing housing scenarios exceed the overall housing (existing and new build) carbon budget in South and Vale, 2331 kt CO_2. Even for scenarios 2 and 3, which represent high ambition scenarios that are unlikely to occur, the overall South and Vale housing carbon budget for 2025-2045 is exceeded by 206% and 289%, respectively.

Given that the housing emissions in South and Vale are unlikely to remain within the carbon budget for both existing and new housing, it is essential that new build housing does not further add to the burden of remaining within the budget. It is arguably sensical that no carbon budget should be apportioned to new build housing since the existing housing subsector is already subject to major carbon mitigation measures that are currently not being employed.

Local plan policy must therefore require robust targets and metrics that truly result in zero carbon development, as Joint Local Plan Policy CE2 currently achieves. This is currently not achievable under a 2023 WMS-compliant policy, such as one reflecting the FHS, as the Target Emissions Rate in the Standard Assessment Procedure, as required by the WMS, does not consider unregulated energy that can account for up to 50% of carbon emissions in new builds. The modelling found that both Future Homes Standard Option 1 and Option 2 resulted in residual emissions from new build housing in 2045, the year of South and Vale's 2045 local net zero target, whilst Joint Local Plan Policy CE2 did not contribute any emissions from new build housing.

It is therefore explicitly apparent that new build housing must be subject to stringent policy that genuinely achieves zero carbon development. Inadequacies and inaccuracies associated with Building Regulations, due to its metrics and modelling tools, cannot be risked through policy implementation according to the 2023 WMS. This study has clearly shown that both FHS options are not appropriate policy to be aligned with South and Vale's local net zero target. Even with a carbon budget set for the new build housing subsector, it is only a true net

zero policy such as Policy CE2 that should be considered appropriate and in line with South and Vale's 2045 local net zero target. Therefore, this study has clearly shown that local circumstances exist to justify a departure from national policy, i.e. the 2023 WMS, as South and Vale would exceed their remaining carbon budget for new build housing if a policy aligned to the 2023 WMS was implemented, whilst Policy CE2 would help to achieve it, as well as their local 2045 net zero target.

As set out in the beginning of the report, South and Vale are well positioned to be national leaders in local plan policy on net zero. The districts contain two science and innovation centres that are leading the way on low carbon innovation, meaning expertise and ambition sit at the heart of our districts. This report, when combined with the wider Net Zero Carbon study findings, provides a strong evidence base to justify that Policy CE2 can be successfully implemented, and crucially needs to be implemented to help meet South and Vale's 2045 local net zero target. Not only does Task 3 of the Net Zero Carbon Study demonstrate the feasibility of achieving the policy targets within Policy CE2, the policy has also been rigorously costed and determined to be viable in the districts' Viability Report. Overall, it is clear that there are local circumstances within the districts to demonstrate that Policy CE2 can, and importantly should, be implemented in the Joint Local Plan.

Appendix: Supporting technical arguments

Grid implications from different policy approaches

As the grid decarbonises through a greater share of renewables in the mix of electricity generation, infrastructure upgrades will be required since the capacity of the electricity grid will need to be larger than it currently is. As the UK transitions away from fossil fuel transport and gas heating to electric vehicles and heating, electricity demand will significantly increase – however, this is not the only reason why the net zero carbon transition requires grid capacity upgrades. The other reason is to account for the varying levels of electricity generation due to weather variations, such as a prolonged period with or without solar PV or wind energy generation. The UK electricity grid infrastructure is not yet prepared for this anticipated increase in capacity or flexibility to respond to fluctuations in generation. This inhibits growth towards a net zero South and Vale and UK.

Upgrades to the capacity of power sub-stations are already becoming problematic to achieve due to a lack of investment and is subsequently limiting some areas in the UK to no new connections until the mid-2030s. This is a clear barrier to achieving net zero at both a local and national level, which could resultantly limit the electrification of heat and transport. This could also present obstacles to a net zero carbon new development policy that relies on the development's ability to export zero-carbon power to the grid in order to balance out the amount of grid electricity it has to use at times when the development's own on-site renewables are not able to match its energy use.

The local plan must therefore provide the best available framework to enable these infrastructure upgrades and move towards a decentralised local energy network that is increasingly self-sufficient and resilient to future challenges. Policy CE2 takes the correct approach by first and foremost reducing the amount of energy consumed by new development. Contrarily, the use of the Target Emissions Rate metric, a carbon metric required by the 2023 WMS, does not truly limit energy consumption and therefore risks posing an unnecessary additional burden on grid constraints.

The scale of intervention required to achieve net zero carbon at a local scale is difficult to predict without specific modelling for the area. However, the local plan can ensure that interventions for new development halt any new emissions from new development (i.e. require that all residential and non-residential buildings can generate sufficient renewable energy on-site to match the total energy that is consumed). It is inevitable that grid infrastructure upgrades and a large increase in localised energy storage is necessary to achieve a resilient net zero local system, which must be supported by policy that utilises absolute energy metrics to ensure that policy does not enable excessive energy consumption in new build housing.

Housing impact and supply chain implications

Since January 2023, three pioneering local authorities (Bath & North East Somerset, Cornwall and Central Lincolnshire) have implemented ambitious policies based upon industry best practice Energy Use Intensity and space heating demand metrics, which go further than the proposed Future Homes Standard options. Crucially, these policies are supported by extensive evidence bases that demonstrate feasibility and viability, as shown in the table below.

Government and volume housebuilders have argued that these policy approaches, which depart from Building Regulations scope and metrics, negatively impact housing supply. Sustainability industry leaders believe that this is not the case and policies that utilise absolute energy metrics can be and are being successfully implemented at scale.

Local authority	**Policy**
Bath & North East Somerset	40 kWh/m2/year – Energy Use Intensity 30 kWh/m2/year – space heating demand On-site renewable energy generation to match Energy Use Intensity
Cornwall	40 kWh/m2/year – Energy Use Intensity 30 kWh/m2/year – space heating demand On-site renewable energy generation to match Energy Use Intensity
Central Lincolnshire	35 kWh/m2/year – Energy Use Intensity 15-20 kWh/m2/year – space heating demand On-site renewable energy generation to match Energy Use Intensity

To determine whether housing supply and viability have been impacted by policy implementation, planning application data from these three local authorities is assessed below[7].

[7] Please note that the following data was collected in early 2024 and does not include more up-to-date data.

1. Cornwall Council

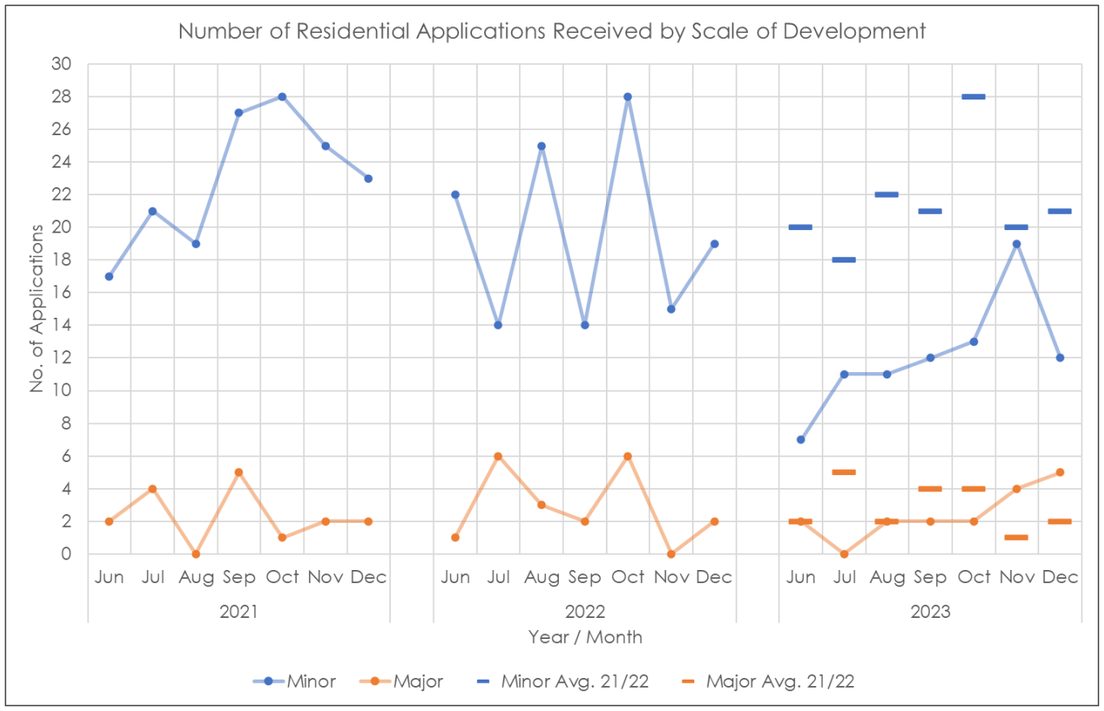
	Applications received*
2022 Q4 - prior to policy implementation	1600
2023 Q1- prior to policy implementation	1708
2023 Q2- prior to policy implementation	1354
2023 Q3- post policy implementation**	1469
**This includes all types of planning applications - i.e. not only new build homes subject to net zero EUI-based policy.* ***Policy implemented on 15 June 2023.*	

2. Bath & North East Somerset Council

	Residential applications granted permission
2022 - prior to policy implementation	104
2023 - post policy implementation*	112
**Policy implemented from January 2023.*	

	****Residential applications refused permission**
2022 - prior to policy implementation	104
2023 - post policy implementation*	112
**Policy implemented from January 2023.* **Not necessarily refused on basis on net zero carbon policy non-compliance.	

3. Central Lincolnshire



	Minor residential applications received	**Major residential applications received**
2021 (Jun-Dec*) - prior to policy implementation	160	16
2022 (Jun-Dec*) - prior to policy implementation	137	20
2023 (Jun-Dec*) - post policy implementation	85	17
**6-month period provided by Central Lincolnshire to reflect a consistent period of post-adoption (plan adopted in April 2023) applications received.*		

Firstly, it is important to note that the initial period of local plan implementation experiences lower application rates due to new policy requirements and developers becoming accustomed to these. Therefore, this analysis does not seek to claim that a direct correlation is apparent between EUI-based policy implementation and planning application trends because such trends are controlled by a multitude of factors. However, what this data does do is contribute to a line of argument that these policies are in fact not significantly impacting housing supply in practice. We are not aware of any evidence that supports the contrary.

The findings in Cornwall show that the number of applications received increased from 2023 Q2 to 2023 Q3. Although new build dwelling applications are not assessed individually here (data not currently available), it is clear that the trend of applications received upon Climate Emergency DPD adoption (which implemented a net zero policy) is positive. Notably, no sudden increase in applications received occurred prior to policy adoption, which can typically be expected when the implementation of new and improved policy standards is imminent. This suggests that the introduction of DPD policies has not hindered the efficiency of the application process in Cornwall.

Assessing the EUI-based new build residential local plan policy (Policy SEC1) in more granular detail, data provided by Cornwall Council shows that for the period 15 June 2023 (date of policy implementation) - 29 January 2024, only 1 application has been refused due to non-compliance with SEC1. Moreover, the refusal in relation to SEC1 was due to an absence of required submission documentation, rather than feasibility or viability issues in achieving energy requirements. The Bath & North East Somerset (B&NES) data supports the fact that application refusal rates have not been impacted by the introduction of policies that use absolute energy metrics, strongly suggesting that these policies do not impact housing supply.

Similarly, the increase from 104 in 2022 to 112 in 2023 of accepted residential applications shown in the B&NES data provides additional support to the notion that development schemes subject to energy-based policy requirements are viable.

The success of implementation in B&NES and Cornwall reflects the extensive work carried out with applicants to support policy compliance and, in cases with agreed technical or viability limitations, apply appropriate flexibility. As with any novel policy approach, upskilling of local authority officers and industry is essential. If sufficiently addressed, innovation can be successfully implemented.

The same trends are not found in the data for minor residential applications in Central Lincolnshire. However, it is important to note that this only applies to minor applications (1-9 dwellings). Major residential applications (10+ dwellings) show no significant deviation from the 2021/2022 average and have in fact surpassed this average in the two most recent months assessed. Given that major applications have not been impacted by the introduction of an energy-based policy, the delivery of homes at scale - the core argument proposed by those against energy-based net zero policy - does not appear to be an issue.

To address negative trends for minor residential applications in Central Lincolnshire, insight from officers explains that this has primarily been due to a lack of documentation awareness and subsequent invalidation of applications. No information or data indicates that the use of absolute energy metrics has determined a reduction of minor residential applications.