Climate Change Evidence Documents

Document C – The contribution of sustainable design to achieving Net Zero

Huntingdonshire District Council

Final Report
Prepared by LUC
November 2024

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Executive Summary

The UK has set legally binding targets to achieve net zero greenhouse gas emissions by 2050. Whilst local authorities are directly responsible for only 2 to 5 percent of local emissions, their policies and partnerships they have strong influence over more than a third of emissions in their area **[See reference** 1**]**. Local authorities therefore have a crucial role to play in achieving the UK's 2050 Net Zero greenhouse gas emissions target.

The built environment is responsible for about 25% of the UK's total greenhouse gas (GHG) emissions and as such will play a key role in reducing greenhouse gas emissions.

Huntingdonshire District Council (HDC) has a target for it to reach net carbon zero by 2040 and has an aspiration for the district as a whole to achieve net zero carbon by 2040. However, we note that relying on grid decarbonisation to achieve net zero operational emissions in the built environment introduces a level of uncertainty as the scale and pace of grid decarbonisation is not guaranteed. As such, there is a clear need to increase the level of ambition if the Council is to achieve its targets.

HDC commissioned LUC and Aether to provide guidance on the role of sustainable design in contributing to net zero carbon in new development, and provide specific advice on future policy approaches.

The purpose of this document is to provide HDC with an evidence base to support the Huntingdonshire Local Plan Update to shape new development in the district in ways that mitigate and adapt to climate change through an overview of the key policy mechanisms available for achieving net zero carbon by promoting sustainable design in developments in Huntingdonshire.

Based on the emissions modelling and risks analysis conducted in **Documents B and D**, the evidence available on related policy responses, and discussions with HDC to understand the context of land use planning in the District, it makes

a series of recommendations for the Council to support its efforts to respond to climate change via implementation in the forthcoming Local Plan update and across wider policymaking.

Chapter 5 and 6 of this document explore policy mechanisms across the following themes to promote sustainable design in developments in Huntingdonshire:

- Approaches to net zero carbon development
- The use of sustainable materials and the circular economy
- Retrofitting and retaining exiting building stock
- Nature-based solutions
- Sustainable travel
- Water efficiency
- Design for adaptation

Listed below are each of the policy recommendations made in Document C to HDC. Within Chapters 4 and 5, each of these **policy recommendations** is discussed in detail alongside other **policy suggestions** which may still be practicable, implementable and produce positive results for HDC if adopted in its next local plan.

Each policy recommendation and suggestion sub-section describes the context of the option, how it might be implemented, worthwhile examples and case studies of similar adopted policies and approaches, technical feasibility of the option, cost implications and summaries of benefits and limitations. Where policy recommendations are made, the sub-section ends with a summary of the policy recommendation being made, identified by the following box.

We recommend that HDC……

With regards to **approaches to net zero carbon development**, LUC recommends that HDC:

- HDC should set policy requirements to achieve minimum scores against quantitative embodied carbon targets to ensure limits on embodied carbon in construction materials and construction processes in domestic and non-domestic developments. It should require that large scale new-build developments are required to submit an Embodied Carbon Assessment demonstrating a score of less than 900kgCO2e/m2 can be achieved.
- HDC should embed the use of accreditation schemes in policy, specifically both BREEAM for commercial and HQM for residential development. On operational energy standards, HDC should set minimum credits for commercial properties to be achieved in the "Energy performance" and "Prediction of operational energy consumption" and "Beyond zero net regulated carbon" categories of BREEAM (or equivalent) to demonstrate that the development has surpassed or achieved net zero regulated emissions. For residential development, minimum credits should be set in the HQM "Energy performance" and "Towards carbon negative" categories of HQM (or equivalent) to demonstrate that the development produces net zero or close to net zero regulated and unregulated emissions.
- Should HDC not wish to adopt specific locally-set embodied carbon targets (above), it could require that major new build developments undertake a whole life-cycle (WLC) carbon assessment using a nationally recognised assessment methodology, and seek to minimise WLC emissions demonstrated through achievement of relevant credits in HQM, BREEAM, or equivalent.

Regarding the use of sustainable materials and the circular economy, LUC recommends that HDC:

- Produce a new authority-wide design code that places a strong emphasis on using local materials and specify waste management practices in new developments, as part of a new ‘Supplementary Plan’.

In addition to reducing emissions from new developments we recommend emission reduction by retrofitting and retaining existing building stock in Huntingdonshire through:

- HDC should produce guidance to encourage developers and residents to make consequential retrofit improvements as part of works to smaller and larger buildings. This would provide guidance on what is accepted nationally and locally and point them to sources of finance, further guidance, materials and even local networks of contractors experienced in retrofit and retrofit-related activities.

With regards to nature-based solutions, we recommend HDC:

- Includes policy that requires new trees and other green infrastructure in new developments. Applicants should be required to plan around a set of principles of green infrastructure design, including maximising tree planting opportunities for carbon sequestration, soft landscaping and use of green living roofs. Policy wording could promote root space and select specific species for sequestration, alongside their abilities in providing cooling.

Regarding sustainable travel we recommend HDC:

- Specify a minimum of EV chargers in a given development, going beyond current standards on EV charging in new development contained within the Building Regulations.

- HDC incorporate a policy on accessible car club parking spaces and/or contributions towards the provision of car clubs in the vicinity of developments.
- *Other policy suggestions within Chapter 6 on sustainable travel should also be considered in tandem with these policy recommendations as sustainable travel needs to be viewed wholistically, considering location and manner of new development along with transport interventions within them.*

On water efficiency, we recommend HDC:

- Require 85 litres per person per day in new dwellings where evidence exists to support it. For non-residential development, requirements could be rise beyond just 'Good' in BREEAM's Wat 1 category.
- Require developers to provide a water efficiency statement at application stage, displaying how the principles of the sustainable water hierarchy have been adhered to, ensuring that water efficiency is considered from an early stage of project development and how the target, above, will be met by the developer.

With regards to designing for adaptation, we recommend HDC:

- Include a policy in its new local plan requiring applicants to submit plans that show adaptation to a heating climate has been considered. This will consider issues of form, orientation, insulation and ventilation. Developer responses should be informed and led by new guidance produced by HDC either contained in brief form within the plan policy itself, newly constructed guidance or a new design code specifying particular design responses required to meet the threat of overheating and other adaptation challenges.

Chapter 1

Introduction

1.1 This document provides an overview of the key policy mechanisms available for promoting sustainable design in developments in Huntingdonshire, such that they contribute towards the achievement of net zero.

1.2 Based on the emissions modelling and risks analysis conducted in **Documents B** and **D**, the evidence available on related policy responses, and discussions with Huntingdonshire District Council (HDC) to understand the context of land use planning in the District, it makes a series of recommendations for the Council to support its efforts to respond to climate change via implementation in the forthcoming Local Plan update and across wider policymaking.

1.3 Chapter 3 explores best current legislation, building regulations and best practice frameworks and standards on net zero development.

1.4 Chapter 4 explains and explores the concepts of embodied carbon and operational carbon in development.

1.5 Chapter 5 discusses the best available approaches for HDC seeking to achieve low carbon or zero carbon emissions from new development via its upcoming local plan. It makes two policy recommendations within that chapter that HDC should take on in its plan update.

1.6 Chapter 6 discusses policy options on sustainable design that would support the approaches above on climate mitigation and also address the threats posed by climate adaptation. It makes a series of policy suggestions and more firm policy recommendations that can be taken on in to the new local plan.

1.7 All references to 'the government' contained in this report refer to the Conservative-led government prior to 4th July 2024.

Overview

1.8 On the 22nd of February 2023, HDC councillors formally recognised a climate crisis and ecological emergency in Huntingdonshire and adopted a Climate Strategy which includes a target for the council to reach net carbon zero by 2040, and an aspiration for the district as a whole to be net zero carbon **[See reference** 2**]**. Key opportunities for action include aligning policy and functions with net zero targets. Ensuring new developments are designed to address mitigation and adaptation to climate change is a key area of focus **[See reference** 3**]**.

1.9 HDC aims to reduce consumption of energy and fossil fuels, within their own estate and operations, through:

- Improvements to the energy efficiency of council buildings;
- Looking for opportunities to install renewable energy on land and buildings; and
- Adapting building and services to be more resilient to prepare for the impacts of climate change.

1.10 HDC's commitment to net zero and imperative to respond to climate change, more broadly, through the local plan process is described in detail in **Document A** of this evidence base.

1.11 On sustainable design, the Local Plan to 2036 **[See reference** 4**]** contains allocations and policies to provide at least 20,100 new homes and sets out the Council's approach to securing sustainable development through design, including key objectives to:

- Utilise sustainable design and construction techniques as a minimum to meet national standards for building performance as they evolve and to exceed them where feasible and viable to do so; and
- Take advantage of opportunities for minimising energy and water use and for securing carbon emissions reductions in all new development and transport choices.

1.12 Its key overarching policy, setting out the Council's approach to achieving high standards of design, is Policy LP12: Sustainable Design and Construction Methods which states (amongst other requirements) that a proposal will be supported where it can demonstrate that it "makes efficient use of energy, water and other resources, such that all new homes comply with the optional building regulation for water efficiency, as set out in Approved Document G and non-residential uses meet Building Research Establishment Environmental Assessment Method (BREEAM) standards (or successor or equivalent standards) 'Good' as a minimum" and "successfully integrates the functional needs of the development including refuse and recycling, cycle storage and car parking so that their dominance is minimised".

1.13 Huntingdonshire District Council has itself stated in its Local Plan update documents that "climate change and responding to the climate crisis is one of the greatest challenges facing our society and is now a much bigger priority than ever before", highlighting energy efficiency and retrofitting, amongst other key issues, as being important to achieving a net zero carbon future **[See reference** 5**]**. The Huntingdonshire Futures Place Strategy Feedback also showed that residents "wished to see action regarding climate change and to see house building that was more environmentally conscious and minimised environmental impacts through measures such as net zero building, renewable energy and generation, improved water efficiency and energy usage" **[See reference** 6**]**.

1.14 Although the current Local Plan integrates sustainable design principles into planning policy, there is a clear need to increase the level of ambition if the Council is to achieve the objectives set out in its Climate Strategy. The Council recognises this. In response to an increasing focus on climate change and the

changing legislative and policy context, the Council wishes to ensure that its Local Plan update includes robustly-evidenced and set policies that require new developments and existing buildings to incorporate sustainable design to adequately respond to the climate emergency and current policy and legislation.

1.15 The aim of this document is to provide an overview of the key policy mechanisms for promoting for sustainable design in achieving net zero. This report is broken down into the following subsections:

- Best practice frameworks for achieving net zero carbon developments;
- The implication of embodied carbon and operational carbon for net zero in Huntingdonshire;
- The feasibility of net zero carbon development in the Huntingdonshire context; and
- Sustainable design principles to help achieve net zero.

1.16 The next section outlines current standards and best practice frameworks for achieving net zero carbon buildings and developments.

Chapter 2

Best Practice Frameworks for Achieving Net Zero Developments

2.1 This section presents an overview of current legislation, building regulations and best practice frameworks and standards on net zero.

Existing Standards

2.2 The Building Regulations set out the current standards for buildings in England **[See reference 7]**. The 'technical requirements' are the key legal requirement to which all building work must meet to comply with the Building Regulations.

2.3 Building Regulations (Part L) sets energy H standards for dwellings (volume 1) and buildings other that dwellings (volume 2), for building fabric (e.g. insulation and double or triple glazing), energy use, and CO_2 emissions.

2.4 In 2022, the Building Regulations 2013 (Part L) was updated to ensure new developments contribute to the UK's 2050 net zero target. As part of this, new homes are to produce 31% less CO_2e (Carbon Dioxide Equivalent) than the previous standard along with a 27% reduction for new non-domestic buildings including offices and shops. These changes came into effect as of the 15th of June 2022 and the grace period, which allowed for adjustments and project finalisation, ended on 15th June 2023.

2.5 The Future Homes Standard (FHS) and Future Buildings Standard (FBS) aligns with the Building Regulations and aims to ensure that new homes and buildings constructed from 2025 produce between 75% and 80% less CO_2e

compared to those built under the Building Regulations Part L 2013. Consultation on the FHS and FBS was concluded on the 27th of March 2024.

2.6 It is likely that standards included in the FHS and FBS, implemented from 2025 onwards, will only apply to regulated emissions, which refers to emissions resulting from energy use emissions such as heating, cooling, ventilation, and fixed lighting. However, these emissions do not cover the full scope of emissions from buildings (unregulated emissions) (discussed in the next chapter). Therefore, these standards will, potentially, not go far enough towards achieving net zero targets (for a definition and understanding of 'net zero' please consult **Document A** in this evidence base).

2.7 The FHS and FBS are also centred on the vision of new buildings being 'zero carbon ready'. This relates to the Government's expressed intention for residential developments to transition to zero carbon status as the electricity grid decarbonises. Crucially, this objective should be attainable without imposing significant costs. Similarly, for non-domestic buildings, the 2021 FBS consultation emphasised that buildings constructed to the Future Buildings Standard will possess the capacity to achieve net zero over time, as the national grid decarbonises, without requiring additional energy efficiency retrofit measures.

2.8 The key components of the 'zero carbon ready' building are, therefore, that the building achieves high standards of energy efficiency, and either has a low carbon (electric) heating system from the outset or is designed to accommodate one at a later date. The expectation is that, if and when the national electricity grid fully decarbonises, those buildings will have net zero operational CO_2e emissions from energy use. However, it does not mean they will be net zero as of 2025 (before the grid has decarbonised).

2.9 Relying on grid decarbonisation to achieve net zero operational emissions introduces a level of uncertainty as the scale and pace of grid decarbonisation is not guaranteed (current target is 2035). If grid decarbonisation was delayed this could undermine HDC's ability to reach net carbon zero by 2040. Therefore,

there is an argument for establishing more ambitious requirements in the local plan that go beyond those planned in the Building Regulations.

2.10 In this context, planning has a legitimate role to play in seeking to close the gap between building regulations and the net zero requirement, particularly given the risk of delays to improvements to Building Regulations and/or to the decarbonisation of the national grid, which the FHS depends on to deliver net zero homes as opposed to 'net zero ready' homes. Other shortcomings of the FHS and FBS that planning policies can help to address include the following:

- they only cover regulated emissions;
- fabric performance standards are not improved beyond Part L 2021 meaning a missed opportunity to reduce energy bills and higher energy demands on the national grid;
- limited requirements for onsite renewable energy; and
- there is no mention of embodied carbon.

Going Beyond Building Regulations and the Future Homes Standard – the Written Ministerial Statement (December 2023)

Setting more demanding carbon targets in local plan policy (beyond those in Building Regulations and the FHS and FBS) is arguably critical to helping HDC achieve its net zero targets and guard against any delays to the strengthening of carbon targets in existing standards, or delays to decarbonisation of the national grid. This would align with HDC's objective to meet and exceed building standards where feasible and viable to do so.

A series of recent announcements and policy U-turns have resulted in uncertainty as to whether LPAs can set net zero requirements in their Local Plans. In particular, The 'Planning – Local Energy Efficiency Standards Update' Written Ministerial Statement (2023) states that *"Any planning*

policies that propose local energy efficiency standards for buildings that go beyond current or planned buildings regulation should be rejected at examination if they do not have a well-reasoned and robustly costed rationale that ensures:

- *That development remains viable, and the impact on housing supply and affordability is considered in accordance with the National Planning Policy Framework.*

- *The additional requirement is expressed as a percentage uplift of a dwelling's Target Emissions Rate (TER) calculated using a specified version of the Standard Assessment Procedure (SAP)…"*

This appears to significantly curtail the flexibility with which LPAs can define policies on energy efficiency. However, others have queried the weight to be given to the WMS. The power for LPAs to set their own energy efficiency standards is clearly set out in Section 1(1) of the Planning and Energy Act 2008 (and Government clarified in the 2021 Future Homes Standard consultation it had no plans to amend this in the immediate term). In addition the NPPF and PPG are clear that plans should take a 'proactive approach' to mitigating and adapting to climate change, in line with the objectives of the Climate Change Act 2008; and the Levelling Up and Regeneration Act 2023 requires that 'the local plan must be designed to secure that the use and development of land in the local planning authority's area contribute to the mitigation of, and adaptation to, climate change' (15C(6)). This bolsters the section 1 power. Open legal advice shared by Essex County Council argues that "The 2023 WMS cannot operate to frustrate or negate the power in section 1(1).

The WMS could also still be found to be unlawful. A legal challenge has been brought against it in reference to the PEA 2008. The High Court has recently (February 2024) quashed the Planning Inspectorate's attempt to

water down net zero buildings policies for a garden village in Oxfordshire in a case seen as intrinsically linked to the WMS. **[See reference 8]**

Three local authorities have successfully adopted policies based on energy-based metrics, going beyond Building Regulations (Bath and North East Somerset, Cornwall and Central Lincolnshire), and as many as 70 authorities have invested expertise and resources to evidence and develop similar policy approaches for their local areas. Fifteen LPAs in Essex, working with Essex County Council are continuing to work together for a joint approach on Net Zero that still included an energy metrics approach. Their evidence base supporting this may be used as a useful model in this area. The Government's response to the FHS consultation in 2021, re-affirmed by published correspondence between Bath and North-East Somerset (BANES) Council and the Department of Department for Levelling Up, Housing and Communities (DLUHC) in 2022 has provided some confidence for LPAs who may wish to set energy efficiency standards beyond national Building Regulations standards.

It is the view of the Town and Country Planning Association (TCPA) that local authorities should continue to form local plan policy informed by robust evidence on carbon reduction, including those that set energy-based metrics to secure emissions reductions from new developments **[See reference 9]**. We expect Government/PINS advice to emerge soon that will provide further clarity.

The next section outlines best practices standards to go beyond the Building Regulations.

Best Practice Standards

2.11 Several national and regional organisations have published their own strategies and recommendations of how the built environment could achieve the necessary reductions to help meet the UK commitments. These provide context for setting specific energy efficiency performance targets for Huntingdonshire. The key standards are considered here, followed by a round-up that compares their basic principles. This is followed by a discussion of the assessment tools that local authorities like Huntingdonshire use to encourage and validate low carbon and net zero development. The chapter concludes with a summary section of recommendations.

The UKGBC Net Zero Carbon Buildings Framework

2.12 In 2019, UK Green Building Council (UKGBC), launched the UKGBC Net Zero Carbon Buildings framework for net zero carbon buildings which sets out high-level principles for achieving net zero carbon for construction and operational energy **[See reference** 10**]**. It emphasises a ‘reduction first’ approach and sets out principles, technical requirements, and areas for future development. The framework is expected to be updated over time and is expected to evolve with the forthcoming UK Net Zero Carbon Building Standard in 2024 (discussed below).

The London Energy Transformation Initiative (LETI) Climate Emergency Design Guide

2.13 The LETI Climate Emergency Design Guide is a comprehensive resource aimed at creating sustainable and resilient buildings **[See reference** 11**]**. It outlines key strategies for reducing carbon emissions, optimising energy efficiency, and incorporating renewable energy solutions. The guide

emphasises the importance of considering the full lifecycle of building materials and encourages the integration of natural systems for water and waste management.

Royal Institute of British Architects (RIBA) 2030 Climate Challenge

2.14 The 2030 Climate Challenge sets a series of targets to adopt, focusing on reducing operational energy, embodied carbon, and potable water, which provides a stepped approach toward reaching net zero **[See reference** 12**]**.

2.15 The Table 3.1 below presents comparison between the Building Regulations and the targets of the best practices industry standards.

Table 3.1: Comparison between Building standards and best practice design targets

Category	Energy use intensity	Space heating demand	Carbon emissions
BR Part L 2021	95 kWh/m^2/yr	60-70 kWh/m^2_{GIA}/yr	~8,930 $kgCO_2/m^2$/yr **[See reference** 13**]**
FHS	40-45 kWh/m^2/yr	50-60 kWh/m^2_{GIA}/yr	~1786 $kgCO_2/m^2$/yr **[See reference**13]
LETI / RIBA	35 kWh/m^2/yr	15 kWh/m^2_{GIA}/yr	<350 $kgCO_2/m^2$/yr **[See reference** 14**]**
RIBA	35 kWh/m^2/yr	15 kWh/m^2_{GIA}/yr	<500 $kgCO_2/m^2$/yr
Passivhaus	60 kWh/m^2/yr	15 kWh/m^2/yr	N/A

UK Net Zero Carbon Buildings Standard

2.16 This is an initiative to establish a consistent methodology for achieving net zero carbon performance in buildings across key industries including UKGBC, LETI, RIBA, RICS, Carbon Trust, CIBSE, and IStructE **[See reference** 15**]**. It is anticipated that this standard will align as far as possible with existing net zero initiatives and Standards and bring together net-zero Carbon requirements for all major building types, based on a 1.5°C trajectory, enabling developers to robustly prove their built assets are net zero carbon and in line with the UK's climate targets. This standard is scheduled to be launched in the spring of 2024.

Common principles and key differences

2.17 These standards generally follow the same broad characteristics of good practice:

- High standards of energy efficiency, such that demand for space heating and all other energy requirements (measured in kWh/m^2 per year) are extremely low;
- Reducing all other energy demands and ensuring that as close to 100% of energy use can be met through on-site renewables, not allowing any fossil fuel combustion on-site ; and
- Reducing the performance gap by considering measures of as-built energy/carbon performance, rather than just modelled performance at the design-stage.

2.18 They differ as to whether they reach for net zero or rather act as tools to drive down carbon emissions and lead stakeholders on a journey eventually intended to achieve net zero developments.

Assessment tools for low carbon/zero carbon developments

2.19 Policy approaches for setting carbon performance requirements for buildings can also involve the use of off the shelf ’third party assessment tools and certification schemes to assess if a carbon reduction or net zero target has been achieved.

2.20 Setting policies with reference to ‘off the shelf’ third party accreditation schemes serves as a less resource-intensive option where LPAs can seek proof of certification/performance from certified assessors rather than needing to review detailed calculations and assumptions within energy statements in-house. Standards tend to apply to a limited number of types of development e.g. domestic or non-domestic developments and the council can have confidence in the ratings given they are completed by independent assessors, preserving resources and technical capacity that would otherwise be spent assessing detailed energy or sustainability statements in-house.

2.21 HDC already makes use through the Huntingdonshire local plan of third party certification schemes - requiring all non-residential developments to meet Building Research Establishment Environmental Assessment Method (BREEAM) standards (or successor or equivalent standards) ‘Good’ as a minimum.

2.22 As such, the key options available to HDC relate to which type of standard to specify, what performance level to require, in the case of the scheme already applied, in order to achieve net zero targets.

2.23 This document explores below the Home Quality Mark (HQM), the Building Research Establishment Environmental Assessment Method (BREEAM) and Passivhaus.

Building Research Establishment Environmental Assessment Method (BREEAM)

2.24 BREEAM is an industry recognised sustainability assessment and rating methodology from the Building Research Establishment (BRE). Assessment and rating certification is delivered through accredited third-party assessors. BREEAM assessments consider a wide range of sustainability factors and are completed throughout the lifecycle of the development. The assessments include an analysis of energy use, health and wellbeing, innovation, land use, materials, management, pollution, transport, waste and water.

2.25 BREEAM, first applied to offices at its foundation, can now be applied to most commercial buildings and does not apply to residential buildings. It is now commonly included in local planning authority planning policies to ensure commercial buildings satisfy high standards of sustainability.

2.26 The implementation of BREEAM for new developments in Huntingdonshire could provide a straightforward approach to compliance, requiring minimal capacity for interrogating energy/carbon calculations. Moreover, the council can have confidence in the ratings given that BREEAM assessments and ratings are completed by independent, third party BREEAM assessors in accordance with the requirements of the scheme.

Home Quality Mark (HQM)

2.27 HQM is a scheme for new build homes in the UK, developed by the Building Research Establishment (BRE). Like BREEAM, it considers a range of sustainability topics, including energy performance, design and construction quality, running costs, and measures to promote occupant health and wellbeing **[See reference** 16**]**.

2.28 Specifically relating to energy, HQM uses some of the same SAP (Standard Assessment Procedure) outputs that are used to show compliance

with minimum standards in Building Regulations. The HQM Energy Performance methodology considers three metrics of the modelled performance of a new building when determining the number of credits achieved for this issue. It is a ratio that defines the performance of a HQM assessed home in terms of its:

- Heating and cooling energy demand (the fabric performance);
- Primary energy consumption (system efficiency); and
- Total resulting CO_2e emissions.

2.29 SAP outputs are used to calculate energy performance ratios (EPRs) for these three metrics above, based on the performance improvement of the actual building compared to a notional version of the building that just complies with Building Regulation requirements. A higher EPR scores more credits, with energy and carbon performance scoring a maximum of 60 credits.

2.30 We are not aware of many other local plans specifying a HQM requirement, although Islington's local plan (currently at examination) provides one example. Policy S3 states that "Major and minor new-build residential developments must achieve a four-star rating (as a minimum) under the BRE Home Quality Mark scheme".

Passivhaus

2.31 Another widely recognised third-party assessment scheme is Passivhaus. The Passivhaus Standard, developed in Germany, focuses on maximising the thermal efficiency of the building fabric using high levels of insulation and air tightness and mechanical ventilation with heat recovery, certified through an exacting and independent quality assurance process.

2.32 Passivhaus represents best practice levels of energy and GHG performance. The levels of energy efficiency are very high, in line with those proposed by the CCC **[See reference** 17**]**. The Passivhaus standard drives much higher levels of insultation than current Building Regulations. Even once

the FHS is adopted, space heating demand may still be significantly higher than buildings constructed to Passivhaus standards.

2.33 To achieve the standard, the Passivhaus Planning Tool (PHPP) must be used. PHPP is known to provide very robust and reliable outputs. However, PHPP would be needed in addition to calculations for Building Regulations and potentially also for BREEAM/HQM, adding work for applicants and requiring suitably trained staff. This could be particularly challenging for minor developments.

2.34 Achieving the standard creates added construction costs and requires skilled labour – a recent analysis by AECOM **[See reference** 18**]** suggested that the uplift could be ~1-2% but case study evidence from the past decade shows a much wider, and higher, range of costs. Finding appropriately qualified construction workers to build to the exacting Passivhaus standard could also be a constraint.

2.35 The Passivhaus standard has not been widely used in planning policies in England to date. However, there are some examples, such as Bristol City Council's Climate Change and Sustainability practice note, serving as an additional document to the Bristol Local Plan **[See reference** 19**]** (an update to the Bristol Local Plan is currently underway), to help guide planning decisions, which encourages use of this standard.

2.36 Where buildings are proposed to be certified Passivhaus standard, the % CO_2 reduction targets above relating to energy efficiency measures, on-site renewables and 'Allowable Solutions' will not need to be met. Allowable Solutions are measures developers can use to offset emissions such as paying into a carbon offsetting fund, which is then used to invest in energy efficiency and renewable and low carbon energy projects. In these cases, a full Energy Strategy will not be required and it will be sufficient to submit the technical information required to demonstrate that the Passivhaus standard can be achieved and for the Sustainability Statement to demonstrate that the residual heat/cooling demand for the development has been met sustainably.

2.37 Given the robustness of the Passivhaus standard, we recommend that HDC consider supporting the use of the Passivhaus standard as an alternative route to compliance regarding energy and GHG emissions. This could involve achieving Passivhaus certification and demonstrating that 100% of operational energy use will be met via on-site renewables.

Summary

2.38 This chapter has outlined the existing national policy standards (Building Regulations and the coming FHS/FBS) with regards to carbon reduction, the best practice standards as recommended across the industry aiming for higher achievement on carbon reduction and the assessment tools that can be used by HDC and other local authorities to drive applicants towards the expectations of these best practice standards.

2.39 It has also dealt with the uncertainty around the recent Written Ministerial Statement on energy efficiency (December 2023). It finds that, despite the government's recent steer, local authorities should remain ambitious and pursue net zero, supported by rigorous evidence. Greater clarity on the situation is expected to follow from Government/PINS soon.

2.40 As stated above, our best available standards and recommendations on approaches to carbon reduction generally follow these broad characteristics:

- High standards of energy efficiency, such that demand for space heating and all other energy requirements (measured in kWh/m^2 per year) are extremely low;
- Reducing all other energy demands and ensuring that, as near as possible, to 100% of energy use can be met through on-site renewables, not allowing any fossil fuel combustion on-site; and
- Reducing the performance gap by considering measures of as-built energy/carbon performance, rather than just modelled performance at the design-stage.

2.41 Best practice standards explored also extend beyond the emission sources considered in Huntingdonshire's local plan, for example addressing the role of embodied carbon. This is considered further in Chapter 3. The next chapter explores embodied carbon and operational carbon for net zero in Huntingdonshire.

2.42 Assessment tools, as discussed above, are a potentially potent method for the Council to drive ambition, particularly where in-house resource does not exist to review assessments from applicants. For both BREEAM and HQM, the council could consider embedding them in policy but also setting requirements for minimum credit scores in specific areas e.g. to require a higher level of energy/carbon performance. For example, in HQM, they could require that new build homes achieve sufficient credits in the "Energy performance" and "Towards carbon negative" categories of HQM (or equivalent) to demonstrate that the development produces net zero regulated and unregulated emissions (e.g. score 4 credits under energy performance category). To provide flexibility, the Passivhaus standard can also be used as an alternative route to compliance regarding energy and GHG emissions as a recognised national independent accreditation scheme. The Council would still be able to rely on external assessment whilst driving ambition higher amongst applicants.

2.43 The available approaches to achieving these low carbon standards are discussed in detail in Chapter 4.

2.44 The sustainable design policy options that local authorities and developers can adopt to achieve these standards are discussed in Chapter 5.

Chapter 3

Embodied Carbon and Operational Carbon in Development

3.1 This chapter describes how operational and embodied carbon are produced in new developments, explaining the theory and principles behind their generation and measurement.

Introduction

3.2 The built environment is responsible for a large portion of the UK's carbon footprint. According to the United Kingdom Green Building Council (UKGBC), buildings will play a key role in enabling the UK to achieve its commitments to achieve net zero by 2050, and a net zero, climate resilient and regenerative built environment presents an opportunity to deliver green growth through innovation, value creation, more green jobs and better, healthier places to live and work **[See reference** 20**]**.

3.3 The Huntingdonshire Local Plan to 2036 **[See reference** 21**]** includes allocations and policies to provide at least 20,100 new homes and housing growth is expected to be around 804 new homes per year **[See reference** 22**]**. An updated to the local plan commenced in January 2023. To help the council achieve its net zero targets the carbon emissions from this new development will need to be reduced as far as possible. This also presents an opportunity to ensure that new developments are resilient to the likely impacts of climate change and contribute to the health and wellbeing of residents.

3.4 For the council to take a holistic approach to sustainable development and building efficiency, it is important to understand the key sources of building emissions.

Emissions from Developments

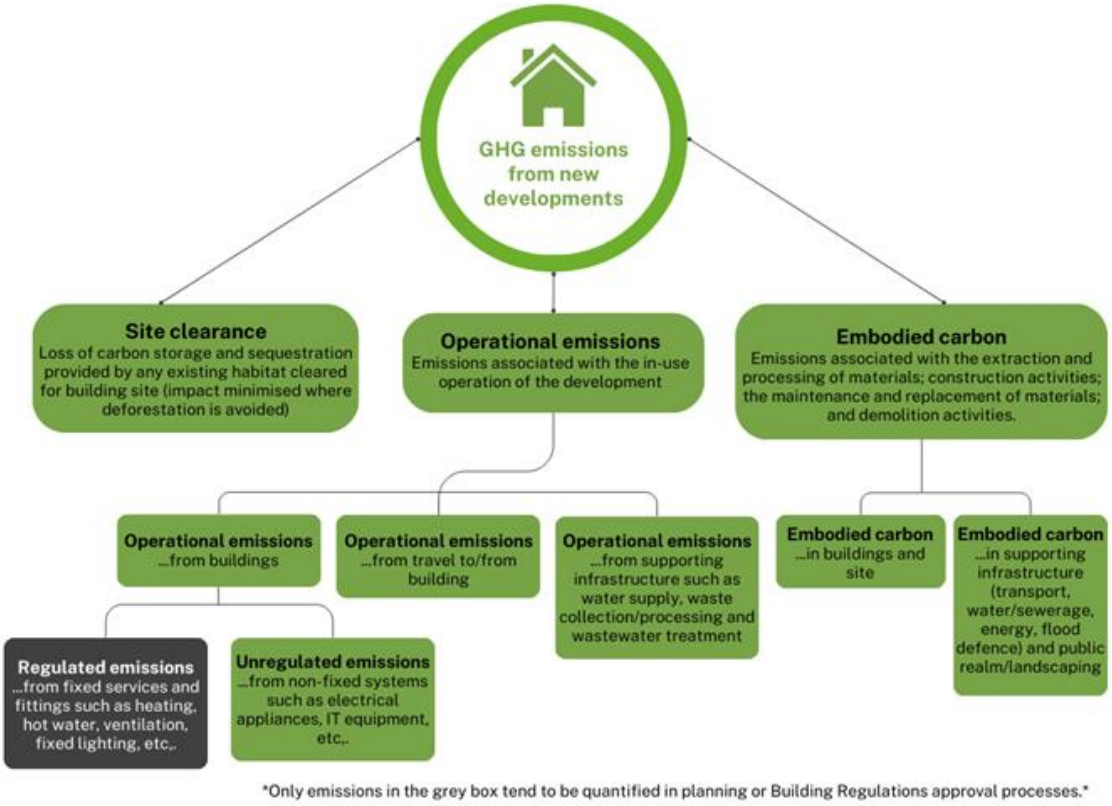
3.5 The direct and indirect greenhouse gas (GHG) emissions that make up the whole life carbon from buildings are categorised into:

- Operational emissions, including post construction transport emissions and emissions associated with in-use operation of developments; and
- Embodied carbon which includes emissions and removals associated with materials and construction processes throughout the whole life cycle of an asset. These emissions can be minimised by the sustainable use materials and the reuse and recycling of material after demolition

3.6 Where site clearance is needed during construction, there will be emissions from the loss of carbon and sequestration, however, this impact can be minimised where loss of trees is avoided.

3.7 The range of greenhouse gas (GHG) emission sources from new developments is presented in **Figure 4.1.**

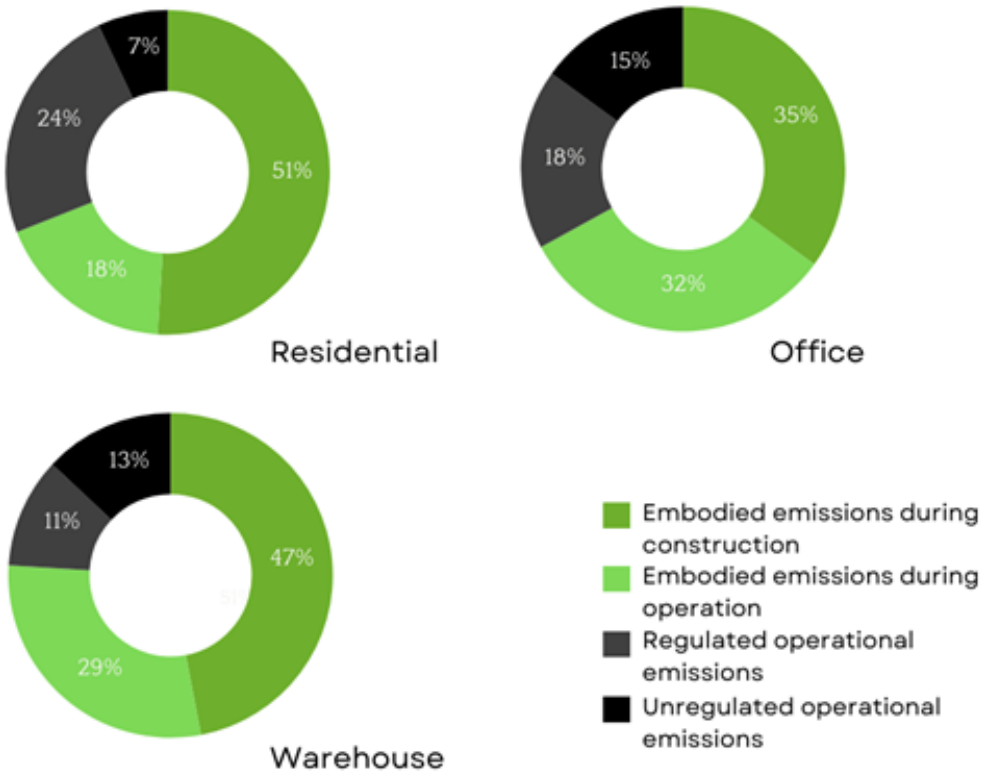
Figure 4.1: GHG emissions from new developments



3.8 Current Building Regulations play a major role in developments' emissions profile, however, Building Regulations primarily address emissions from controlled fixed services such as heating, cooling, ventilation, and lighting (regulated emissions), as presented in **Figure 4.1** (grey box). Embodied carbon, operational transport and unregulated operational emissions (from appliance use and small power plug loads such as IT equipment, TVs, and kettles) represent equally significant sources of emissions, contributing towards a building's carbon footprint.

3.9 Figure 4.2 presents an indicative illustration of the relationship between emission sources for the built environment, showing the contribution of regulated and unregulated emissions, to the whole life carbon of building for three different building typologies.

Figure 4.2: Indicative illustration of the relationship between operational and embodied carbon emissions for building typologies [See reference **23**]



3.10 Therefore, to achieve sustainability and net-zero targets in the built environment, in-line with HDC's objectives, a holistic approach is needed that considers the full scope of emissions in new developments, including unregulated operational emissions and embodied carbon emissions from the construction phase through to the demolition phase of the building.

The Implications of tackling embodied carbon and operational energy in new developments

3.11 Given the need for an all-encompassing approach, highlighted above, the Climate Change Committee has emphasised the need for a comprehensive whole-life carbon approach for new developments, including embodied and sequestered carbon, in its 2019 report on UK housing **[See reference** 24**]**. The Environment Audit Committee has recommended that the Government should introduce a mandatory requirement to undertake whole-life carbon assessments (WLC) for buildings (also referred to as life-cycle carbon assessments or LCAs) **[See reference** 25**]**. The Government's response in September 2022 agreed that WLCs are likely to have a significant role to play in delivering decarbonisation across the sector.

3.12 Looking beyond carbon emissions reduction, it is also expected that achieving net zero carbon in new developments will have multiple co-benefits such as reduced energy bills and fuel poverty, health and well-being benefits from improved indoor and outdoor air quality and the reduction of overheating risks.

Summary

3.13 This chapter has described how operational and embodied carbon are produced in new developments, explaining the theory and principles behind their generation and measurement.

3.14 The implication of this understanding is that, rather than, perhaps, promoting sustainable design choices that tackle, simply, the ongoing emissions produced by the use of new developments, related planning policy needs to

consider the whole-life cycle of developments and the many ways in which the construction and use of new developments generate carbon emissions.

This report therefore goes on to explore options for reducing both embodied and operational carbon. First the report explores the holistic approaches HDC can take towards securing net zero achievement by developers (Chapter 4); then it explores the specific sustainable design choices that could be instituted in new planning policy in specific topic areas

Chapter 4

Approaches to Net Zero Carbon Development in Huntingdonshire

4.1 This section assesses different approaches to delivering low carbon and net zero developments that the Council could adopt in its Local Plan update.

4.2 Modelling in **Documents B and D** presented the justification for HDC to set ambitious planning policies, contributing towards its net zero ambitions, setting higher targets than in existing and planned Building Regulations (including FHS and FBS) to guard against delays to grid decarbonisation and/or a delay in progress in national legislation and policy. Chapters 2 and 3 provide the technical context for doing so.

4.3 Planning policy can also address gaps in Building Regulations such as unregulated energy and embodied carbon. This would align with the NPPF's stipulation that plans should take a "proactive approach" to mitigating climate change.

4.4 The chapter will assess the legitimacy of different approaches that could be taken by HDC in seeking to achieve low carbon or net zero carbon developments in Huntingdonshire, where low carbon developments aim to reduce the rate of greenhouse gas emissions, and net zero carbon developments aim to achieve zero residual *operational* carbon emissions. Approaches considered here are:

- A Building Regulations-led approach;
- Use of BREEAM and HQM (third-party schemes;
- An embodied carbon target-led approach;
- Whole Life Carbon assessments;
- Operational energy targets; and

- Addressing the performance gap.

4.5 For each of the approaches above, the discussion considers:

- Examples, with relevant policy wording, from other local planning authorities who have delivered these approaches;
- Technical feasibility;
- Economic viability (i.e. the cost);
- Benefits of adopting the approach for achieving net zero and other goals; and
- Limitations of the approach for achieving net zero.

4.6 Achieving low or net zero carbon in new developments in Huntingdonshire will be achieved through a range of measures, typically involving energy-efficient fabric and renewable energy solutions. All of the approaches above focus on the setting of performance targets that ultimately allow developers to decide how they will achieve the target, rather than prescribing the method (even those approaches focused on reducing embodied carbon will allow developers to show they can satisfy these expectations).

4.7 Chapter 5, below, discusses sustainable design solutions for developers that can help achieve these low carbon standards, should Huntingdonshire feel they should be particularly encouraged or enforced.

4.8 **Document E** of this evidence base, focused on large-scale renewable energy generation in Huntingdonshire, includes a brief discussion of on-site renewable policy options that Huntingdonshire may pursue alongside large-scale generation. However, allowing developers flexibility in achieving carbon targets on-site at their new developments (rather than prescribing on-site renewable generation targets) should be the main approach to seeing low carbon targets achieved.

4.9 **Document F**, of this evidence base, focused on offsetting and sequestration, discusses how offsetting policies may be taken on by HDC to

enable the achievement of net zero carbon developments where developers are unable to deliver sufficient carbon reductions on-site.

Building Regulations-led Approach

4.10 This section assesses the feasibility of a policy approach framed relative to existing and forthcoming regulations.

4.11 HDC has the option to set carbon reduction targets in the Local Plan update relative to existing Building Regulations (a target representing a proportional change from the legislated minimum requirements) or simply to defer to the requirements in the Building Regulations.

4.12 Deferring only to current Building Regulations is not advised. Local authorities are expected to pursue policies to the best of their abilities that seek significant reductions in carbon emissions. This is explored in detail in Chapter 2 ('Existing Standards)' when discussing the Building Regulations and in **Document A** of this study which explains the legislative expectation for local authorities to address climate change.

4.13 Given the recent slow-down in the advancement of national policy on net zero, and considering the 2030 Nationally Determined Contribution Goal, which stipulates a minimum 68% reduction in territorial emissions from 1990 levels, it is evident that emissions reductions from non-nationally influenced sources must increase in scale **[See reference** 26**]**. Sole reliance on Building Regulations in the built environment will not suffice to meet the pressing need for climate mitigation in the built environment and transport sectors, both at the local and national levels. Moreover, expected future uplifts to Building Regulations on net zero would present further complications of local authorities seeking to use this as their main approach to achieving net zero.

4.14 The current requirements for new developments within the Huntingdonshire Local Plan, detailed in LP12 Sustainable Design and Construction Methods, The supporting text to policy LP12 highlights the role of

planning in managing energy efficiency in buildings, stating that planning should "seek energy efficiency for residential development through aspects that fall outside the remit of building regulations". This is a key point we return to below.

4.15 Pursuing a target relative to Building Regulations would bring further gains in operational emissions reductions. However, the limitations of this approach are discussed in detail in the Limitations section below.

HDC can require all planning applications for new dwellings or major non-residential developments to be supported by an Energy Statement incorporating emission reduction relative to the Building Regulations Part L to demonstrate how the relevant targets for reducing CO_2 emissions will be met. The purpose of the Energy Statement is to ensure that the objectives of the policy option are considered from the earliest stages of project planning and design, to demonstrate how the proposed development will comply with the relevant targets, and to provide a means of monitoring against net zero objectives. This approach is demonstrated in both the London and Sutton Local Plans, explored in the 'Examples and Case Studies' section below.

Examples and Case Studies

4.16 Policy 28: Carbon reduction, community energy networks, sustainable design and construction, and water use, of the Cambridge Local Plan **[See reference** 27**]**, requires new homes to a 44% achieve on-site reduction of regulated carbon emissions relative to Part L 2006 Building Regulations, from 2014 and 44% from 2016 onwards.

4.17 The London Plan **[See reference** 28**]** policy SI2 requires:

> "A minimum on-site reduction of at least 35 percent [carbon reduction] beyond Building Regulations is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures"

4.18 This policy sets a performance requirement for new development to achieve an uplift relative to performance requirements in Building Regulations. The GLA's Energy Assessment Guidance provides further advice on how to comply with these policies and can be updated to reflect changes in Building Regulations - it states that if the Building Regulations are updated, the policy thresholds within the plan will be updated.

4.19 Similarly, the Sutton Local Plan, adopted in 2018, includes Policy 31: Carbon and Energy, which mirrors the targets within the London Plan to meet targets of reducing CO_2 emissions expressed as a percentage over the Building Regulations L 2013, but also includes a requirement that "all minor residential developments should achieve at least a 35% reduction in regulated CO_2 emissions on site" **[See reference** 29**]**.

4.20 It should be noted that some local plans that apply policies relative to Building Regulations have also set additional net zero-carbon targets (although this is rare). For instance, the London Plan Policy SI2, in addition to setting the on-site carbon reduction targets cited above, also requires major development to be "net zero-carbon". Proposals must demonstrate how the target will be met within the framework of the energy hierarchy of be lean (use less energy), be clean (exploit local energy resources), be green (maximise on-site renewables). Where "it is clearly demonstrated the zero-carbon target cannot be fully achieved on-site", any shortfall must be met through carbon offsetting (see separate chapter on carbon offsetting).

4.21 Added requirements such as these, typically result in added costs for developers (both in terms of maximising onsite measures and buying any offsetting required), as such the impacts on development viability of

implementing such an approach within Huntingdonshire would need to be considered.

Technical Feasibility

4.22 The energy efficiency requirements within current Building Regulations are performance-based standards requiring dwellings to achieve targets of regulated primary energy, CO_2 emissions and fabric energy efficiency. Buildings are required to produce 31% less CO_2e, for new homes, and 27% less, for new non-domestic buildings, than the Building Regulations 2013 Part L.

4.23 The Future Home Standard and (FHS) and Future Buildings Standard (FBS) (see Chapter 2 for details), due to be enacted in 2025, will require 44-49% less CO_2e, than the current Building Regulations or 75-80% less than the 2013 Building Regulations.

4.24 The consultation conducted to assess the impact of the uplifts to the energy efficiency requirements of the Building Regulations **[See reference** 30**]**, suggests that the most likely means of compliance to the 2021 Part L requirements was a specification with:

- A high level of energy efficiency;
- Low carbon heat;
- Renewable energy to match energy needs; and
- Wastewater heat recovery.

4.25 These compliance methods were also believed to be the most likely means of compliance with the FHS, requiring the least change from current building practices. The main alternative route to compliance for housebuilders for the FHS was assumed to be with a heat pumps.

4.26 Viability studies for relevant LAs including Greater Cambridge Study **[See reference** 31**]**, Runnymede **[See reference** 32**]**, and East Hampshire Study

[See reference 33**]** also present the technical standards of construction that would be required to make a building meet and exceed the compliance needs listed above. As such, it is anticipated that policies relative to the existing Building Regulations and the forthcoming regulations (FHS) will be compatible with existing systems, technology, materials and infrastructure.

Cost Implications

4.27 Setting targets above and beyond the Building Regulations requirements will result in added costs for developers.

4.28 Whilst considering implementing carbon emissions standards that were more demanding than the Building Regulations, Guildford Council found a significant increase in build costs, jeopardising the viability of some schemes **[See reference** 34**]**. It therefore recommended not seeking higher carbon standards but still encouraging schemes to reduce carbon emissions as much as possible.

4.29 The impact on the costs and viability for different development typologies also needs to be considered.

4.30 The Net Zero Carbon Toolkit (Forest of Dean, Cotswold and West Oxfordshire Councils) **[See reference** 35**]** suggests that the cost premium for developing a new net zero carbon home is estimated to represent approximately 2% to 6% compared with a Part L 2021 equivalent. However, the report estimates a 5-6% cost premium for typical new terrace homes compared to 4-5% for a new block of flats.

4.31 Other published viability studies carried out on behalf of East Hampshire, Greater Cambridge, and Winchester Councils **[See reference** 36**]**, on average suggest at a cost uplift of 3-5% for domestic developments, and a cost uplift of approximately 5-10% for non-residential developments (net zero carbon emissions from total energy use, i.e. ‘regulated’ and ‘non-regulated’ energy), compared against Part L 2021. However, the costs are dependent on the

dwelling typology in question and are likely to vary significantly depending on the scheme.

4.32 Higher performance standards can also result in substantial cost savings for residents/home occupiers. The consultation conducted to assess the impact of the uplifts to the energy efficiency requirements of the FHS, projects a reduction in energy bills by up to 50% **[See reference** 37**]**. This suggests potential for further reductions if buildings are required to meet standards that exceed the Building Regulations. The report also states that if buildings were initially constructed to higher standards, it could avoid the need for costly retrofitting in future.

4.33 Overall, viability studies suggest that policies relative to the existing and forthcoming regulations will be compatible with existing systems, technology, materials, and infrastructure. Setting targets above the Building Regulations will result in added costs for developers, however, higher performance standards can result in substantial cost savings for residents/home occupiers.

4.34 The sections below present the benefits and limitations of this approach.

Benefits

4.35 Setting targets relative to Building Regulations is a low-risk approach and can reduce the need for policy updates as Building Regulations will be progressively updated and amended to achieve net zero in line with national policy (local plans can simply refer to the latest iteration of the Building Regulations).

4.36 With regards to setting targets relative to Building Regulations, case studies of the implementation of this approach suggest that it is a well-used approach, successfully defended and adopted in local plans.

4.37 Local plans that have adopted this approach typically also include policies for carbon offsetting for residual emissions which could generate funds for investments in energy efficiency improvements to existing homes, reducing emissions and fuel poverty. This could ensure that carbon reduction in the built environment is achieved even in the occurrence of political delays to future Building Regulations.

Limitations

4.38 Deferring to Building Regulations only would lead to missed opportunities and wider benefits that come with further decarbonising the built environment, including significant and rapid emissions reduction, as well as health and well-being benefits.

4.39 Setting targets relative to Building Regulations, although more ambitious, relatively easy to adopt as a planning policy and readily implementable, bring a host of limitations as to their to help significantly tackle emissions mitigation. These can be briefly summarised as follows:

- The new Labour government is yet to specify whether it will be enacting the Future Homes Standard, replacing Building Regulations, in 2025 or beyond. Tacking to the regulations may, therefore, not see an uplift in standards.
- The new government has also not yet specified its plan to achieve decarbonisation of the national grid by 2035, which the FHS depends on to deliver net zero homes as opposed to ‘net zero ready’ homes.
- Building Regulations, FHS and FBS only cover regulated emissions, not unregulated, so they do not result in genuinely net zero emissions from operation.
- Fabric performance standards in FHS are not improved beyond Part L 2021 Building Regulations

- The lack of ambition on fabric performance standards also fails to support efforts to reduce the energy demands of new development on the national grid.
- Building Regulations, FHS and FBS do not cover embodied carbon.

4.40 In terms of implementation, whilst HDC could rely on building control to look for compliance with Building Regulation standards, the Council would need to seek further energy assessments and be able to interrogate these internally that higher standards, if asked for, have been achieved. There would likely be a lack of in-house expertise/resource at the council to review and verify robustness of energy calculations submitted and identify relevant carbon reduction schemes where carbon offsetting was pursued.

RECOMMENDED APPROACH: Embodied Carbon Target Approach

4.41 This section presents the recommended, ambitious approach of setting quantitative targets for embodied carbon in new developments in Huntingdonshire.

4.42 Modelling in **Documents B and D** has shown that a significant proportion of emissions related to new development in Huntingdonshire in the plan period will result from embodied carbon. Embodied carbon relates to emissions associated with the materials used in development and construction processes.

4.43 HDC should set policy requirements to achieve minimum scores against quantitative embodied carbon targets to ensure limits on carbon in construction materials and construction processes in domestic and non-domestic developments. Recently produced cost modelling identifies that ambitious reductions in embodied carbon will not result in significant cost differences from current development models (see Cost Implications below). This report therefore recommends this approach as an ambitious policy option significantly addressing Huntingdonshire's emissions profile in the coming years.

4.44 This process institutes a baseline for building elements for developments before carbon-saving measures are developed, allowing the designer to focus attention on areas where greater carbon mitigation interventions can be instituted.

4.45 This approach will help developers create strategies to identify alternative measures and building elements and quantify the magnitude of carbon abatement that each would provide.

4.46 An increasing number of local authorities (Greater London Authority, Westminster City Council, City of London, Bath and North East Somerset and Bristol City Council) have implemented embodied carbon and/or whole life carbon considerations into planning policy with many others now exploring their incorporation.

4.47 As a guide for setting quantitative targets, this report recommends using the approach recently taken by Bath and North-East Somerset Council (BANES). The BANES policy is aimed at major developments. Evidence in the public domain suggests these targets are technically feasible to achieve, viable for developers and now being met by local developers (see below in Technical Feasibility and Cost Implications). They are shown in Examples and Case Studies below.

4.48 BANES' targets are significant although not as ambitious as those recommended in LETI's Climate Design Guide, explored in Chapter 2 of this report.

4.49 Table 5.1 below presents LETI's recommended baseline and 2030 targets for building archetypes.

Table 5.1: Summary table of LETI's embodied carbon targets for building archetypes [See reference **38**]

Building Archetypes	LETI Baseline $kgCO_2/m^2$	LETI Targets $kgCO_2/m^2$
Residential	800	300
Office	1000	350
School/Retail	1000	300

4.50 LETI's targets have yet to be taken on by any local authorities and represent the next stage of ambition.

4.51 It is recommended that HDC speak to BANES to better understand their experience of delivering the policy and its implementation in the development management process. This may inform how evidence is presented to show its deliverability and viability at the planning stage and best practices for its application and monitoring after adoption.

Examples and Case Studies

4.52 BANES' adopted Local Plan Partial Update (2023) **[See reference** 39**]** states for Policy SCR8: Embodied Carbon that:

> "Large scale new-build developments (a minimum of 50 dwellings or a minimum of $5000m^2$ of commercial floor space) are required to submit an Embodied Carbon Assessment having regard to the Sustainable Construction Checklist SPD that demonstrates a score of less than $900kgCO_2e/m^2$ can be achieved within the development for the substructure, superstructure and finishes."

4.53 No offsetting is permitted and if the development is not compliant with the policy, a valid justification must be provided with the appropriate reasons and evidence.

Technical Feasibility

4.54 A review led by University of Bath researchers into the first six months of BANES' new policy (which was also marked by its ambition on operational carbon) found that planning applicants supported the intentions of the policy, while highlighting concerns about increased planning and construction costs, and awareness of the scheme but that applications were in line with the policy **[See reference** 40**]**.

4.55 The primary actions required to achieve significantly reduced embodied carbon include building less, light, wisely, low carbon, for the future, and collaboratively **[See reference** 41**]**.

4.56 These include:

- actions to refurbish and re-use existing buildings and structures;
- considerations for the structure of buildings at the design stage to reduce surface area;
- building for the long-term
- considerations for the use of sustainable materials in construction;
- ensuring future uses and end of life are considered and adaptability is designed in; and
- considerations for emissions is applied across the whole building and planning team

4.57 The need to consider a compact building form and material selection means that the setting of embodied carbon standards can also support other gains for climate adaptation alongside climate mitigation. The need to achieve

building form that protects against overheating (and unnecessary energy use) is discussed in Chapter 5 as well as the need to use materials that provide adequate insulation, also in Chapter 5.

4.58 LETI's targets require 50% of building construction materials and elements to come from reused sources, for residential and non-residential buildings, in accordance with circular economy principles. A relevant case study of implementation showing the technical feasibility of this approach is presented within the LETI Climate Emergency Design Guide **[See reference** 42**]**. The recently published Essex Embodied Carbon Policy Study (discussed in further detail in Cost Implications, below) also provides significant case studies and worked-through models of how greatly reduced embodied carbon, matching LETI's ambitious targets, is simple to achieve across different common development types.

4.59 Further consideration could be given by HDC to the promotion of low-carbon materials like wood to displace high-carbon materials such as cement and steel following recommendations from the Climate Change Committee to 'lock up' carbon over the long-term in buildings **[See reference** 43**]**. This approach could also stimulate a local timber production industry for buildings, boosting the local economy, in line with other objectives of the Huntingdonshire local plan to support a diverse, thriving economy. It should, however, be noted that this could have impacts on woodland stock and the benefits it provides (not least for carbon sequestration) would need to be considered and addressed e.g. through forestry management plans that ensure new trees of the right type are planted to place those felled.

Cost Implications

4.60 The cost of procuring low-carbon materials is not anticipated to be onerous for developers.

4.61 The recently published Essex Embodied Carbon Policy Study **[See reference** 44**]** has produced rigorously developed costings for embodied carbon approaches across different development types.

4.62 It shows that for semi-detached, terrace and low-rise blocks of flats, the achievement of embodied carbon totals well below this report's suggested quantitative target (below 500kgCO2e/m2, bettering even LETI's targets) would add 8-10% on housing construction costs depending on house type when paired with the achievement of net zero carbon operational. In isolation from efforts to achieve net zero operational emissions, the embodied carbon scenarios represent an additional cost uplift of just 2% and 3%.

4.63 The achievement of greatly reduced embodied carbon within new developments is, therefore, relatively inexpensive. Some construction types and/or materials satisfying these ambitions are considered cost neutral.

4.64 Indeed, BANES believed on adoption that their target of 900kgCO2e/m2 on large scale new build development was a cost neutral approach, implemented to introduce the concept of embodied carbon assessments locally, before stretching the requirements in future years. They are already considering setting stricter quantitative standards and broadening the reach of the policy to other development in their next local plan**[See reference** 45**]**.

Benefits

4.65 This approach would address a significant and growing proportion of Huntingdonshire's development-related emissions, as explored in **Documents B and D,** as operational emissions fall in coming years.

4.66 A quantitative target encourages developers to consider the choice of materials focusing on carbon content, encouraging the use of materials with lower carbon footprints as well as early designs around building form.

Limitations

4.67 The approach primarily focuses on embodied carbon, neglecting operational carbon which, despite continuing reductions via a decarbonising grid and expected national policy requirements for operational emissions for new developments, will also be a significant source of emissions. This could lead to a lack of comprehensive carbon management. As such, an embodied carbon approach should be used in conjunction with other approaches. This report recommends, immediately below ('Use of third-party accreditation schemes') that HDC also adopt policy that requires developers to demonstrate operational energy performance via third-party accreditation schemes.

4.68 Implementation of this policy would require that HDC officers assess development applications against their achievement of the target. This would require specific skilled resourcing on the part of HDC. If this is deemed undesirable, HDC may consider pursuing embodied carbon aspiration only via third-party accreditation schemes and the achievement of related credits, below.

We recommend that HDC should set policy requirements to achieve minimum scores against quantitative embodied carbon targets to ensure limits on carbon in construction materials and construction processes in domestic and non-domestic developments.

It should require that large scale new-build developments (an appropriate threshold to which HDC could consider) are required to submit an Embodied Carbon Assessment demonstrating a score of less than 900kgCO_2e/m^2 can be achieved within the development for the substructure, superstructure and finishes.

Modelling in Documents B and D has shown that a significant proportion of emissions related to new development in Huntingdonshire in the plan period will result from embodied carbon. An ambitious policy is, therefore, needed to respond to HDC's own Climate Strategy where it relates to the built environment.

Recently produced cost modelling identifies that ambitious reductions in embodied carbon will not result in significant cost differences from current development models. The above target, should, in fact, be cost neutral, simply requiring different design considerations and choices. This report therefore recommends this approach as an ambitious, yet viable policy option significantly addressing Huntingdonshire's emissions profile in the coming years.

Should HDC be reluctant to install such a policy, for the limitations expressed above, it may seek to address embodied carbon via third-party accreditation schemes, discussed below.

RECOMMENDED APPROACH: Use of BREEAM and HQM accreditation schemes

4.69 As described in Chapter 2 – 'Assessment tools for low carbon/zero carbon developments' – third-party assessment tools are a potentially potent method for the Council to drive ambition, particularly where in-house resource to review assessments from applicants are limited.

4.70 They may represent an alternative approach to embodied carbon targets, identified above, and/or a complementary policy, in being used to address operational emissions such that both emissions sources are addressed.

4.71 The benefits of pursuing embodied carbon via third-party accreditation schemes, involved the completion of Whole Life Carbon Assessments, are discussed in greater detail in 'Whole Life Carbon Assessments (WLC) Approach' below.

4.72 This is a favourable policy option for HDC as it does not require significant staff resource and/or capacity from the Council to scrutinise energy statements. The council can rely on the ratings achieved to demonstrate that a development addresses the impacts from energy use as well as its embodied carbon make-up.

4.73 BREEAM is also currently used in Huntingdonshire, requiring all non-residential developments to meet BREEAM standards (or successor or equivalent standards) 'Good' as a minimum, as such this scheme is already familiar to building developers in the district. The energy category in BREEAM considers a building's operational energy, encouraging developers to promote the sustainable use of energy throughout the building's life span, including during the construction phase. This category therefore evaluates efforts to:

- Enhance the building's inherent energy efficiency
- Reduce its carbon emissions
- Support sound energy management during the building's operational stage

4.74 BREEAM captures embodied carbon in its 'Materials' category where embodied carbon and the sustainability of the materials in the context of the whole lifecycle of the building, with maintenance and replacement cycle influencing decision making. In coming years, BREEAM intends to combine operational and embodied carbon credits into a dedicated carbon category.

4.75 Similarly, HQM's Energy and Carbon Performance category considers operational energy in buildings. HQM's 'Environmental Impact of Materials'

category recognises and encourages the selection of products with a lower environmental impact, including embodied carbon over the life cycle of the building.

4.76 In addition, national sustainable design and construction standards such as BREEAM ensure that in addition to energy use, a development's full impact on the environment is considered and addressed, including water use, transport, land use and ecology, and waste.

To monitor this policy option, HDC track the number of proposals achieving a 'Very good' and 'Excellent' rating for BREEAM as well as the number of proposals achieving HQM. The frequency of monitoring should be annual and the desired trend should be the net increase in proposals achieving the desired ratings.

Examples and Case Studies

4.77 Policy S3: Sustainable Design Standards of the Islington local plan, adopted in September 2023 **[See reference** 46**]**, includes a range of specific BREEAM and HQM requirements for different types of development. This includes requirements for:

"Major and minor new-build residential developments must achieve a four-star rating (as a minimum) under the BRE Home Quality Mark scheme.

All non-residential and mixed-use developments proposing 500sqm or more net additional floorspace – final (post-construction stage) certified rating of Excellent as part of a fully fitted assessment within BREEAM New Construction 2018 (or equivalent scheme) and must make reasonable endeavours to achieve an Outstanding rating. A 'verification stage'

certification at post occupancy stage must also be achieved, unless it can be demonstrated that this is not feasible."

4.78 In addition, the policy sets out requirements for minimum credit scores in specific areas for both new construction and domestic refurbishment schemes e.g. responsible sourcing of materials. The council could set high energy/carbon performance targets through BREEAM and HQM using this approach.

4.79 Policy 28: Carbon reduction, community energy networks, sustainable design and construction, and water use, of the Cambridge Local Plan 2018 **[See reference** 47**]** includes requirements for new non-residentials developments to achieve a minimum BREEAM level 'Excellent' from 2016 onwards, unless it can be demonstrated that such provision is not technically or economically viable. The policy also supports proposals that lead to higher levels of performances, stating that "*Proposals that lead to levels of environmental performance equivalent to or higher than BREEAM will be supported.*" It should be noted that work on a new joint Greater Cambridge Local Plan is underway.

4.80 The supporting clause for Policy S7: Reducing Energy Consumption – Residential Development of the Central Lincolnshire Local Plan, adopted 2023 **[See reference** 48**]**, state that applicants can provide certified demonstration of compliance with:

- Passivhaus Plus or Premium; or
- Passivhaus Classic, provided this is supplemented with evidence to demonstrate how renewable energy generation is considered; or
- Any other recognised national independent accreditation scheme, provided such scheme is demonstrated to be consistent with the requirements of this policy.

4.81 The supporting clause for Policy S8: Reducing Energy Consumption – Non-Residential Buildings of the Central Lincolnshire Local Plan also states that

applicants can demonstrate compliance, as an alternative to policy requirements, through compliance with BREEAM Outstanding or Excellent.

4.82 Policy SEC1 – Sustainable Energy and Construction of the Cornwall Climate Emergency Development Plan Document states that, among others,

> "Development proposals will be required to demonstrate how they have implemented the principles and requirements set out in the policy below.
>
> 1) The Energy Hierarchy All proposals should embed the Energy Hierarchy within the design of buildings by prioritising fabric first, orientation and landscaping in order to minimise energy demand for heating, lighting and cooling. All proposals should consider opportunities to provide solar PV and energy storage.
>
> 2) 2a) New Development – Major Non-Residential Development proposals for major (a floor space of over 1,000m2) non-residential development should demonstrate how they achieve BREEAM 'Excellent' or an equivalent or better methodology…"

4.83 Similarly, Policy CC2.6 Sustainable Design Standards of the Merton Local Plan under examination **[See reference** 49**]**, seeks high standards of sustainable design and construction from new development, achieved by:

> "Requiring all new build non-residential development of 1,000sqm GIA and above to achieve a minimum of BREEAM Non-domestic New Construction 'Excellent' standard or equivalent"

Technical Feasibility

4.84 There are several London-centred case studies and some non-metropolitan county case studies of non-residential buildings achieving a BREEAM 'excellent' rating for large non-residential developments within the UK **[See reference** 50**],** as well as a few case studies where the HQM has been implemented. LPAs have also extended HQM requirements to major and minor new residential developments within adopted local plans. Thereby indicating the technical feasibility within the Huntingdonshire context.

4.85 The schemes are periodically updated to align with Building Regulations, which ensures that credits are not awarded to sub-standard buildings as regulations evolve. However, the schedule of updates for both BREEAM and HQM schemes, is not available.

4.86 Therefore, in implementing specific ratings for policies, policy wording needs to be outcome-oriented and/or caveated to reduce the emphasis on achieving overall ratings or credits within either of these schemes, reducing the risk of policy being superseded.

Cost Implications

4.87 The uplift costs required for BREEAM and HQM compliance are expected to arise from meeting the energy and GHG performance requirements depending on the energy/GHG performance requirements set.

4.88 Published research specific to the BREEAM certification suggests that the uplift in costs, compared with the Building Regulations Part L 2013 could be between 0.2-5% for residential buildings and between 0.1-10% on average for non-residential buildings, depending on the type of development **[See reference** 51**]**. However, the cost of uplift is expected be smaller against the 2021 Building Regulations. HQM is similarly not expected to have any significant additional capital cost impact. A summary of cost uplifts for the

BREEAM certificate for building typologies and certification levels/ratings is presented in Table 5.2 below.

Table 5.2: Uplift in costs associated with achieving BREEAM standards [See reference **52**]

Rating	School	Industrial	Retail	Office	Mixed Use
Very Good	0.2%	0.1%	0.2%	0.2%	0.15%
Excellent	0.7%	0.4%	1.8%	0.8%	1.5%
Outstanding	5.8%	4.8%	10.1%	9.8%	4.8%

4.89 As such, where requirements to achieve BREEAM ratings of 'Very Good' were extended to residential buildings in Huntingdonshire, the uplift costs to developer could increase by up to 0.2%. Similarly, where non-residential buildings were required to achieve 'Excellent' ratings, the uplift cost could increase by up to 2%, depending on the type of development. These findings are supported by work by Currie & Brown with BRE on the costs of achieving an Excellent BREEAM rating UK New Construction 2014 under Ene 01, for an air-conditioned office, which considered how both BREEAM and London Plan energy targets could be achieved through a series of energy models **[See reference** 53**]**. The capital cost of achieving London plan compliance was around a 1% increase on that of the base specification.

4.90 With regards to Passivhaus, the extra costs associated with building to the Passivhaus standard in the UK is around 8% higher than comparable non-Passivhaus projects, reducing to 4% with further development of skills, expertise and supply chain maturity **[See reference** 54**]**. It is important to note that these additional costs result in a better quality product, with lower running costs, lower maintenance costs and a higher capital value.

4.91 The table below presents an estimate of the potential extra costs of building to Passivhaus.

Table 5.3: Extra Over Costs Of Building To Passivhaus [See reference **55**]

Uplifts	Uplift costs in £/m^2
Floor insulation	5
Wall and roof structures	30
Windows and external doors	5
Airtightness	5
Mechanical Ventilation with Heat Recovery (MVHR)	50
Hot water and heating	-15 (lower than typical)
Prelims	12
PH Design	5
Airtightness testing	3
MVHR commissioning	1
Supervision	4
PH certification	2

4.92 HDC will have to consider the range of uplift costs for the different development types in Huntingdonshire.

Benefits

4.93 This approach is a tried and tested approach in many local plans, including the current Huntingdonshire local plan. As such, there is less risk that this approach will be contested.

4.94 By obtaining specific credits under third party schemes (such as HQM, BREEAM, Passivhaus, and/or other recognised independent accreditation

schemes that are consistent with net zero developments), developments can demonstrate net zero targets at or beyond net zero regulated emissions.

4.95 This approach will help to safeguard against the risk of potential delays to updates in building regulations, which could lead to elevated GHG emissions throughout the Local Plan review period.

4.96 Third party schemes present a practical approach, particularly in instances where there is a deficiency of in-house technical expertise or capacity to scrutinize energy statements.

4.97 BREEAM and HQM assess a broad scope of sustainability considerations in the built environment. Consequently, these tools could be employed across a wide range of policies to foster cohesion throughout the Local Plan and alleviate the burden on developers, who could use these tools to demonstrate compliance across a wide spectrum.

Limitations

4.98 This approach may impose additional costs on the developer, which are likely to increase as the target progresses towards net zero.

4.99 This approach will remove control over quality assurance from HDC. Additionally, HDC will be reliant on BRE to update their methodologies as time progresses with limited involvement with the process.

4.100 Where BREEAM's embodied targets are implemented, it is important to note that the Building Research Establishment (BRE) has indicated future consolidation of operational and embodied carbon credits. Any future policy wording from HDC referencing specific credits would therefore need to be suitably caveated to future-proof the policy against these changes.

We recommend that HDC embed the use of accreditation schemes in policy, specifically both BREEAM for commercial and HQM for residential development.

For the achievement of exacting operational energy standards, HDC should set minimum credits for commercial properties to be achieved in the "Energy performance" and "Prediction of operational energy consumption" and "Beyond zero net regulated carbon" categories of BREEAM (or equivalent) to demonstrate that the development has surpassed or achieved net zero regulated emissions. For residential development, minimum credits should be set in the HQM "Energy performance" and "Towards carbon negative" categories of HQM (or equivalent) to demonstrate that the development produces net zero or close to net zero regulated and unregulated emissions. An alternative route to compliance is to achieve Passivhaus certification and demonstrate that 100% of operational energy use will be met via on-site renewables emissions.

Should HDC not wish to adopt specific locally-set embodied carbon targets, it could require that major new build developments undertake a whole life-cycle (WLC) carbon assessment using a nationally recognised assessment methodology, and seek to minimise WLC (including embodied) emissions demonstrated through achievement of relevant credits in HQM, BREEAM.

Whole Life Carbon Assessment (WLC) Approach

4.101 This section assesses the feasibility of requiring a Whole Life Carbon (WLC) assessment approach from applicant developers. This would see

developers not just isolating embodied or operational carbon but looking at the full spectrum of unwanted emissions from developments.

4.102 It is a continuation from the recommended policy above that outlines the virtues for HDC of using BREEAM and HQM for both operational emissions and, should HDC not be keen to set its own locally-set embodied carbon targets, for reducing embodied carbon emissions in new development. Whole Life Carbon Assessments would be submitted via BREEAM/HQM accreditation schemes and ratified by them.

Whole Life Carbon Assessment (WLCA)

A comprehensive multi-step methodology to quantify total carbon emissions (embodied and operational) and other environmental impacts (such as acidification and eutrophication) through the life stages of a building. The EN 15978 standard is typically used to define the different life cycle stages A1-3 ('Cradle to Gate'), A1-3 + A4-5 ('Cradle to Practical Completion of Works'), B1-5 ('Use'), C1-4 ('End of Life'), D ('Supplemental') **[See reference** 56**]**.

4.103 This approach would allow HDC to look holistically at the combined operational and embodied carbon performance of new developments.

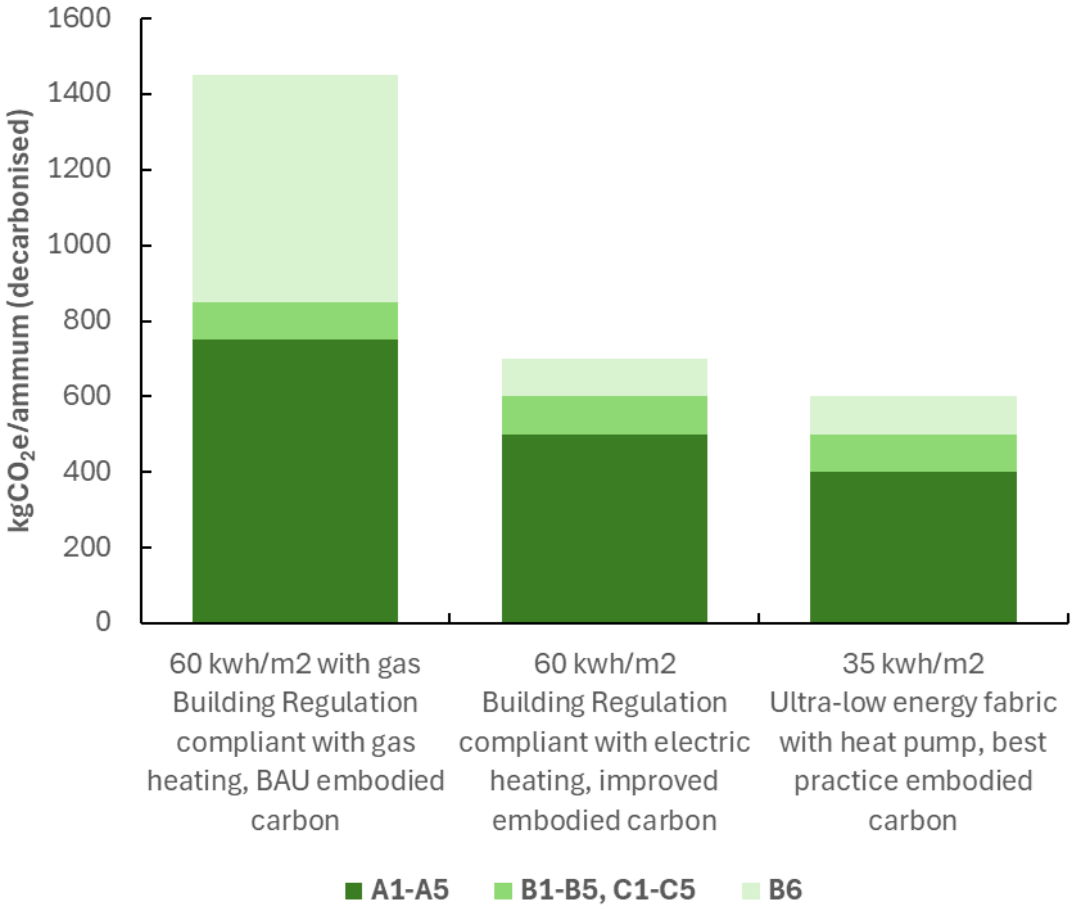
4.104 This approach is also compatible with third-party schemes like BREEAM, as such, to demonstrate high performance in managing whole life carbon emissions (including both embodied and operational emissions), developers can achieve relevant credits within recognised sustainability assessment schemes, as discussed in the sub-section below on 'feasibility of third party schemes'. Specifically, credits related to WLCA can be targeted in the HQM (Home Quality Mark) or the BREEAM (Building Research Establishment Environmental Assessment Method) standards.

4.105 BREEAM offers up to seven credits within the category labelled ‘Mat 01’. Developers can earn these credits by actively reducing the environmental life cycle impacts of their buildings. This reduction is achieved through conducting a rigorous WLC assessment and integrating its outcomes into the design decision-making process.

4.106 With regards to the HQM framework, the relevant assessment category is ‘Environmental Impact of Materials’. The primary aim of this category is to minimise the impact of construction products on the environment. While it covers various environmental aspects beyond embodied carbon, the latter remains a critical output of this assessment.

4.107 Both tools identify opportunities to reduce GHG emissions through the whole life cycle of new developments. The plot in **Figure 5.** presents a comparison of three options for residential buildings showing the possible reductions in WLC. The X axis below shows a key for three main types of carbon with a building’s life cycle – A1-A5: Materials and Construction; B1-B5 & C1-C5: Use of materials and End of Life; B6: Operational Energy Use only. The reduction in emissions from operational energy is shown to be substantial when a switch from gas to electric heating takes place, even whilst primarily still targeting Building Regulations overall.

Figure 5.1: A comparison of three options for residential buildings showing the possible reductions in WLC [See reference **57**]



To monitor this policy option, HDC should use the number of WLCA submitted as part of planning applications. This can also serve as a baseline for measuring the performance gap for buildings pre or post occupation. The desired trend should be a net increase in WLCAs.

Where accreditation schemes are used, HDC can use the number of properties achieving a 'Very good' and 'Excellent' rating as well as the number of properties achieving HQM, Passivhaus, and other relevant

accreditation scheme ratings in Huntingdonshire. The frequency of monitoring should be annual and the desired trend should be the net increase in properties achieving the desired ratings.

Examples and Case Studies

4.108 Some local authorities now ask for WLCA as part of a planning submission.

4.109 Greater Cambridge City Council is currently explore the use of WLCAs within their new local plan. Policy CC/NZ: Net zero carbon new buildings of the Greater Cambridge Local Plan, under examination, **[See reference** 58**]**, states that:

"Residential developments of 150 homes or more and non-residential development of 1,000 m^2 or more should calculate whole life carbon emissions through a nationally recognised Whole Life Carbon Assessment and demonstrate actions to reduce life-cycle carbon emissions. This should include reducing emissions associated with construction plant"

4.110 The Net Zero New Buildings Policy evidence for Local Plans **[See reference** 59**]**, informing Policy DP6: Net zero construction of the North Somerset Local plan **[See reference** 60**]**, under examination, in their submission states that Councils should:

- Require a WLC assessment to be carried out using a RICS recognised assessment tool (limited to a 'one-click' tool for minor developments), reporting against LETI A++ to G benchmarks.

- D2 Consider the introduce a backstop $kgCO_2e/m^2$ target covering upfront emissions for major developments, setting out how and when future targets will increase in scope.
- D3 Use data gathered through WLC assessments to inform industry wide development of more robust planning targets.

4.111 The guidance identifies two local authorities that include whole life carbon assessments within their local plans including the Greater London Authority, highlighted below, and the Greater Manchester Authority which states that applicants "*Include a carbon assessment to demonstrate how the design and layout of the development sought to maximize reductions in whole life CO2 equivalent carbon emissions.*"

4.112 The most advanced adopted policy relating to embodied carbon is included in the London Plan and supplementary guidance. Policy SI2 includes the requirement that "Development proposals referable to the Mayor should calculate whole life-cycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions".

4.113 The supporting text to Policy SI2 highlights the increasing importance of focusing on embodied carbon emissions as operational carbon targets become more stringent and flags the importance of a 'whole life-cycle approach' to capture unregulated emissions and embodied emissions. Further guidance on how to complete a whole life carbon assessment is provided in dedicated supplementary guidance from the GLA and a reporting template is also provided along with suggested wording for London's local authorities for a planning condition to secure the assessment in line with this guidance

4.114 The adopted London Plan 2021 **[See reference** 61**]** includes an approach to whole life carbon implemented by the Greater London Authority in Policy SI2 which includes the requirement that:

> "Development proposals referable to the Mayor should calculate whole life-cycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions."

4.115 The supporting text highlights the increasing importance of capturing embodied carbon emissions and unregulated operational emissions as operational carbon targets become more stringent, stating "a whole life-cycle approach is needed to capture its unregulated emissions (i.e. those associated with cooking and small appliances), its embodied emissions (i.e. those associated with raw material extraction, manufacture and transport of building materials and construction)".

4.116 Further guidance on how to complete a WLC is provided in dedicated supplementary guidance **[See reference** 62**]**. A reporting template is also provided along with suggested wording for a planning condition to secure the assessment in line with this guidance.

4.117 It should be noted that the London Plan policy only applies to proposals that are referable to the Mayor which generally includes major developments (150+ dwellings), development over 30m in height and development on Green Belt or Open Metropolitan land. Furthermore, the policy does not include a quantitative target for embodied carbon.

4.118 Although these examples represent urban cases, the technical and financial viability of delivering this policy in the context of Huntingdonshire is not dissimilar, requiring the knowledge and capability of performing whole life carbon assessments and the use of available tools like the 'One-click LCA' tool.

Technical Feasibility

4.119 A WLC approach can be achieved using tools prescribed by BREEAM and HQM. These methods are well established, based on deliverable targets, and in most cases, familiar to developers. The technical feasibility of this approach can therefore be dependent on the targets set within BREEAM and HQM which can be submitted as part of a planning application.

4.120 It is anticipated that the use of accreditation schemes will reduce burdens for HDC, allowing HDC to rely on external resources for assessing WLCs as they would be conducted by BREEAM and HQM-affiliated assessors. There would not be a need to provide specifically-trained internal resource to review WLC assessments.

4.121 Examples where requirements for WLC assessments have been implemented in local plans show that they are typically applied for larger/major developments.

4.122 It is important to note that the findings of the House of Commons Committee report – 'Building to net zero: costing carbon in construction' stated that "Local authorities are mandating WLC assessments of their own accord. Evidence so far shows that the policy is achievable and is working, with few barriers to its introduction" **[See reference** 63**]**. The report also suggests that WLCs and related efforts will become national policy in the near future **[See reference** 64**]**.

Cost Implications

4.123 The general uplift in costs, required to achieve a BREEAM certification, compared with the Building Regulations Part L 2013, could be between 0.2-5% for residential buildings and between 0.2-7.6% on average for non-residential buildings **[See reference** 65**]**. The costs associated with BREEAM accreditation is given further consideration in the 'Third-party schemes' section.

Benefits

4.124 WLC encourages early carbon profile considerations as developments are proposed and this has the potential to achieve efficient and cost-effective solutions on emissions reductions. This could include the potential use of low-carbon materials, such as wood, to replace high-carbon materials like cement and steel, thereby enabling long-term carbon storage in buildings.

4.125 Using external resources for WLC assessments can enhance the accuracy and reliability of these evaluations for HDC, without occupying internal resources.

4.126 The application of well-established accreditation methods minimises the workload for developers, making the process more manageable.

4.127 The targets set by BREEAM and HQM are realistic and attainable (see above), providing a clear and feasible roadmap for developers.

Limitations

4.128 WLC assessments are a relatively new concept and may receive further pushback from uninitiated developers than other approaches such as the referral to well-known third party assessors.

Operational Energy Targets

4.129 Some LAs have set operational energy targets that reflect net zero targets based on operational energy within best practice standards such as the London Energy Transformation Initiative (LETI). The key argument put forward by the LETI in the climate emergency design guide **[See reference** 66**]** for this approach is that energy use targets are more transparent and robust, compared

with carbon reduction targets used in the Building Regulations Part L, and are a better way to ensure zero carbon homes are delivered in practice. They are arguably easier to understand; can be measured easily for buildings in use by using energy bills and thus can help to incentivise better design and close the performance gap between design and as-built performance; and they cover both regulated and unregulated energy use.

4.130 Table 5.4 below presents a summary of energy performance targets for relevant best practice standards.

Table 5.4: Summary of energy performance targets for relevant best practice standards [See reference **67**]

Archetypes	LETI EUI Targets (GIA)	RIBA	UKGBC Paris Proof Target (GIA)
Homes	35kWh/m^2/year	35kWh/m^2/year	70kWh/m^2/year
Offices	55kWh/m^2/year	55kWh/m^2/year	55kWh/m^2/year
Schools	65kWh/m^2/year	60kWh/m^2/year	N/A
Space Heating Demand (all)	15kWh/m^2/year	N/A	15-20kWh/m^2/year
Fossil Fuels	All buildings should be fossil fuel free.	All buildings should be fossil fuel free.	All buildings should be fossil fuel free.

4.131 The Passivhaus Planning Package (PHPP) also has a similar space heat demand target of 15kWh/m^2/year.

4.132 HDC can take a staggered approach to setting operation energy targets for new developments, settings progressively stricter targets for all or just non-residential developments following stipulated years. For instance, following the approach from the Cambridge local plan, highlighted below, HDC could require new non-residential development to achieve a operational energy efficiency

targets relative to BREEAM minimum levels of 'Very good' starting 2024, and require a minimum BREEAM level of 'Excellent' from 2026 onwards.

Examples and Case Studies

4.133 In relation to residential developments, Policy SCR6: Sustainable Construction Policy for New Build Residential Development, of the Bath & North East Somerset Local Plan Partial Update (LPPU), adopted 2023 **[See reference** 68**]**, states that:

> "New build residential development will aim to achieve zero operational emissions by reducing heat and power demand, then supplying all energy demand through onsite renewables. Through the submission of an appropriate energy assessment, having regard to the Sustainable Construction Checklist SPD, proposed new residential developments will demonstrate the following:

- Space heating demand less than 30kWh/m^2/annum;
- Total energy use less than 40kWh/m^2/annum;
- On site renewable energy generation to match the total energy use, with a preference for roof mounted Solar PV; and
- Connection to a low- or zero-carbon District heating network where available."

> "…In the case of major developments where the use of onsite renewables to match total energy consumption is demonstrated to be not technically feasible (for example with apartments) or economically viable, renewable energy generation should be maximised and the residual on site renewable energy generation (calculated as the equivalent carbon emissions) must be

offset by a financial contribution paid into the Council's carbon offset fund where the legal tests set out in the Community Infrastructure Regulations are met."

4.134 With regards to major developments, Policy SCR7: Sustainable Construction Policy for New Build Non-Residential Buildings within the local plan states that:

"New build non-residential major development will maximise carbon reduction through sustainable construction measures. Through the submission of an appropriate energy assessment having regard to the Sustainable Construction Checklist SPD, all planning applications will provide evidence that the standards below are met.

Major development is to achieve a 100% regulated operational carbon emissions reduction from Building Regulations Part L 2013 (or future equivalent legislation), following the hierarchy set out below:

- Minimise energy use through the use of energy efficient fabric and services;
- Residual energy use should be met through connection to a low- or zero-carbon heat network if available;
- Maximise opportunities for renewable energy to mitigate all regulated operational emissions; and
- Residual carbon emissions that cannot be mitigated on site should be offset through a financial contribution to the council's carbon offset fund."

4.135 Policy 28: Carbon reduction, community energy networks, sustainable design and construction, and water use, of the Cambridge Local Plan **[See reference** 69**]**, applies a staggard approach for non-residential developments,

requiring minimum BREEAM levels of 'Very good' from 2014, and minimum BREEAM levels of 'Excellent' from 2016 onwards.

4.136 Specific targets for net zero carbon space heating demand are also set within Cornwall Council's Climate Emergency Development Plan Document **[See reference** 70**]**, adopted February 2023, which adds to the Cornwall Local Plan's Strategic Policies.

4.137 Policy SEC1 – Sustainable Energy and Construction, within this document requires all proposals to:

"…embed Energy Hierarchy within the design of buildings by prioritising fabric first, orientation and landscaping in order to minimise energy demand for heating, lighting and cooling. All proposals should consider opportunities to provide solar PV and energy storage.

New Development – Major Non-Residential: Development proposals for major (a floor space of over 1,000m^2) non-residential development should demonstrate how they achieve BREEAM 'Excellent' or an equivalent or better methodology.

New Development – Residential: Residential development proposals will be required to achieve Net Zero Carbon and submit an 'Energy Statement' that demonstrates how the proposal will achieve:

- Space heating demand less than 30kWh/m^2/annum;
- Total energy consumption less than 40kWh/m^2/annum; and
- On-site renewable generation to match the total energy consumption, with a preference for roof-mounted solar PV.

Where the use of onsite renewables to match total energy consumption is demonstrated to be not technically feasible (for example with apartments) or economically viable renewable energy generation should be maximised as much as possible; and/or connection made to an existing or proposed low carbon district energy network; or where this is not possible, the residual energy (the amount by which total energy demand exceeds the renewable energy generation) is to be offset by a contribution to Cornwall Council's Offset Fund.

Where economic viability or technical constraints prevent policy compliance, proposals should first and foremost strive to meet the space heating and total energy consumption thresholds. Proposals must then benefit as much as possible from renewable energy generation and/or connection to an existing or proposed low carbon district energy network. As a last resort, any residual energy is to be offset by a contribution to Cornwall Council's Offset Fund, as far as economic viability allows."

4.138 There are similar policies in draft plans for authorities such as North East Cambridge **[See reference** 71**]**, Winchester **[See reference** 72**]**, Leeds **[See reference** 73**]**, and Lancaster **[See reference** 74**]**, which are at different stages of consultation. Note that some of these draft policies have been challenged by planning inspectors, as in the case of Lancaster City Council. However, the more recent adoption of the BANES and Cornwall policies sets a precedent. It is the view of the Town and Country Planning Association (TCPA) that "As a matter of law and policy […] a local planning authority is entirely justified, and, in the TCPA's view required, to set out a net zero objective in planning policy" **[See reference** 75**]**.

Technical Feasibility

4.139 LETI highlights the key technical levers able to drive operational performance in energy use intensity and space heating demand for current technology and practice for building archetypes. This includes the use of heat pumps, increasing insulation, improving air tightness, and hot water efficiency.

4.140 The images in **Figure 5.2 and Figure 5.3 below** present LETI's recommended opportunities to reduce energy consumption for residential and non-residential developments.

Figure 5.2: Recommended levers to reduce energy consumption in residential developments [See reference **76**]

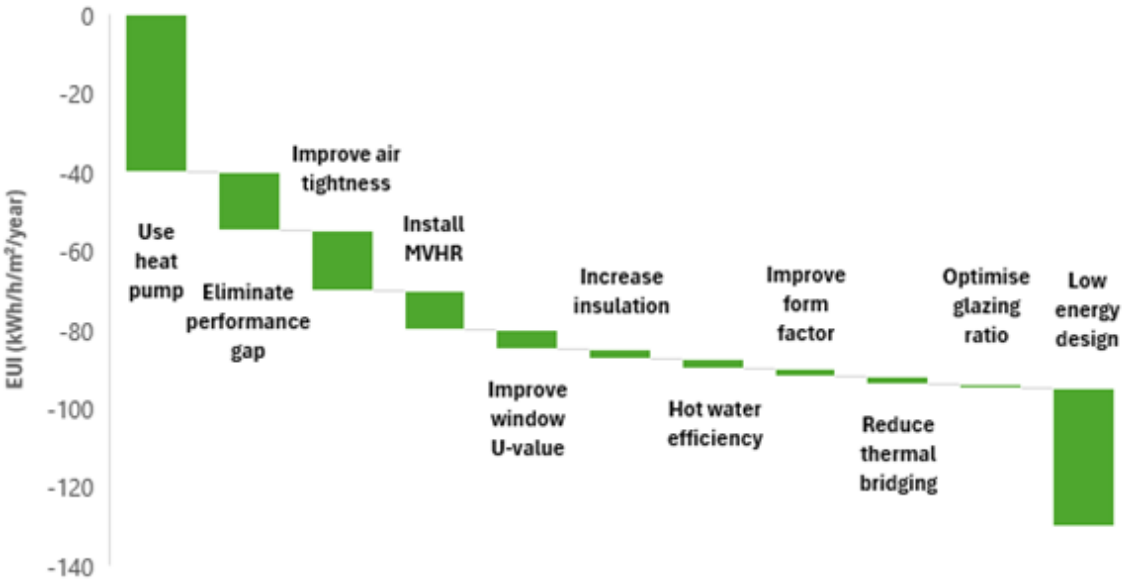
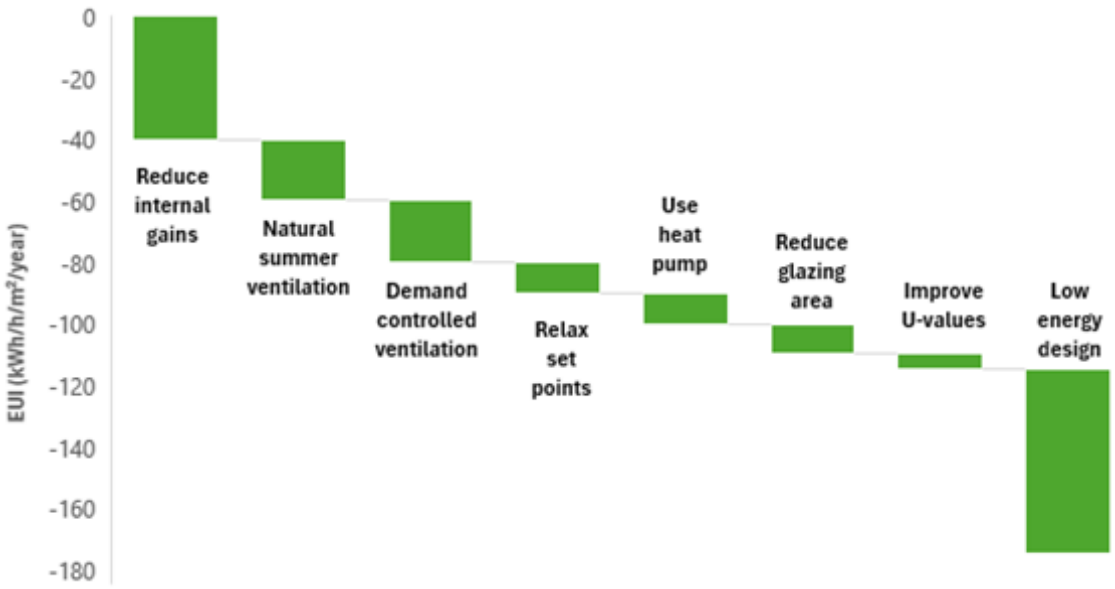


Figure 5.3: Recommended levers to reduce energy consumption in non-residential developments [See reference 77]



4.141 The opportunities presented suggest that current technology and practice can be applied towards achieving net zero emissions in buildings based on LETI's estimates.

HDC can require planning applications for major residential and major non-residential developments to be supported by an Energy Statement. The Energy Statement will outline how a proposed development will achieve the targets set for operational energy. It should typically include energy an assessment of energy demand, information on energy sources, details on energy efficiency measures, and predicted carbon emissions. HDC can leverage the information within the energy statement to monitor progress towards low carbon developments.

Cost Implications

4.142 A report by the Climate Change Committee **[See reference** 78**]** highlights the projected increased costs associated with achieving a range of energy efficient performance standards for two building archetypes, set against a counterfactual of a home built to the Part L 2013 national specification with gas heating. This is shown in Table 5.5 below which presents modelled cost uplift of meeting a 15kWh/m^2/year target as specified by the LETI guidance for homes using an Air Source Heat Pump and District Heating, assuming a Gross Internal Floor Area (GIA) of 93m^2 for semi-detached (3-bedroom) and 142m^2 for detached (4-bedroom).

Table 5.5: Cost uplift associated with alternative building standard approaches

Archetype	Air Source Heat Pump	District Heating
Semi-detached	3.9%	3.5%
Detached	4.3%	4.0%

4.143 Further information on the cost of uplifts against different building standards is provided in Table 5.6 which outlines the estimated costs of different building standard approaches and their uplift in costs compared to the current baseline of Part L Building Regulations 2021, including LETI targets.

Table 5.6: Cost uplift associated with alternative building standard approaches

Standard	Semi-detached House	Terraced House	Bungalow	Detached House	Low Rise Flats	High Rise Flats
Part L 2013	-5.0%	-5.5%	-5.5%	-4.5%	-1.7%	-1.3%
Part L 2021	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline
Part L 2025	-2.4%	-2.0%	-2.4%	-2.0%	0.4%	0.4%
Part L 2025 + PV	0.3%	1.3%	0.1%	0.1%	2.1%	1.6%
UKGBC 2025	3.4%	6.3%	5.5%	3.5%	4.3%	3.7%
LETI	2.7%	5.1%	4.1%	3.2%	3.7%	3.0%

Key

- Part L 2013/2021/2025: Typical levels of performance required for the ‘notional building’ in current and upcoming building standards (including the FHS).
- Part L + PV: As above, with maximum rooftop solar (not required by Part L 2025).
- UKGBC: UKGBC’s stretch targets for EUI and space heating.
- LETI: Targets set out above.

Benefits

4.144 This approach aligns with the recommendation from the Climate Change Committee for 15-20kWh/m^2 limits for space heating and cooling by 2025.

4.145 The LETI approach, which focuses on best practice energy demand limits, effectively addresses the issue of the decarbonising energy grid complicating emission calculations.

4.146 LETI targets that do not calculate carbon can be used in conjunction with building standards that do calculate carbon use, as the sets of metrics do not come into conflict.

4.147 This approach establishes a recognised pathway for new buildings to operate at net zero levels by 2030.

4.148 This approach can result in significant reductions in energy bills for building occupiers.

Limitations

4.149 A key constraint on applying this approach is the 2023 Written Ministerial Statement which clearly states that any planning policies that propose local energy efficiency standards for buildings that go beyond current or planned buildings regulation must express the percentage uplift of a dwelling's Target Emissions Rate (TER) calculated using a specified version of the Standard Assessment Procedure (SAP). The approach advocated by LETI is clearly contrary to this approach. However, as highlighted in the earlier section on the WMS there are questions about the weight to be given to this and a 'live' legal challenge.

4.150 With regard to other limitations, this approach will clearly impose additional costs on developers as it sets higher performance standards than the Building Regulations. The use of Energy Use Intensity (EUI) would also require developers to perform separate energy calculations from those required for Building Regulation compliance.

4.151 There would also be a need for an in-house specialist in HDC to scrutinise the developer's submitted energy statement and verify the robustness of calculations.

Feasibility of Addressing the Performance Gap

4.152 Studies show that in most cases, there is a difference between the anticipated and actual performance of buildings, known as the 'performance gap'. The factors that contribute to this performance gap include inaccurate energy calculations, poor quality construction and insufficient post-construction testing and commissioning.

4.153 Currently, there are no requirements set out in national policy concerning the performance gap.

4.154 The Climate Change Committee **[See reference** 79**]** has, however, highlighted this issue and identified the need for greater levels of inspection and stricter enforcement of building standards, alongside stiffer penalties for non-compliance.

Examples and Case Studies

4.155 Policy S4 of the London Borough of Islington's local plan, adopted September 2023, sets out the detailed comprehensive approach, stating that projects:

> "Provide an assessment of predicted future energy use based on PHPP for residential and low energy non-domestic buildings; and CIBSE TM54 for non-domestic buildings (or any equivalent methodology), rather than Part L only assessments. Predicted energy use must be declared in kWh/m^2/yr and kWh/yr and this will become one of the Green Performance Plan (GPP) indicator targets in the future.
>
> Confirm the actual performance values achieved in comparison to the original energy targets, and to submit the associated evidence including site photographs of insulation installation and the construction manager's declaration. This information must be submitted to the Council prior to occupancy as part of the final GPP.
>
> Carry out an air tightness test and thermographic survey. The test reports, along with details of any remediation measures, must be provided to the Council prior to occupancy as part of the final GPP."

4.156 The London Plan Policy SI2 sets out how developments should follow the energy hierarchy with the final stage being "be seen: monitor, verify and report on energy performance". Context is given within the supplementary guidance which indicates the requirement is to monitor and report energy performance post-construction.

Technical Feasibility

4.157 The impact assessment on the 2021 changes to the energy efficiency requirements for domestic buildings **[See reference** 80**]** shows that requirements to consider the performance gap will add design considerations, and potentially added costs, as developers invest more in design and construction practices as well as the monitoring buildings once built. The report states that, the uplifts needed to address the performance gap in line with the UK 2050 net zero targets are "currently achievable by industry and have a low risk of unintended consequences such as a build-up of moisture in the dwelling".

4.158 This approach will also result in technical energy capacity constraints in planning, however, this could be managed by simply prescribing additional credit requirements in the off-the-shelf assessment like BREEAM and HQM.

4.159 BREEAM V6 includes a credit for post-occupancy evaluation (POE) in the category Man 05 Aftercare (though there is no requirement to achieve this credit to achieve an Excellent rating). The credit requires that:

> "The client or building occupier commits to carry out a POE exercise [by an independent party]… one year after the building is substantially occupied. This gains comprehensive in-use performance feedback… and identifies gaps between design intent and in-use performance. The aim is to highlight any improvements or interventions that need to be made and to inform operational processes."

4.160 Similarly, HQM includes post occupancy evaluation (POE) as an issue under 'Customer Experience' with 10 credits available.

4.161 As such, HDC can, following the approach from Policy S4 of the London Borough of Islington's local plan, include policy wording requiring applicants to

follow the energy hierarchy with the final stage being “be seen: monitor, verify and report on energy performance” and/or require a specific assessment of predicted future energy use based on PHPP for residential and low energy non-domestic buildings; and CIBSE TM54 for non-domestic buildings (or any equivalent methodology) and confirm the actual performance values achieved in comparison to the original energy targets, prior to occupancy.

Cost Implications

4.162 Where the HQM and BREEAM schemes are used for post-occupancy evaluations, which is recognised as an effective way of getting the best possible performance out of a building, it is not anticipated that the additional cost to developers will be significant. According to the Post Occupancy Evaluation Guidance by RIBA **[See reference** 81**]**, the cost of POE is “a very small percentage of overall building costs. Research shows as a proportion of a project’s cost, undertaking POE adds an additional 0.1%-0.25%”. Thus, imposing a requirement for POE is not anticipated to have any significant impact on overall costs and viability.

Benefits

4.163 This approach would help the council to collect data and monitor the performance gap. This data could also be shared with other councils to help collective learning about the performance gap.

4.164 This approach will ensure appropriate design stage energy and carbon calculations are performed for applications.

Limitations

4.165 This approach will result in some added costs and complexities when undertaking comprehensive post occupation modelling.

4.166 There could be a lack of in-house expertise to review assessment and verify that calculations are robust, where off the shelf schemes are not used.

Summary of policy recommendations

We recommend that HDC should set policy requirements to achieve minimum scores against quantitative embodied carbon targets to ensure limits on embodied carbon in in domestic and non-domestic developments.

It should require that large scale new-build developments (an appropriate threshold to which HDC could consider) are required to submit an Embodied Carbon Assessment demonstrating a score of less than 900kgCO2e/m2 can be achieved within the development for the substructure, superstructure and finishes.

Modelling in Documents B and D has shown that a significant proportion of emissions related to new development in Huntingdonshire in the plan period will result from embodied carbon. An ambitious policy is, therefore, needed to respond to HDC's own Climate Strategy where it relates to the built environment.

Recently produced cost modelling identifies that ambitious reductions in embodied carbon will not result in significant cost differences from current development models. The above target, should, in fact, be cost neutral,

simply requiring different design considerations and choices. This report therefore recommends this approach as an ambitious, yet viable policy option significantly addressing Huntingdonshire's emissions profile in the coming years.

Should HDC be reluctant to install such a policy, for the limitations expressed above, it may seek to address embodied carbon via third-party accreditation schemes, discussed below.

We recommend that HDC embed the use of accreditation schemes in policy, specifically both BREEAM for commercial and HQM for residential development.

For the achievement of exacting operational energy standards, HDC should set minimum credits for commercial properties to be achieved in the "Energy performance" and "Prediction of operational energy consumption" and "Beyond zero net regulated carbon" categories of BREEAM (or equivalent) to demonstrate that the development has surpassed or achieved net zero regulated emissions. For residential development, minimum credits should be set in the HQM "Energy performance" and "Towards carbon negative" categories of HQM (or equivalent) to demonstrate that the development produces net zero or close to net zero regulated and unregulated emissions. An alternative route to compliance is to achieve Passivhaus certification and demonstrate that 100% of operational energy use will be met via on-site renewables emissions.

Should HDC not wish to adopt specific locally-set embodied carbon targets, it could require that major new build developments undertake a whole life-

cycle (WLC) carbon assessment using a nationally recognised assessment methodology, and seek to minimise WLC (including embodied) emissions demonstrated through achievement of relevant credits in HQM and BREEAM.

Sustainable Design Policy Options

4.167 This chapter outlines an assessment of sustainable design principles and the policy options required to implement them for developments in Huntingdonshire. Their implementation would help support the delivery of overall approaches to net zero discussed in Chapter 4, above.

4.168 It makes a series of recommendations based on the evidence available and the context of land use planning in Huntingdonshire. Analysis produced in **Document B** (Position statement and analysis of baseline and forecast future emissions) has informed the selection of policy options and recommendations. The 'responses' to adaptation and emissions reductions needs discussed in Document B act as additional advice to the Council to that presented in this Document. However, the recommendations made in this Document, Document C, are to be seen as the primary source of advice for planning policy changes within the Local Plan Update and beyond to respond to climate change.

4.169 Huntingdonshire can achieve significant emissions reductions through encouraging or requiring selected design considerations for new buildings. In addition, some of the principles discussed below are also the main options to help support climate resilience and adaptation in new developments in Huntingdonshire.

4.170 Many of these choices are instituted primarily in the design stage of development and do not require significant capital expenditure. Design stage actions such as appropriate site layout, landscaping and orientation of buildings, have the potential to significantly support net zero targets, as well as resulting in cost savings from future retrofits and savings from energy bills for residents.

4.171 This chapter addresses the steer from previous chapters in recommending sustainable design options that address both embodied and operational carbon. These options also help new developments both mitigate and adapt to climate change. The following key areas of sustainable design are covered:

- Modern methods of construction
- Retrofitting and/or retaining existing buildings
- Nature Based Solutions in New Developments;
- Sustainable travel;
- Water efficiency
- Form and orientation; and
- Insulation, airtightness and ventilation;

4.172 As stated in Chapter 4, in order to achieve net zero buildings in Huntingdonshire, approaches to securing high energy efficiency for new developments in Huntingdonshire should be combined with on-site and off-site renewable energy sources, and as such, should also be considered a key area of sustainable design. This is discussed in **Document E** of the Climate Change Study, and should be read alongside carbon offsetting, discussed in **Document F**.

Sustainable materials and the circular economy

Modern methods of construction

4.173 Modern methods of construction (MMC) refers to a collective term for a wide range of non-traditional building processes focusing on the use of sustainable materials and off-site manufacturing, including modular construction

where units are fully fitted out off site, panelised systems (such as timber or light-steel frames), site-based MMC such as thin-joint blockwork and sub-assemblies and components (such as prefabricated chimneys, porches etc.)' **[See reference** 82**]**.

4.174 Offsite manufacturing is often associated with an enhanced speed of construction, minimal defects in structures, and reduced wastes and energy consumption due to the pre-casting and fabrication of building segments, reducing onsite activities. **[See reference** 83**]**.

4.175 While MMC approaches are presently being used in the UK, such as the Ladywell scheme in Lewisham **[See reference** 84**]**, there is currently no policy requirement to implement MMC in planning, limited examples of policy requirements from LPAs for this approach. Additionally, it should be noted that ere is little literature explicating the degree of effectiveness of these MMC in the construction of buildings, particularly in terms of time and cost.

Examples and Case Studies

4.176 We are not aware of any local plan implementing requirements or supporting MMC approaches, however a report by RICS presented project-based case studies of where MMC has been implemented in the UK **[See reference** 85**]**.

Technical Feasibility

4.177 A 2005 report from the National Audit Office **[See reference** 86**]** on MMC had already suggested that it should be possible to build up to four times as many homes with the same on-site labour using MMC, and that site construction time could be reduced by more than half. However, RICS state that the lack of familiarity with different offsite construction techniques can lead to risk averse decisions against its use **[See reference** 87**]**. The report also states that there may also be some aversion to this approach from an abiding image of

post-war emergency housing rather than 21st Century technology delivering better quality, safer, and far more cost-effective homes at the same or, with upscaling, at lower cost.

Cost Implications

4.178 In a 2019 report, the Commons Housing, Communities and Local Government Select Committee estimated that construction programme time could be reduced by 20–60% by using MMC, and went on to predict a 20–40% reduction in costs as well as the potential for lower whole-life cost. However it should be noted that a report by RICS **[See reference** 88**]** highlights the infancy of these construction strategies, stating that "from a cost, value and performance perspective, modern offsite construction is relatively untested and is still in an evolutionary phase. The data on cost of construction, value and performance using offsite is not robust yet, and as techniques evolve, cost information and performance changes, and previous data becomes obsolete. This makes it hard for the industry to estimate costs, assess benefits and plan appropriately, which is a challenge for surveyors in particular.

Benefits

4.179 With regards to achieving net zero carbon developments, the key benefits include reduced wastes and energy consumption due to the application of off-site manufacturing, however, RICS **[See reference** 89**]** presents a summary of other potential benefits from MMC including:

- faster construction
- better quality
- lower unit cost
- predictable performance
- lower operational costs.

- improved health and safety during construction, with a larger proportion of workers in factories and fewer operating at height
- less noise, dust and disruption

Limitations

4.180 Pre fabrication strategies are relatively new construction methods, as such there is limited data on cost of construction, value and performance using offsite is not yet robust

4.181 The is rare evidence of this approach implemented by other local authorities as such there is limited evidence of the successful implementation of policy requirements.

4.182 Supply chains for these strategies homes are not currently as robust as they could be.

4.183 Innovation entails a departure from the tried and tested, but the construction industry can be reluctant to change or modernise. It tends to revert to what it has always done.

RECOMMENDED POLICY: Produce a design code

4.184 Design codes are a set of design requirements which can be used to outline the council's expectations for design quality, to develop a vision for new developments.

4.185 The NPPF highlights that local planning authorities should prepare design codes that are consistent with the principles that are set out in the National Design Guide (NDG) and National Model Design Code (NMDC).

4.186 Consultation with Huntingdonshire's urban designers suggest a keen interest in opportunities to deliver sustainability goals through an authority-wide design code.

4.187 An illustrative authority wide design code could include simple, concise and illustrated parameters, reflecting local character and design preferences for physical development in the area; and could specify development principles and standards that relate to waste management and the circular economy. The design code should be adopted as a Supplementary Plan, building upon existing policies set out in the Local Plan

4.188 The design code should use words like 'must' and 'shall' and include figures and precise parameters within which there is large flexibility.

4.189 We recommend HDC promote a circular economy approach in the design code alongside options to make strategic decisions on sustainable materials and options to reduce embodied carbon by placing further emphasis through coding and guidance contained within the design code. The design code could also include specifications for household and/or commercial developments' on-site waste facilities and storage that promote sustainable and circular practices.

Examples and case Studies

4.190 The **Lake District Design Code SPD**, adopted in September 2023 **[See reference 90]**, places a strong emphasis on using local materials in new developments which can reduce waste during construction, stating:

> To minimise the carbon generated through construction and development, new development must:
>
> - Re-use and adapt existing buildings and building materials, especially traditional buildings and materials that contribute to local distinctiveness such as locally quarried stone and slate;

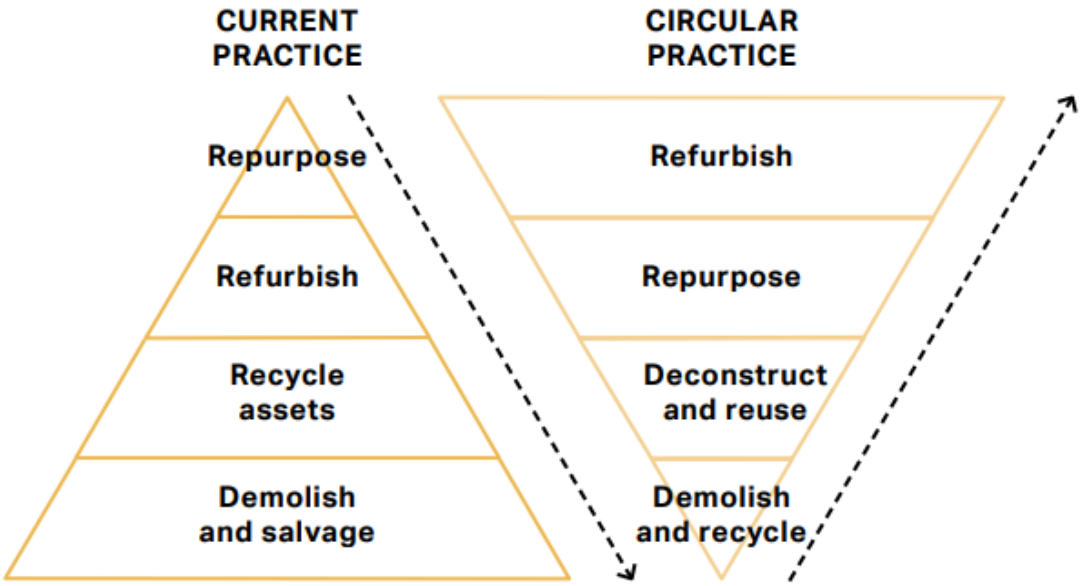
- Use locally sourced and/or low carbon building materials such as:
  - Sustainably sourced timber;
  - Locally quarried building stone and aggregate;
  - Locally quarried slate; and
  - Natural lime for mortars, renders and limewashes.
- Minimise the use of building materials that require large amounts of energy and resources to produce and/or cannot be readily recycled:
  - Concrete and cement, including in render and other finishes; and
  - uPVC, aluminium and steel-framed glazing, windows and doors (aluminium is preferred to uPVC).
- Avoid synthetic materials such as artificial roof tiles or cladding.

4.191 While not a design code, the London Plan Policy SI7 ‘Reducing waste and supporting the Circular Economy is supported by the Design for a Circular Economy Primer which includes principles to:

- create buildings that are high quality, flexible and pay attention to the building lifespan, through appropriate construction methods and the use of attractive, robust materials which weather and mature well;
- Improve resource efficiency to keep products and materials at their highest value use for as long as possible; and
- Promote waste avoidance and minimisation and ensure that there is zero biodegradable or recyclable waste to landfill by 2026

4.192 The primer contains a the circular economy hierarchy that can be adopted to inform key decisions presented below

Figure 4.4: The circular economy hierarchy [See reference 91]



4.193 Although this represents an urban case, the technical and/or financial viability of delivering this policy in the context of Huntingdonshire is not dissimilar, requiring additional sustainable construction considerations from developers at the design stage, and as such providing a framework for these considerations.

Technical Feasibility

4.194 Design codes rely on the balance being found between being positive and ambitious about design quality and considering local constraints. The UK Government's Design Code Pilot – monitoring and evaluation report found that "A steep learning curve is required to produce design codes and to use the new methodology in the NMDC, and with a few exceptions local authorities were not set up to deliver design coding in-house. Key skills gaps include urban design, graphic communication, viability assessment and digital engagement". Therefore, HDC might need to seek support from external specialists to develop an area wide design code or expand the skills of their in house expertise.

Cost Implications

4.195 The production of design codes are a relatively inexpensive task. However, a challenge exists in creating design code content that is suitably ambitious whilst considering development viability in the locality.

Benefits

4.196 A design code offers a means to help deliver high quality, climate resilient places by complementing the local plan policies.

4.197 A design code can provide consistency of measure implement by developers towards considerations for sustainable construction, waste management, and the circular economy.

Limitations

4.198 Design codes rely on the balance being found between being positive and ambitious about design quality and considering local constraints.

4.199 HDC might need to seek support from external specialists to develop an area wide design code or expand the skills of their in house expertise.

We recommend HDC produce a new authority-wide design code that places a strong emphasis on using local materials and specify waste management practices in new developments, as part of a new 'Supplementary Plan'.

Retrofitting and/or Retaining Existing Buildings

4.200 An effective way of ensuring emissions from the built environment within Huntingdonshire are minimised is to avoid unnecessary demolition and construction. Retention, supported by retrofit, can, in many cases, respond to Huntingdonshire's housing needs, described within the Annual Monitoring Report 2023 **[See reference 22]**, without resource-intensive construction. Retrofit, whilst bringing buildings up to better standards, can also improve the sustainability of existing buildings by tackling their efficiency and operational emissions, as well as embodied carbon emissions, construction emissions for site work activities, and emissions associated with demolition. However, it is noted that demolition, is not a significant problem in Huntingdonshire, with greenfield development is more common and some cases existing in the town centre retail locations.

4.201 The median energy efficiency score for dwellings in Huntingdonshire is 66 (band D). Newer houses and flats, however, have much higher scores at an average of 83 and 82, respectively (band B) **[See reference** 92**]**. The energy efficiency bands are based on the Energy Performance Certificates (EPCs) of buildings which indicate the energy efficiency of buildings, showing high and low energy efficiency scores to facilitate a greater understanding of the latest data and inform decisions around improvements of energy efficiency in existing housing stock and new dwellings.

Policy promoting retention

4.202 HDC does not currently have planning policy promoting the retention or refurbishment of existing buildings, whether for sustainability purposes or other goals.

4.203 The example of Camden Council (see below) whereby all proposals that involve substantial demolition are expected to demonstrate that it is not possible to retain and improve an existing building, is a simple example of this type of policy.

4.204 Going further, HDC should consider policy that promotes retrofit of existing buildings that targets sustainability purposes via energy efficiency.

4.205 It could consider policy that strongly discourages 'demolish and rebuild' schemes and to adopt a presumption against demolition except where it the applicant can show that it is justified, having given regard to whole life-cycle carbon impacts.

4.206 In addition to this or instead of policy explicitly focused on demolition/rebuild, HDC could look to loosen restrictions on installing energy efficiency measures on buildings (for instance, heritage related buildings) and pursue policy beyond the planning realm that promotes retention by providing support to retrofit and retention schemes.

4.207 Part L of the Building Regulations covers 'consequential improvements' which refer to energy efficiency improvements that are consequential to changes to a building. Regulation 28 of the Building Regulations and Section 12 require that, for an existing building with a total useful floor area of over 1000sqm, additional works may be needed to improve the overall energy efficiency of the building ("to the extent they are technically, functionally and economically feasible") if proposed work consists of an extension or specified works to building services. The aim is to ensure that the entire building complies with the current requirements of Part L.

4.208 Consequential improvements could include:

- Upgrading heating, cooling or air handling systems.
- Upgrading lighting systems.
- Installing energy metering.

- Upgrading thermal elements.
- Replacing windows.
- On-site energy generation.
- Applying measures proposed in a recommendations report accompanying an Energy Performance Certificate.

4.209 This requirement provides a useful driver to wider improvements to the energy efficiency of existing buildings when specific works are proposed, but it only applies to buildings over 1000sqm floor area.

Examples and Case Studies

4.210 Camden Council's adopted Local Plan Policy CC1 **[See reference** 93**]** which requires developers to prove that retention and refurbishment was not possible, stating that:

> "all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building."

4.211 The supporting text to the policy states that:

> "all proposals for substantial demolition and reconstruction should be fully justified in terms of the optimisation of resources and energy use, in comparison with the existing building. Where the demolition of a building cannot be avoided, we will expect developments to divert 85% of waste from landfill and comply with the Institute for Civil Engineer's Demolition Protocol and either reuse materials on-site or salvage appropriate materials to enable their reuse off-site. We will also require developments to consider

the specification of materials and construction processes with low embodied carbon content."

4.212 Central Lincolnshire also include a clause on 'presumption against demolition' with full justification required where demolition is proposed in Policy S11 Embodied Carbon – in their updated 2023 Local Plan **[See reference** 94**]**.

4.213 The recent Essex Embodied Carbon Policy Study **[See reference** 95**]** has provided proposed wording for aspiring local authorities to prioritise retrofit over re-build, below:

'Presumption against demolition and in favour of the re-use of existing buildings unless a full justification for demolition is provided. Justification where substantial or total demolition and re-build is sought must include:

• The purpose of the new building and whether this is a change of use.

• How much demolition is proposed:

- Percentage of envelope and structure to be retained by area?
- Percentage of internals to be retained by area?
- Justification of substantial or total demolition by building layer (skin/shell, structure/frame, building services, and space plan/interior).

• Explanation as to why the existing building cannot be retained, providing evidence to this effect. This should go beyond saying a building is 'low quality' or 'not fit for purpose' and include an assessment of:

- Structural condition - by means of a structural engineers report
- Contamination (e.g. asbestos)
- Visual/importance of the architecture in streetscape/location
- Whether the development will deliver significant public benefits……
- Service life/maintenance of fabric and systems – by means of an architectural and building services report.'

4.214 Islington Council's Policy CS10 (G) requires all developments are to be designed and managed to promote sustainability during their operation. This protects against the need for demolition in future years.

Technical Feasibility

4.215 Establishing policies on favouring the retention and adaptation of existing buildings or would depend on developing technical capacity within HDC to assess associated information submitted as part of planning applications.

4.216 Judgements on such a policy, assessing whether demolition and rebuild is justified may be challenging. Whilst minimising the embodied energy of construction is clearly important in some cases demolition and rebuild is justified by the poor performance of the existing building structures, its inability to provide the space or configuration requirements of future occupants, or, indeed by the need to scale up housebuilding as required by the new Labour government **[See reference** 96**].** This report recommends the adoption of an ambitious policy on embodied carbon in new developments (Chapter 4) and this, itself, should be the main driver of attempts to reduce embodied carbon from Huntingdonshire's development profile.

4.217 As for the delivery of retention, reuse and retrofit, heritage buildings (pre-1919) present unique challenges for reuse and retrofit. Planning constraints limit the extent of repair or alteration of these buildings. Their construction materials and methods often differ significantly from modern buildings, leading to incompatibility with modern building standards and incorrect assessments in current Building regulations.

4.218 Sustainable retrofit can be achieved by adopting a Whole Building Approach **[See reference** 97**]**, integrating fabric measures, such as insulation, new windows, draught proofing, and services (particularly ventilation, heating, controls and renewables) along considerations for building use. More detail can be found in Historic England's publication "Energy Efficiency and Traditional Homes'. **[See reference** 98**]**

Cost Implications

4.219 Encouraging the retention of buildings over demolition and construction has specific cost implications for developers. While the current tax system disincentivizes retention, significant savings can be made by pursuing this less intensive form of development. Despite the 20% VAT rate on retrofit projects compared to a zero VAT rate on new build projects **[See reference** 99**]**, avoiding the costs of demolition, waste disposal, and constructing new foundations and structural elements represents major savings for developers.

4.220 The cost of retrofitting existing buildings will vary widely depending on building type and characteristics. The Net Zero Carbon Toolkit developed for West Oxfordshire, Cotswold and Forest of Dean District Councils, provides a rough estimate for an average 90m^2 semi-detached home, indicating costs between £5-15k for a shallow retrofit (which, if starting with a poor baseline, could save around 30% in carbon emissions), through to £45-55k for a deep retrofit (including significantly improving the building fabric, changing the heating system to a heat pump and fitting roof mounted solar PVs) **[See reference** 100**]**. As Semi-detached (30.2%) and detached homes (39.7%) make up a significant proportion of Huntingdonshire's households **[See reference** 101**]**, the indicative estimates highlighted can serve as a guide to the anticipated costs for the district.

4.221 The table below, **Table 6.1** provides a summary of the potential costs of some retrofit interventions, highlighted within the Net Zero Carbon Toolkit, presenting indicative prices for retrofit interventions for a 90m^2 semi-detached dwelling **[See reference** 102**]**.

Table 6.1: Retrofit interventions

Measure	Shallow	Deep
Fit 100% low energy lighting	£20	£20
Increase hot water tank insulation by 50mm	£50	£50

Measure	Shallow	Deep
Loft insulation – add 400mm	£500	£500
Fit new time and temperature control on heating system	£150	£150
Improved draught proofing	£150	N/A
100% drought proofing	N/A	£2,000
Cavity wall insulation – 50mm	£600	£600
Floor insulation	N/A	£1,500
Insulate all heating and water pipework	N/A	£500
Fit mechanical ventilation and heat recovery (MVHR)	N/A	£7,000
Condensing gas boiler	£3,800	N/A
Air source heat pump	N/A	£9,000
Half glazed doors – double glazed	£1,500	N/A
Half glazed doors – triple glazed	N/A	£2,000
External wall insulation	N/A	£11,000
Double glazing	£7,000	N/A
Triple glazing	N/A	£8,400
Solar PV, 3kWp (21m^2 area)	N/A	£6,500
Miscellaneous and enabling works	£1,000	£5,000

4.222 There is limited data and information on the potential costs of retrofitting for other building typologies, however these costs will vary depending on the retrofit interventions required as well as the size, type, and characteristics of the building.

4.223 Despite the capital cost to developers and homeowners, retrofit interventions are expected to also provide significant savings for residents from energy savings.

Benefits

4.224 Retaining and retrofitting existing buildings will avoid costs associated with demolition, waste disposal, and constructing new foundations and various structural elements which can represent major savings for developers.

4.225 This approach will lead to significant savings associated with embodied carbon which will work towards Huntingdonshire's net zero targets.

4.226 While demolition is not a significant problem or a highlighted key issue in Huntingdonshire, this approach can also limit typical problems incurred by demolition and construction activities for new builds which could be beneficial to local communities.

Limitations

4.227 Establishing judgements on a policy against demolition and rebuild may be challenging. Whilst minimising the embodied energy of construction is clearly important, in some cases demolition and rebuild is justified by the poor performance of the existing building structures, its inability to provide the space or configuration requirements of future occupants, or the housebuilding agenda.

4.228 Any new such policy would require on new technical capacity within HDC to assess associated information submitted as part of planning applications.

4.229 Infrastructure contributions via the Community Infrastructure Levy (CIL) are not expected from properties that undergo retrofitting. The proposed Infrastructure Levy may require change-of-use retrofits to contribute, but at much lower rates than new developments. This could pose a challenge for HDC's infrastructure commitments, especially when retention and retrofit support a conversion, such as office to residential, which could strain local infrastructure without the usual developer contribution to fund necessary capital expenditure or other infrastructure responses.

4.230 A change of a building's use could result in lower space standards compared to what would be achieved in a new residential development, such as when a building is converted from commercial to residential.

4.231 The availability of appropriate financial incentives from Government such as grants and loans, will ultimately drive the retrofit sector and its intensity across the UK. Without these incentives, planning policy may not support significant retrofit activity.

4.232 In the absence of national government initiatives, a 'zero carbon' policy for new homes, supported by a carbon offset fund for existing buildings, could help generate funding for upgrades. However, HDC would need to identify resources for in-house energy or carbon expertise to implement such a scheme, such as identifying and developing appropriate carbon reduction projects to fund.

4.233 Retrofitting activities are typically implemented by small-scale contractors. This can make it hard for homeowners to gain confidence in contractors. However, a number of relevant trade bodies can be used to check the validity of providers, e.g., Action on Energy Cambridgeshire.

RECOMMENDED POLICY: Produce guidance on retrofit

4.234 The planning system is limited in the influence it can drive on promoting retrofit of existing building stock. In large part, retrofit activity is driven by financial incentives that sit outside of planning policy remit. As discussed above, there is a growing movement towards planning policy that presumes against demolition and rebuild, indirectly promoting retrofit as an alternative. However, this is a challenging policy to implement, as shown.

4.235 Planners can, however, encourage sustainable retrofit by providing guidance on what measures are likely to be acceptable in their locality. This

may include guidance on the particular challenges of historic properties or buildings in multiple occupancy.

4.236 Some councils may want to go further and actively support local markets for retrofit. UKGBC provides guidance on this **[See reference** 103**]**

4.237 The guidance should reference British Standards Institution (BSI) published PAS 2035: 2023 Retrofitting Dwellings for Improved Energy Efficiency – Specification and Guidance **[See reference** 104**]**, an example of best practice. PAS 2035 sets out a requirement for the proper assessment of dwellings and design and implementation of retrofits. The standard drives the 'whole house approach' including the 'fabric first' methodology. It defines the qualifications and responsibilities of individual retrofit roles and respective activities required prior and post EEM installation. TrustMark Registered Businesses carrying out work within its scope are required to be compliant with its requirements, as such residents may wish to ask about PAS 2035 and whether builders are TrustMark registered businesses.

4.238 Developers can demonstrate the implementation of best practices for retrofitting through specific categories from third party accreditation schemes like the BREEAM Refurbishment and Fit-Out standard, created to enable the assessment of sustainable refurbishment and fit-out of existing buildings that aspire to reduce the environmental impact caused during the refurbishment and fit-out process.

4.239 Similarly, the Passivhaus EnerPHit standard is another example of best practice and an alternative means of showing compliance with any consequential improvements policy. This would link policy options for energy efficiency in new developments with option for retaining and retrofitting existing building stock in Huntingdonshire.

4.240 The Council could subsequently provide further guidance on sustainable retrofitting (or instead of the above policy on retrofit), either by signposting to existing guidance or through the creation of a ‘Local Guidance’ document. The box below shows the wealth of guidance HDC could draw on.

There is a wide range of guidance available. A small selection is provided below, but there are many other examples:

- A sustainable design toolkit intended for Local Authority use is available under a Creative Commons license; HDC could choose to signpost to it directly or adapt it to suit local needs: https://www.cotswold.gov.uk/media/05cougdd/net-zero-carbon-toolkit.pdf
- Hertfordshire is an example of a Local Authority that has commissioned a website and toolkit dedicated to sustainable design, which includes templates for sustainability statements to accompany planning applications: https://www.hertfordshire.gov.uk/microsites/building-futures/a-sustainable-design-toolkit/sustainable-design-toolkit.aspx
- The Energy Saving Trust offers a range of guidance on energy efficiency, renewables and heating: https://energysavingtrust.org.uk/energy-at-home/
- LETI has produced guidance on how to retrofit homes in line with net zero standards: https://www.leti.uk/retrofit
- The Government has produced guidance aimed at improving the public sector estate: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1035417/Net_Zero_Estate_Playbook__1_.pdf
- Information aimed at local authority housing: https://localpartnerships.org.uk/wp-content/uploads/2021/07/Local-Partnerships-LA-Domestic-Retrofit-Handbook-July2021.pdf
- The UKGBC has produced guidance aimed at encouraging retrofits in commercial buildings: https://ukgbc.org/resources/delivering-net-zero-key-considerations-for-commercial-retrofits/
- A range of toolkits aimed at improving environmental performance of commercial buildings is provided via the Better Buildings Partnership: https://www.betterbuildingspartnership.co.uk/sites/default/files/media/attachment/bbp-low-carbon-retrofit-toolkit.pdf

- For older properties and heritage assets, guidance is available from Historic England and the Sustainable Traditional Buildings Alliance: https://historicengland.org.uk/images-books/publications/energy-efficiency-and-traditional-homes-advice-note-14/heag295-energy-efficiency-traditional-homes/

To monitor this policy option, HDC should use the latest releases of the Energy efficiency of housing in England and Wales published by the Office of National Statistics (ONS), currently 2023 **[See reference 92]**. The published datasets provide insights on the energy efficiency, carbon dioxide emissions and central heating main fuel type for new and existing homes by property type, tenure, and property age. The energy efficiency of buildings is indicated using Energy Performance Certificates (EPCs) which indicate the energy efficiency of dwellings and are based on data about a building's energy features, for example, the building materials used, the heating systems and insulation. The EPCs are collected by an accredited energy assessor and entered into government-approved software to generate an EPC score, typically ranging from 1 to 100.

HDC can use this annually published dataset to monitor the rate of increase in energy efficiency for older dwelling in Huntingdonshire. The frequency of monitoring should be annual and the desired trend should be the increase in EPC scores for older dwellings.

Examples and Case Studies

4.241 Policy S13: Reducing Energy Consumption in Existing Buildings of the Central Lincolnshire local plan **[See reference 48]** presents a case study of how considerations for retrofitting can be incorporated in local plans, stating:

> For all development proposals which involve the change of use or redevelopment of a building, or an extension to an existing building, the applicant is encouraged to consider all opportunities to improve the energy efficiency of that building (including the original building, if it is being extended)*.
>
> Proposals which do consider and take such viable opportunities will, in principle and subject to other material considerations, be supported. In particular, residential properties which, following an extension or conversion, will achieve an improved EPC rating overall will, in principle, be supported. To gain this in principle support, a pre-development EPC should be provided as part of the application, together with evidence as to how a completed development EPC is likely to be rated.
>
> More generally, for any work on a residential property, the use of the PAS 2035:2019 Specifications and Guidance (or any superseding guidance) is encouraged.
>
> *Note: for any heritage asset, improvements in energy efficiency of that asset should be consistent with the conservation of the asset's significance (including its setting) and be in accordance with national and local policies for conserving and enhancing the historic environment.

4.242 Several councils have also implemented Supplementary Planning Document (SPD) to support retrofitting policies within their local plans. However, the Levelling Up and Regeneration Act (LURA) 2023 provides for the creation of new planning policy documents called Supplementary Plans (SPs) **[See reference** 105**]**. The intention is that SPs replace Supplementary Planning Documents (SPDs) and Area Action Plans (AAPs) once the regulations are in place for the reformed plan-making system in 2024, in order to simplify, speed up and create more certainty in the plan making system, improve consultation and engagement in the formulation of planning policy, and streamline the number of information sources for those making planning applications **[See reference** 106**]**. The published consultation on plan making reforms states that "Supplementary Plans (SPs) are not intended to be used routinely; planning authorities should prioritise including all policies in their local plan or minerals and waste plan, leaving supplementary plans only for exceptional or unforeseen circumstances that need resolving between plans" **[See reference** 107**]**.

4.243 The plan making reforms once brought in to force will remove the legal powers that enable the preparation of Supplementary Planning Documents (SPDs), and Supplementary Plans (SPs) may only be used only on a site-specific basis (e.g. to support a new development opportunity) or to build on existing policies in the development plan (e.g. to set out a masterplan or design code for a site allocated in a local plan).

4.244 Therefore, it is anticipated that HDC will need to decide whether the information the SPD contains should go into the local plan, as demonstrated by Central Lincolnshire above or whether it can become local guidance. There is an overall aspiration for Local Plans to become shorter and simpler, which HDC will also need to consider.

4.245 Some example of SPDs implemented by local authorities include:

- Islington Council's Sustainable Design Supplementary Planning Document (SPD) requires buildings to be 'long life and loose fit', requiring buildings to be operable and habitable for many years and adaptable to new uses other than those planned for at the start of their life.

- The Royal Borough of Kensington and Chelsea have prepared a Greening SPD which includes a chapter on retrofitting existing buildings to help developers and residents increase energy efficiency within existing buildings.
- Similarly, Epping Forest have published sustainability guidance for householders on refurbishments and extensions.
- The Forest of Dean, Cotswold and West Oxfordshire District Councils have collaborated to develop a toolkit to provide guidance for developing new homes and retrofit projects that are net zero carbon. It offers practical advice to ensure that the UK's legally binding net zero target is achieved through the delivery of new homes. The guide was produced with leading technical experts from Etude, the Passivhaus Trust, Levitt Bernstein and Elementa Consulting. It reflects up to date design approaches and good practice within the field of net zero buildings. The toolkit is produced under a creative commons license, meaning that local authorities can use and adapt the toolkit to reflect local circumstances (as long as the toolkit is acknowledged).
- Cornwall Council provided guidance for local authority staff, professionals, contractors and building owners to upgrade the energy efficiency of historic buildings while retaining character, in a report. This included methods to reduce energy consumption, utilise sustainable materials and acquire funding to make these upgrades. The guide also includes local good practice examples and information on costs and performance of suitable products. The guide was approved by Cornwall Council as a material consideration for land use planning purposes.

Technical Feasibility

4.246 The production of a guidance on retrofitting can incorporate the British Standards Institution (BSI) published PAS 2035: 2023 Retrofitting Dwellings for Improved Energy Efficiency – Specification and Guidance, an example of best practice. However,

4.247 The guidance produced should highlight key actions for retrofitting existing buildings like integrating fabric measures, such as insulation, new windows, draught proofing, and services such as particularly ventilation, heating, controls and renewables, along with considerations for building use **[See reference** 108**]**

4.248 Where retrofitting is implemented, appropriate retrofitting for energy efficiency should take place with a PAS2035-approved Retrofit Coordinator who will take responsibility for demonstrating compliance with the PAS 2035 standard.

4.249 For significant impact, policies or guidance supporting retrofit should be combined with policy support against unnecessary demolition of buildings in Huntingdonshire.

Cost Implications

4.250 The development of guidance is not expected to be capital and resource intensive for HDC. Retaining and retrofitting existing buildings will also avoid costs associated with demolition, waste disposal, and constructing new foundations and various structural elements which can represent major savings for developers.

Benefits

4.251 The production of a guidance on retrofitting will provide a framework for developers, helping to stimulate greater confidence in retrofitting activities in the area.

4.252 Retaining and retrofitting existing buildings will avoid costs associated with demolition, waste disposal, and constructing new foundations and various structural elements which can represent major savings for developers. This approach will lead to significant savings associated with embodied carbon

which will work towards Huntingdonshire's net zero targets. This is a rarity in addressing emissions from existing building stock as opposed to new developments, which policies in this report focus on.

Limitations

4.253 Many of the standards used to guide retrofit programmes place great demands the homeowner/developer. For instance, the Passivhaus EnerPHit standard typically results in a building that outperforms current new-build properties in terms of energy and comfort. The standard would only be achievable for a limited number of developers and residents.

HDC should produce guidance to encourage developers and residents to make consequential retrofit improvements as part of works to smaller and larger buildings.

This would provide guidance on what is accepted nationally and locally and point them to sources of finance, further guidance, materials and even local networks of contractors experienced in retrofit and retrofit-related activities.

Nature-based Solutions for climate change mitigation and adaptation

4.254 There are a range of, increasingly popular, solutions to the challenges of overheating and flooding that involve the sensible use of nature itself to fight back against these climate-related impacts. Trees and other vegetation, landscaping and further green infrastructure also help in placemaking and beautifying our urban environments.

4.255 This stands in contrast to the more traditional response to environmental challenges of deploying hard infrastructure which can be far more expensive, creating permanent, unsightly features on the landscape and bring with them enormous amounts of embodied carbon.

RECOMMEND POLICY: Requiring trees and green infrastructure in new developments

4.256 The Committee on Climate Change has indicated that the UK needs to achieve an average of 30,000ha of new woodland planting per year up to 2050 to help sequester and store atmospheric carbon and mitigate the effects of climate change, but to date delivery is falling well short of this target.

4.257 Carbon sequestration is the process of capturing and storing atmospheric carbon dioxide. It is one method of reducing the amount of carbon dioxide in the atmosphere with the goal of reducing the impact of climate change. Despite making limited reference to woodlands, Paragraph 136 of the NPPF states that "Planning policies and decisions should ensure that new streets are tree-lined, that opportunities are taken to incorporate trees elsewhere in developments (such as parks and community orchards), that appropriate measures are in place to secure the long-term maintenance of newly-planted trees, and that existing trees are retained wherever possible" **[See reference** 109**]**. All local planning authorities are therefore encouraged to pursue the incorporation of trees in the built environment. Similarly, The National Model Design Code (Part 2 Guidance Notes) states that "It is the government's intention that all new streets include trees" They also set out design principles for street trees and signpost to the Urban Tree Manual for guidance on installation, management and maintenance, as proper management is key to ensuring the health and longevity of street trees.

4.258 The table below presents carbon sequestration rates for different tree and vegetation types to present the variance in carbon sequestration that can be achieved through planting.

Table 6.2: Potential carbon sequestration rates for different habitat types

Habitat type	Habitat	Carbon sequestration rate
Woodland	Broadleaved woodland	5.7
Aquatic	Reedbed	3.29
Grass	Scrub	3.7
Hedgerow	Native and non-native hedgerow	2
Grass	Other neutral and semi-improved grassland	0.4

4.259 The development of small-scale and large-scale developments in Huntingdonshire therefore represents a great opportunity for tree planting that not only supports carbon sequestration goals (see **Document F** of this study) but also supports resilience on those developments by tackling overheating.

4.260 Trees prevent buildings' warming as they provide shade and block short-wave radiation from the sun touching walls, windows and roofs. They also release moisture through their leaves which cools the surrounding air. Those combined effects make a significant contribution in urban or developed areas where heat is stored in hard surfaces and released at night, preventing surrounding homes from cooling down.

4.261 Green infrastructure measures more broadly (e.g. green roofs, green spaces, sustainable drainage), also provide a sustainable and effective solution for flood risk management in urban developments. They not only help in managing the immediate risks associated with flooding but also contribute to overheating prevention. GI planning should, therefore, not just consider the creation of new green spaces or canopies that help with the protection and enhancement of existing green assets, but also target climate change adaption

needs, including the long-term sustainability and resilience of urban environments.

4.262 Policy LP3 Green Infrastructure of Huntingdonshire's local plan, supported by LP31 Trees, Woodland, Hedges and Hedgerows, sets out the role of green infrastructure in protecting and enhancing Huntingdonshire's biodiversity and supporting local residents' access to recreation and leisure. However, LP3 is not concerned with development and the built environment and rather green spaces beyond them LP31 plays a vital role in protecting existing trees and woodland but not in requiring that new, further trees are planted, utilising the impact of new development to fund such works. A review of other local authority development plan policies has confirmed that most LPAs have also tended to focus on the protection of existing trees and woodland in accordance with the general need to protect existing environmental assets first.

4.263 HDC should therefore develop policy extending trees and green infrastructure requirements specifically to new developments by encouraging new applicants to plan around a set of principles of green infrastructure design, including maximising tree planting opportunities for carbon sequestration, soft landscaping and use of green living roofs. Plans policy to extend woodlands are discussed in **Document F**.

4.264 Such measures will not only help to mitigate overheating risks and reduce energy consumption but also meet other green infrastructure principles already contained in Policy LP3 and any others that the Council is seeking to meet in its forthcoming Local Plan update such as creating further opportunities for carbon storage and sequestration in the district. It would also build upon The Huntingdonshire Tree Strategy 2020 – 2030, adopted in November 2020 **[See reference** 110**]**, also sets out how trees will be managed and protected across the district to 2030.

4.265 HDC's policy should include policy requirements for new trees in new developments given trees and woodland provide higher rates of carbon sequestration than most other habitat types alongside other benefits from trees including moderating urban temperatures, absorption of particulate pollution,

improving biodiversity, and flood risk mitigation and management. Policy wording could promote the integration of street trees and other urban greening measures (e.g. sustainable drainage measures) into new streets and open spaces, whilst ensuring tree roots have sufficient space to support healthy, long lived trees.

4.266 HDC can also consider policy requirements for new trees to be selected from species providing higher rates of carbon sequestration than other habitat types. This could also require major developments to provide, through the retention of existing and/or the establishment of new, appropriate canopy coverage equal to at percentage of the site area.

4.267 It is also important to minimise the loss of sequestered and stored carbon in vegetation, soils and wetlands that might take place during the development process. This is an important function of the development management and enforcement process supported by Policies LP 30 Biodiversity and Geodiversity, LP 31 Trees, Woodland, Hedges and Hedgerows, and LP 32 Protection of Open Space, where carbon stored in grasslands are considered. However, the key policy option considered here for the HDC local plan update in this report is tree planting and habitat creation.

Examples and Case Studies

4.268 A good example of a proactive approach to tree planting and woodland creation is the St Helen's Borough Local Plan (2020-35) **[See reference 111]** , which includes a policy for trees and woodland which states:

> "The Council will, working where necessary with the Mersey Forest and other partner organisations, seek to increase the extent of tree cover across the Borough and to protect and enhance the multi-purpose value of trees, woodlands and hedgerows.

> Proposals that would enhance the value and/or contribution of woodland in respect of: recreational or educational needs; health; the landscape or townscape; heritage; biodiversity; tourism; and/or economic regeneration will be supported."

4.269 Policy S66 of the Central Lincolnshire Plan (adopted 2023) states that development proposals should maintain, improve and expand the existing tree and woodland cover and opportunities for expanding woodland should be actively considered. Furthermore, Policy S17 sets out how existing carbon sinks, such as peat soils, must be protected, and where opportunities exist, they should be enhanced in order to continue to act as a carbon sink.

4.270 Policy SI4: of the London Plan, includes consideration for the risk of overheating in buildings, stating that:

> "Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure"

4.271 Similarly, Policy G1 in Cornwall's Climate Emergency DPD states:

> "Street trees and other greening shall be integrated into street design and public open spaces wherever possible while remaining sympathetic to the historic environment. Streets should be designed to accommodate tree pits, whilst maintaining the space for the necessary runs of services (e.g. water, electric, sewerage)."

4.272 The same DPD also has a specific policy on tree canopy (Policy G3) which includes the following:

> "All major development should provide, through the retention of existing and/or the establishment of new, canopy coverage equal to at least 15% of the site area (excluding areas of the site that are priority habitat types) in accordance with a Cornwall Council approved calculator or metric."

4.273 The supporting text explains that:

> "In order to both encourage on-site retention of existing trees and to plant new trees, the Council has determined that a 15% canopy coverage, as measured by the overhanging spread of a mature tree, is an achievable aim for major developments in the Cornish climate and fits generally within the character of the Cornish landscape."

4.274 Cornwall Council's Design Guide **[See reference** 112**]** emphasises the importance of creating high quality developments that are affordable for a Cornish income. Green infrastructure is identified as fundamental to this approach, as green spaces are shown to promote resident wellbeing while improving overall quality of life. The Resilient Places section of this guide outlines the importance of adapting to climate change, such as expecting that buildings will be designed to be flood resilient and incorporate natural ventilation to prevent overheating.

Technical Feasibility

4.275 These requirements relate to the masterplanning and urban design of new streets and communities. They should be straight forward to deliver if considered from the outset of the site design process. However, consideration should be given to Huntingdonshire's peatland areas as new forest planting on peatland is not supported, as highlighted in the IUCN National Committee United Kingdom's position statement on peatlands and trees **[See reference**

113]. HDC should support this policy option by identifying priority areas for planting within Huntingdonshire, especially for areas with peatlands.

4.276 Natural England's Green Infrastructure Framework includes GI design guidance and online mapping and a range of training materials to support GI planning and design.

4.277 Urban tree planting is a particularly long-term investment with a slow but increasing return of benefits over time, particularly where the right species are chosen for the right location. Canopy cover, particularly where overheating and resilience are the main objective, takes many years to develop. However, particularly where appropriate species selection and soil preparation takes place, trees can persist and grow over decades and beyond 100+ years of growth, providing increasing benefits over time, particularly in comparison to street trees that need replacing every 10-15 years **[See reference 114]**.

4.278 Urban tree planting is a particularly long-term investment with a slow but increasing return of benefits over time, particularly where the right species are chosen for the right location. Canopy cover, particularly where overheating and resilience are the main objective, takes many years to develop. However, particularly where appropriate species selection and soil preparation takes place, trees can persist and grow over decades and beyond 100+ years of growth, providing increasing benefits over time, particularly in comparison to street trees that need replacing every 10-15 years **[See reference** 115**]**.

Cost Implications

4.279 Masterplanning for green infrastructure is a relatively inexpensive activity. The costs of installing green infrastructure interventions will vary substantially be scale and type. For example, simple extensive green sedum roofs are a relatively affordable intervention but more intensive green roofs with deeper substrates and a wider variety of planting will create more biodiversity value, hold more water and provide more insulation. As a guide, prices can vary from

£50/m^2 for a sedum roof to £200/m^2 for a fully planted intensive roof **[See reference 116]**.

4.1 The installation of street trees may involve more infrastructure, and therefore cost, than many may assume. These include supply, delivery, installation, tree guard and tree grille, warranty, traffic management and watering/ongoing management. A key source of cost data is the standard costs in the English Woodland Creation Offer (EWCO) Grant Manual **[See reference 117]**. Appendix 1 of the manual includes standards cost items that are available through EWCO. The EWCO does, though, provide £300 per hectare to maintain a woodland.

4.2 A cost benefit analysis by GreenBlue Urban **[See reference 118]** modelled the installation cost of a standard 18-20cm (7-8") London Plane street tree, including supply, delivery, installation, tree guard and tree grille, warranty, traffic management and watering. It found that whilst ensuring that mature, existing trees can be maintained in developed spaces may be an expensive activity but can therefore be seen a cost-effective solution when the long-term multi-functional benefits of these trees are considered.

4.3 Where HDC implements its own tree planting efforts, there are a range of central government sources of finance for non-woodland tree planting that HDC could seek. In 2021/22, over half a million trees were planted outside of woodlands with grants from the Urban Tree Challenge Fund, the Local Authority Treescapes Fund and the Levelling Up Parks Fund. However, ongoing costs of management and maintenance are also important to consider. It is also worth considering that tree planting in new developments utilises the resources held by developers against their expected property sales and their efficiencies in delivering trees and other green infrastructure alongside other works at development sites.

Benefits

4.4 Trees play a key role in climate change climate mitigation and climate resilience through the storage and sequestration of carbon and increased resilience of urban areas to the effects of climate change, including flooding, heat, pollution, and soil nutrient depletion.

4.5 Nature-based solutions like urban trees can help regulate the temperature inside and around buildings, reducing the need for air conditioning which can lead to reductions in energy emissions as well as result in cost savings for occupiers.

4.6 There are also potential amenity and health and wellbeing benefits from nature-based solutions including a positive impact on the mental health for more green spaces.

4.7 Pursuing new green infrastructure via new developments utilises the cost efficiencies of delivering via new development construction. Green infrastructure requirements can add costs for developers, both in terms of capital cost and ongoing maintenance costs; however, if considered from the outset of the design process they should not be significant. Also, the additional cost may be outweighed by higher resulting sales values. Proximity to trees and greenspace has also been shown to produce a premium on house prices **[See reference 119]**. Therefore, tree planting can boost the desirability and liveability of homes in the eyes of existing and future residents.

Limitations

4.8 Planners and developers will need to consider the long-term maintenance of trees and other green infrastructure. Lack of maintenance can mean that some trees seldom live long enough to reach maturity and provide meaningful canopy and other ecosystem services. Maintenance arrangements for new trees, and

wider GI measures such as green roofs, must be established prior to planting to ensure value for money, healthy growth and effective performance.

4.9 Prior to maintenance, appropriate species selection and the preparation of planting areas, particularly soil, is vital to achieving tree maturity and the realising of benefits. For example, trees grown in less compacted structural soils grow more quickly, have a better physiological performance and provide five times greater cooling than the same tree planted in a highly compacted soil. Developers should be expected to describe such conditions in their proposals to Council, including the orientation of tree planting. They should also consider the use of climate-resilient species in face of climate change.

We recommend HDC include policy that requires new trees and other green infrastructure in new developments.

New applicants should be required to plan around a set of principles of green infrastructure design, including maximising tree planting opportunities for carbon sequestration, soft landscaping and use of green living roofs.

Such measures will not only help to mitigate overheating risks and reduce energy consumption but also meet other green infrastructure principles already contained in Policy LP3 and the Huntingdonshire Tree Strategy 2020 – 2030/

HDC could consider policy requirements for new trees to be selected from species providing higher rates of carbon sequestration than other habitat types. This could also require major developments to provide, through the retention of existing and/or the establishment of new, appropriate canopy coverage equal to at percentage of the site area.

Policy wording could promote the integration of street trees and other urban greening measures (e.g. sustainable drainage measures) into new streets and open spaces that ensure tree roots have sufficient space to support healthy, long lived trees.

Proposals can demonstrate compliance within a Design and Access Statement (DAS). The DAS will detail how the development will meet the requirements of the policy, allowing HDC to review the DAS to ensure the proposed development aligns with considerations for new trees and green infrastructure. Once a project is approved, the DAS serves as a reference point for monitoring compliance across developments.

RECOMMEND POLICY: Enhance current SUDS policy by requiring drainage hierarchy

4.10 Policy LP 15 Surface Water of the Huntingdonshire local plan supports proposals that incorporate and maintain SuDS in accordance with the Cambridgeshire Flood and Water Supplementary Planning Document (SPD) **[See reference** 120**]** or successor documents and advice from Cambridgeshire County Council as Lead Local Flood Authority.

4.11 Policy LP 15 should be expanded to introduce a ‘drainage hierarchy’ to encourage use of multi-functional green solutions to reduce the rate and volume of surface water runoff. This would provide an additional framework for developers, incorporating into policy an ambitious rigorous drainage hierarchy, expecting all/major developers to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible, including water reuse.

4.12 National Planning Practice Guidance sets out a hierarchy of drainage, promoting the use of multi-functional sustainable drainage systems, aligning

modern drainage systems with natural water processes, and to solutions that allow surface water to be discharged according to the following hierarchy of options by **[See reference** 121**]**.

- into the ground (infiltration);
- to a surface water body;
- to a surface water sewer, highway drain, or another drainage system;
- to a combined sewer.

4.13 It is also recommended that as part of preparing local design codes or guides LPAs should provide clarity about SUDS design expectations at an early stage – as recommended by paragraph 128 of the NPPF and in accordance with the National Model Design Code – HDC should explicitly consider flood risk management. This should include providing guidance within these documents advising on the use and integration of SuDS into developments and key design considerations.

HDC could also consider incorporating drought-resistant landscaping in to any guidance produced on SUDS and the drainage hierarchy. This landscaping would require low supplementary irrigation and be designed to act as a natural firebreak. Although a consideration for water scarcity rather than drainage and the threat of flooding, Huntingdonshire is a water stressed area (as discussed in **Document B**). Any new landscape schemes incorporating SUDS should also, therefore, consider the reduction of irrigation to reduce unnecessary water usage in the district.

For instance, the Islington Environmental Design SPD **[See reference 122]**, states in its section on minimising water demand and maximising efficiency that ‘use of soft landscaping and planting requiring high levels of irrigation should be avoided”. Huntingdonshire’s guidance could go further to point developers to new or already existing guidance on varieties and

mixes of species and landscaping that can address drought, diseases and pathogens.

4.14 Document B also identified the need to locate developments away from areas at risk of flooding and to produce flood risk assessments (considering wider risks and impacts of flooding, including site accessibility to emergency services and floodwater contamination). However, these do not form separate policy options or recommendations here as they are already suitably addressed in the existing Huntingdonshire Local Plan.

Examples and Case Studies

4.15 Policy EE13 of the Runnymede Borough Council Local Plan states that

"All new development is required to ensure that sustainable drainage systems are used for the management of surface water unless demonstrated to be inappropriate. All new developments in areas at risk of flooding must give priority to the use of sustainable drainage systems."

4.16 Policy SI13 Sustainable drainage of the London Plan states that developments should aim to achieve greenfield run-off rates and that there should be a preference for green over grey features, in line with the following drainage hierarchy:

- Rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
- Rainwater infiltration to ground at or close to source
- Rainwater attenuation in green infrastructure features for gradual release (e.g. green roofs, rain gardens)
- Rainwater discharge direct to a watercourse

- Controlled rainwater discharge to a surface water sewer or drain
- Controlled rainwater discharge to a combined sewer

4.17 This policy is also complemented by the London Sustainable Drainage Action Plan which contains a series of actions to make the drainage system work in a more natural way with a particular emphasis on retrofitting.

Technical Feasibility

4.18 The drainage hierarchy is relatively simple to implement, provided reasonably applicable guidance is provided for developers. The layout and function of SuDS needs to be considered at the start of the design process for new development, as integration with roads and other infrastructure can maximise the availability of developable land. Particular types of sustainable drainage features may not be practicable or appropriate in some locations, such as the use of infiltration techniques from potentially polluting development in areas where groundwater provides a potable supply of water. Design guidance could highlight such locations constraints and could also encourage the incorporation of rainwater harvesting in sustainable drainage systems to help manage potable water demand from new development.

4.19 A relevant example of a good SUDS design guide is the Sustainable Drainage: Cambridge Design and Adoption Guide which can be accessed at: https://www.cambridge.gov.uk/media/5457/suds-design-and-adoption-guide.pdf. Other examples include the Surrey County Council Sustainable Drainage System Design Guidance **[See reference 123]**, and the Sustainable Drainage Systems Design Guide For Essex **[See reference 124]**.

Cost Implications

4.20 For new developments, it is likely that implementing a drainage hierarchy in combination with SuDS will lower costs compared to considerations for

alternative drainage systems. Early stage considerations will maximise benefits from this option.

4.21 Consideration of SuDS at an early stage in the design process is key to maximising benefits and minimising costs. Although costs will vary depending on the size of the development or scope of works associated, the cost for the planning and design of SuDS are typically 15% of the eventual capital costs of implementing the SuDS **[See reference** 125**]**.

4.22 PPG, in fact, makes it clear that where cost is a reason put forward by a developer for not including sustainable drainage systems, they should provide information to enable comparison with the lifetime costs of a conventional public sewer connection (para 059).

4.23 The maintenance required for SuDS and the responsibilities for that maintenance are often cited as putting off developers from installing SuDS. HR Wallingford's work for the DTI (HR Wallingford, 2004) on whole life costing for SuDS components suggested that annual operational and maintenance costs as a proportion of construction costs ranged from just 0.5% to 10% for all components with the exception of an infiltration trench for which a 20% figure was cited as a maximum **[See reference** 126**]**

Benefits

4.24 Implementing a drainage hierarchy will ensure that water is evacuated efficiently, contributing to flood resilience. This will relieve pressure on existing drainage systems.

4.25 The hierarchy not only prioritises natural, less invasive solutions, but these likely represent a cost saving on harder forms of infrastructure.

4.26 SuDS interventions will also provide a range of benefits beyond drainage including biodiversity and amenity.

Limitations

4.27 Designing an effective drainage hierarchy will require careful consideration of site-specific factors.

HDC should bolster existing Policy LP 15 Surface Water by requiring developers to follow a stated 'drainage hierarchy'.

This hierarchy of approaches to drainage would expect all, or just major, developers to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible, prioritising the use of multi-functional green solutions prior to hard infrastructure. This could emphasise water re-use takes place at sites. This would ideally be accompanied with appropriate design guidance supporting the achievement of the hierarchy.

Guidance should state that the design of SUDS needs to respond to projected impacts of climate change on runoff rates and volumes such that they are able to support local climate change resilience.

Sustainable Travel

4.28 This section considers the contribution of sustainable transport, including electric vehicle infrastructure, in achieving net zero in Huntingdonshire.

4.29 Transport is a significant contributor to the UK greenhouse gas (GHG) emissions, contributing about 26% of all emissions **[See reference** 127**]**. In Huntingdonshire, these emissions amount to about a quarter of the districts greenhouse gas emissions **[See reference** 128**]**. Huntingdonshire's rural nature means that a significant proportion of journeys are made by car. However, the supporting text for Policy LP16 Sustainable Travel within the Huntingdonshire Local Plan suggest that more than a quarter of all journeys to work in Huntingdonshire are less than 5km in length **[See reference** 129**]**.

4.30 Policy LP16: Sustainable Travel of Huntingdonshire's local plan requires new developments to maximise opportunities for the use of sustainable travel modes.

4.31 HDC can strengthen this policy and its sustainable transport ambitions by incorporating specific sustainable travel approaches in any plan update. Below, we discuss 20-minute neighbourhoods, electric vehicles and car hubs and private vehicle demand management.

4.32 The policy recommendations presented should not be considered in isolation. Rather, they are able to complement each other and/or work together to achieve maximum benefits for Huntingdonshire.

A 20-minute neighbourhood approach for strategic-scale developments

4.33 A 20-minute neighbourhood centres around the accessibility of residents to meet every day needs within a 20-minute walk and return.

4.34 Requiring large scale developments to employ the concept of 20-minute neighbourhoods will facilitate more permeable developments either around existing services, or with provision of essential local services on new sites if current services are beyond a 20-minute walk or cycle distance.

4.35 A focus around the 20-minute neighbourhood concept would ensure HDC can reduce emissions arising from short distance travel (less than 5km) within Huntingdonshire, thereby strengthening the existing Policy LP16 of the local plan by ensuring that opportunities for sustainable travel modes are maximised.

Figure 6.1: Overview of a 20-minute neighbourhood (authored by LUC)

4.36 In the Huntingdonshire context this approach would need to be applied for larger-scale developments, including new communities of over 2,500 homes or equivalent scale mixed use sites.

4.37 To support a 20-minute neighbourhood approach, without explicit reference to 20-minute terminology or principles, HDC could instead enshrine

through policy the principles of a movement hierarchy (or sustainable transport hierarchy). This places walking and wheeling, cycling, public transport, shared transport and the private car on a hierarchy (in that order) of street design prioritisation.

4.38 To achieve it, the location of services within or outside developments must be considered and an assessment of the suitability of walking and cycling to these services should be undertaken. Following which, public transport movements should be considered and finally movement of general traffic. This approach should be set out within policy to ensure developers understand that walking and cycling should be prioritised.

4.39 HDC could also highlight the importance of incorporating green infrastructure along active travel routes in the updated Local Plan to help create attractive routes. In addition, where appropriate, specific wording within each ‘significant site (large developments / urban extensions)’ could be added regarding the 20-mininute neighbourhood concept.

4.40 Policy wording could indicate the need to prioritise sustainable and active modes of travel and define a clear street hierarchy, the provision of safe and convenient routes for walking and cycling through developments and linking with existing and enhanced networks beyond.

4.41 If deemed appropriate, policy wording could also seek the creation of liveable communities embodying the 20-minute neighbourhood concept and delivering attractive, healthy places with permeable street networks within the site with clearly defined route hierarchies. This would help to ensure routes are safe, designed for all users and support desirable opportunities for people to choose not to travel by car. Urban greening measures such as tree planting should also be sought, particularly for placement along routes prioritised for walking and cycling.

Examples and Case Studies

4.42 Leeds City Council included a policy in their most recent local plan update concerning the 20-minute neighbourhood concept (Reg 19 –Pre- Submission Draft changes - October 2023). **[See reference** 130**]** This inclusion acknowledges the correlation between the principles of local living, which involves the establishment of well-equipped, secure, accessible, and walkable neighbourhoods, and the reduction of emissions.

4.43 They are calling it ‘complete, compact and connected places’. It had originally been branded as a 20-minute neighbourhood concept. However, the council have recently considered that the varying nature of cities, town centres, urban suburbs and rural areas would be different and so that the focus should be on integrating the key features of the 20-minute concept to allow people to live locally rather than focussing exclusively on the 20 minute aspect, giving people the ability to meet most of their daily needs within a 20-minute return walk/wheel from home and with access to safe cycling and local transport/shared mobility alternatives to access facilities that are not within 20 minutes.

4.44 To support this policy, the council commissioned an analysis of local accessibility, producing a heat map showing the walkability of neighbourhood areas in relation to the ease of walking to local amenities. This analysis gives a score to authority areas which are classified under four categories of walkability.

4.45 Similar assessments can be commissioned by HDC when requiring new large-scale development to implement this approach to identify specific site locations to satisfy the demand for 20-minute neighbourhoods. Therefore, Policy LP16 would state that the 20-minute neighbourhood approach would only apply to selected areas/sites.

4.46 Surrey County Council has developed guidance for planners on net-zero compatible street and travel-related design and spatial planning guidance, in the ‘Surrey Street Design Guide: Healthy Streets for Surrey’ **[See reference** 131**]**.

Technical Feasibility

4.47 Requiring large scale developments to implement this approach should be straightforward to deliver if considered at the outset of the site design process.

4.48 Delivering on the concept is more viable in denser locations or larger greenfield developments where the number of people present provides a 'market' for local services and sustainable travel modes. This also relates directly to costs whereby the provision of related infrastructure would represent a smaller proportion of delivery costs for a larger development as well as, possibly, for an urban development where the extent of provision needed to satisfy the 20-minute concept would be smaller given the availability of local services.

4.49 The potential benefits from the 20-minute neighbourhood concept can best be actualised where a significant proportion of planned growth is through large, mixed use development sites that are delivering services and facilities on-site. As sites move through the various stages of planning and into construction, it is important to ensure that appropriate services will be delivered on these sites, and that means of connectivity to and from them to facilities elsewhere is achieved. This will necessitate an important role for HDC's planning team.

Cost Implications

4.50 The provision of appropriately designed street networks is particularly low-cost as a proportion of construction costs. The provision of services and facilities on-site, rather, is likely to be a matter of ensuring a local market exists such that it could sustain them.

4.51 Supporting evidence is, however, needed to identify specific areas and sites where 20-minute neighbourhoods can be implemented.

Benefits

4.52 A 20-minute neighbourhood approach has the potential to strengthen HDC's policies on sustainable travel supporting an increasing proportion of journeys being undertaken by sustainable travel modes.

4.53 Beyond climate-related benefits, this approach can provide improved public realms, support to the local economy, healthier lifestyles and support a vibrant, cohesive community.

4.54 This approach can support greater integration of retail and transport strategies in line with HDC's housing and economic objectives.

Limitations

4.55 Implementing a 20-minute neighbourhood approach should involve the production of supporting evidence to identify appropriate sites where this approach should be applied. Not all sites, in the context of largely rural Huntingdonshire, could sustain a 20-minute neighbourhood. This approach is more suited to denser, urban locations..

Promotion of sustainable travel modes

4.56 HDC can implement policies to strengthen objectives to maximise the use of sustainable travel modes as presented in Policy LP16: Sustainable travel of the local plan, via policy measures that reduce the demand for private transport. To address issues of carbon emissions, air quality and congestion, local authorities should explore all means available to increase usage of forms of transport which offer an alternative to carbon-heavy private cars.

4.57 Policies that specifically aim to directly limit the convenience and, therefore, demand for private vehicle use include: charges for using the road

network on a pay-as-you-go model, increases in parking charges, reductions in the amount of parking available and traffic calming. If appropriate, certain road users can be made exempt, such as blue badge holders. Note however that such measures can be negatively viewed as ‘anti motorist’ so may not be supported by all.

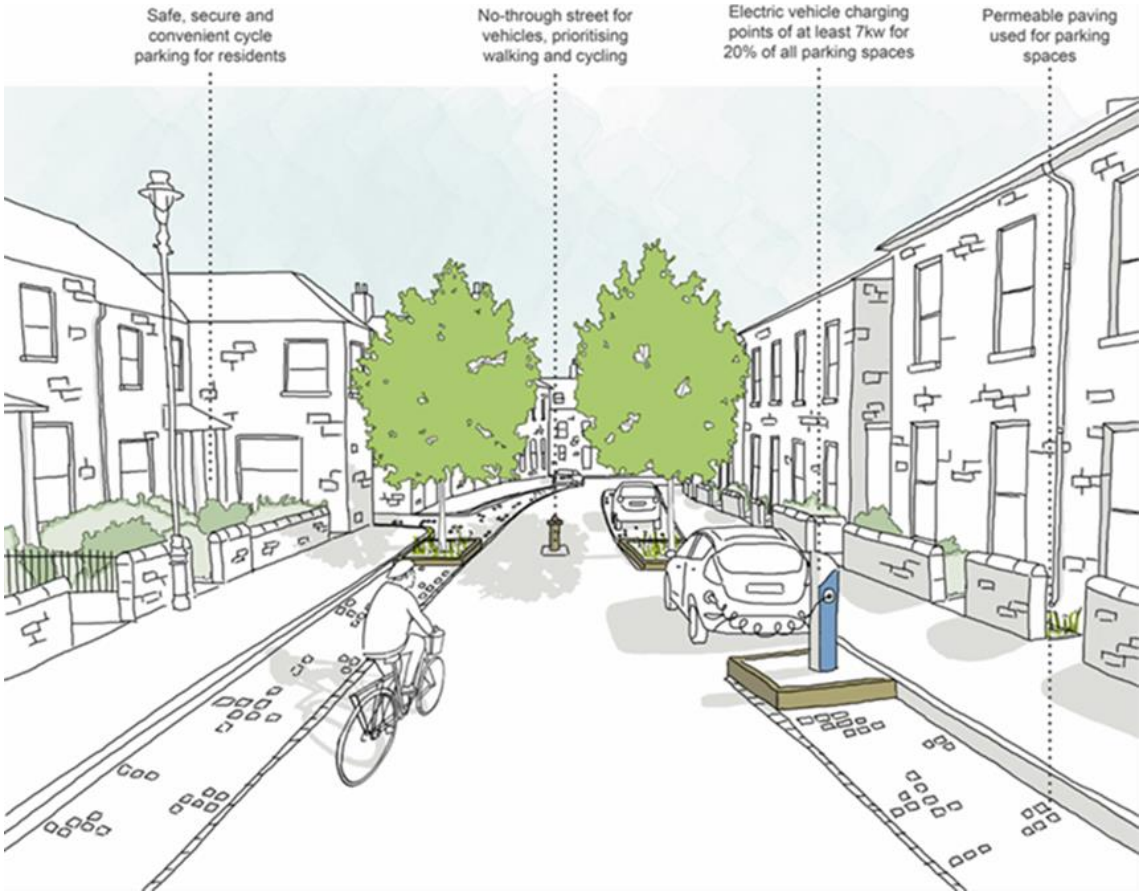
4.58 Beyond reducing the desirability of private vehicle use, policies to promote other forms of travel, include the creation of places that prioritise active travel, public transport, supporting more cycle parking and lanes, and car clubs in line with Policy LP17 of Huntingdonshire’s local plan. The pursuit of liveable neighbourhoods, such as the 20-minute neighbourhood approach mentioned above, primarily involve promotion of active travel rather than limiting car use. However, support to on-site facilities, active travel provision and amended road design for people and active travel can be considered a method of managing demand for private vehicles.

4.59 Policy LP17 and LP16 address the use of sustainable travel models and the provision of cycle lanes. However, HDC could include the provision of accessible car club parking spaces and/or contributions towards the provision of car clubs in the vicinity of developments. This will help deliver against net zero targets by increasing vehicle occupancy rates, allowing users to access vehicles without owning one. Any such policy wording should ensure that car club vehicles are ‘clean’, i.e. powered by alternative fuels to minimise harmful impacts on the environment.

4.60 More direct private vehicle demand management policies include levers for using the road network based on a pay-as-you-go model, increases in parking charges and reductions in the amount of parking available, and traffic calming.

4.61 The illustrative street scene below shows how demand management of private vehicles can involve attractive, positive improvements to the built environment, in addition, alongside or in place of more restrictive measures. This street scene supports a healthier, wellbeing-boosting approach to the built environment that simultaneously addresses Huntingdonshire’s climate change mitigation needs.

Figure 6.2: Example of a street that incorporates sustainable travel features *(authored by LUC)*



Examples and Case Studies

4.62 London and Glasgow City Council have implemented road user charging schemes in place, including the Congestion Charge, the Low Emission Zone (LEZ) and the Ultra Low Emission Zone (ULEZ). However, this is unlikely to be desirable in rural settings.

4.63 Islington's draft local plan includes wording in Policy T3: Car-free development which supports car clubs where they use EVs:

> "The Council will support the provision of car clubs, including the provision of accessible car club parking spaces and/or contributions towards the provision of car clubs in the vicinity of the development, where appropriate. Car club vehicles must be 'clean,' i.e. it must be powered by alternative fuels to minimise harmful impacts on the environment."

4.64 Policy TI/3: Parking Provision of the South Cambridgeshire Local Plan **[See reference** 132**]**, states:

> 3. The Council will encourage innovative solutions to car parking, including shared spaces where the location and patterns of use permit, and incorporation of measures such as car clubs and electric charging points

4.65 Policy SS/2: Land between Huntingdon Road and Histon Road of the South Cambridgeshire Local Plan, states:

> 6. Development and transport systems will be planned in order to integrate with adjoining development in Cambridge City, to reduce the need to travel and to maximise the use of sustainable transport modes, so as to achieve a modal share of no more than 40% of trips by car (excluding passengers). This will include the provision of employee travel plans, residential travel planning, and other similar measures which could include car clubs

4.66 Part 9 of the policy also states that:

> 9. Car parking and secure cycle parking will be provided in accordance with Policy TI/3. Car clubs will be encouraged in order to minimise the amount of

land given over to car parking. This must be explored through the Transport Assessment and Travel Plan.

Technical Feasibility

4.67 Private car management policies are readily implemented across the UK. Case studies within England and Scotland demonstrate the technical feasibility of this approach. Rather than costs (see below), ensuring effective consultation on the sensitive subject of measures to restrict local car use is a greater challenge for local councils.

Cost Implications

4.68 Parking charges, traffic calming and reductions in the amount of parking are low-cost interventions and may raise revenue in some cases. We are not aware of any areas of the UK that have installed pay-as-you-go road pricing in more rural areas. However, the Local Government Association has recently commissioned research to gather local government views on a potential national road pricing system.

Benefits

4.69 Managing the demand for private car will have a direct impact on the ease of using private vehicles. This may have a greater impact in reducing car use, with its negative externalities than indirect measures such as Liveable Neighbourhoods as it directly targets car-use and car users rather than targeting alternative transport methods.

4.70 National policy requires that income raised by local authorities through traffic related fines are spent on essential transport projects. Money raised by new demand management measures may, therefore, be reinvested in

Huntingdonshire's transport network. This could provide an important source of revenue to fund other policy areas such as active travel, strengthening alternatives to car use, whilst also offering the prospect of an improved road network to affected road users.

4.71 Like the provision of active travel services, supporting the growth of car clubs may provide lower cost transport options for those priced out of private vehicle ownership in Huntingdonshire. Car clubs may allow those individuals greater freedom to move around or even re-locate in the District.

Limitations

4.72 Restrictions on car use may have negative impacts (e.g. for the local economy) if they are not supported by policies and infrastructure that make it easier to find alternative carbon-friendly transport. Similarly, efforts to make active travel more inviting may be insufficient to affect change without disincentives to use cars.

4.73 Policies to manage car use are therefore best applied when dovetailing with appropriate liveable neighbourhood-related policies – helping to ensure that local services and facilities are accessible through other means, either through proximity or the availability of other transport options. A specific discussion of car clubs is included below in 'Policy on car clubs', a report recommendation.

4.74 Such policies are politically sensitive. Drivers may be sensitive to suggestions that car use may be restricted in any way. Efforts to deliver private vehicle management must therefore be delivered carefully, with communication designed to show how any such policies do not prevent car use but rather discourage its use for certain activities. This challenge also provides a case for firmer commitments to delivering private vehicle management on new developments (e.g. restricting car ownership for new homes or ensuring road layouts that prioritise people and active travel modes), given its comparative ease and potential for ensuring carbon reductions.

RECOMMENDED POLICY: Policy on Electric Vehicle Infrastructure

4.75 HDC's guidance on design and security set out in the Huntingdonshire Design Guide SPD **[See reference** 133**]** sets out priorities to encourage the use of electric vehicles within the district through the provision of EV charging points for large employment and commercial car parks.

4.76 Building Regulations Part S require electric vehicle charging points. However, they remain limited in ambition, only requiring that a single charging point is provided in developments that contain car parking and only requiring a minimal amount of spaces are provided further cabling where a new residential or non-residential building has more than 10 parking spaces.

4.77 HDC should extend policies supporting electric vehicle charging points to new major developments, supporting the needs of residents where private car use is required whilst still addressing emissions created by private vehicle use.

Examples and Case Studies

4.78 Leeds City Council implemented Policy EN8: Electric Vehicle Charging Infrastructure requiring parking spaces meet the minimum standard of electric vehicle charging points for new developments. The policy states:

> "All applications for new development which include provision of parking spaces will be required to meet the minimum standard of provision of electric vehicle charging points. This requires:

- i) Residential: 1 charging point per parking space and 1 charging point per 10 visitor spaces.

- ii) Office/Retail/Industrial/Education: Charging points for 10% of parking spaces ensuring that electricity infrastructure is sufficient to enable further points to be added at a later stage.
- iii) Motorway Service Stations: Charging points for 10% of parking spaces ensuring that electricity infrastructure is sufficient to enable further points to be added at a later stage.
- iv) Petrol Filling Stations: Provision of fast charge facilities."

4.79 Salford City Council included a policy on EV charging points in their local plan (Policy A10) **[See reference** 134**]**, so that new development would support the development of a network of EV infrastructure, stating that:

"New development shall make provision for electric vehicle charging infrastructure, using dedicated charge points specifically designed for charging all types of electric vehicle, in accordance with the following standards (unless superseded by higher standards in the Building Regulations):

- 1. For dwellings with off street parking, at least one dedicated charge point per dwelling.
- 2. For non-residential developments, 10% of spaces shall accommodate a dedicated charge point. In addition to this, 20% of spaces shall accommodate appropriate ducting infrastructure to facilitate future provision. A reduced requirement will be permitted where it can be demonstrated that the specific characteristics of development would result in lower levels of demand for electric vehicle charging."

Technical Feasibility

4.80 The approach toward electric vehicle infrastructure employs existing technology. EV charging stations can be seamlessly integrated into the public realm as shown in **Figure 5.3,** above (in Demand Management of Private Vehicles).

4.81 Finding space and grid capacity for EV charging may be less of a challenge in new developments than in existing streets, particularly Huntingdonshire's many old villages. Narrow streets and limited off street parking mean there is little space of new charging systems. Local grid stakeholders will also need to be consulted before their installation. However, where this policy recommendation applies, even at the minimum of 10 new developments, physical space can easily be incorporated in to new designs for an EV charger. Additionally, discussions between the developer and local grid owners, or conversations facilitated by the Council, should have taken place at an early stage to consider whether there is grid capacity at the location to handle the overall demand provided by new developers.

Cost Implications

4.82 Considerations towards electric vehicle users through the provision of EV infrastructure will have cost implications for developers.

4.83 Table 6.3 below sets out indicative costs for domestic and public EV charging stations, indicating the limited cost per domestic and 'standard' space **[See reference** 135**]**.

Table 6.1: Indicative charging infrastructure costs [See reference **136**]

Type	Description	Indicative Cost
Domestic	Up to 7kW	£500-£1,000
Public – Standard	7kW	£10,000
Public – Fast	22kW	£13,000
Public – Rapid	43kW	£34,000

4.84 The costs are the concern of developers; however, prices are likely to decline over the coming years as the drive to support a transition to electric vehicles accelerates. The cost of EVs for consumers are also anticipated to continue to decline over the coming decade making them more affordable to the general public, which could raise the demand for charging points significantly.

Benefits

4.85 Support for EV infrastructure (along with car clubs) will reflect the need for car use in rural settings whilst tackling the emissions that vehicles typically produce. Ensuring developments provide car charging options also provides options for those seeking to switch to electric cars but are unable to do so without available charging facilities.

4.86 It may be pursued as an alternative to other harder-to-achieve sustainable travel approaches which may receive greater pushback.

Limitations

4.87 Implementing policies that support EVs raises concerns around embodied carbon. The production of EVs involves considerable carbon emissions in their

production. Huntingdonshire's support to EVs can not, therefore, be solely considered as a net zero approach. Supporting EVs also helps to maintain the potential for traffic congestion, rather than tackling it as other sustainable travel policies might do, which has its own negative consequences on pollution and wellbeing.

4.88 There is a need to consider the capacity of local energy grids before allowing EV charging infrastructure. The impacts of on street charging infrastructure (and associated EV charging bays) on the street scene and wider parking provision will also need to be considered in siting such infrastructure.

We recommend that HDC specify policy requiring a minimum of EV chargers in a given development. A realistic target would ask for 1 charger per 10 households or as 10-20 % of all parking spaces. This would look to go beyond current standards on EV charging in new development contained within the Building Regulations

It could specify that a majority of car parking spaces included in new residential and non-residential development are either fitted with a charging point or have the infrastructure to have one fitted in the future (e.g. 30% fitted and 30% future). As shown in the installation costs above, these do not represent onerous costs for developers. Charging infrastructure can be integrated into the delivery of wider parking infrastructure. These prices may decline over the coming years as the drive to support a transition to electric vehicles accelerates.

RECOMMENDED POLICY: Policy on car clubs

4.89 Car clubs allow users to access a vehicle without owning one and can offer a flexible, cost effective alternative to private car ownership or leasing. As car club vehicles are often newer, they tend to have lower emissions than private cars, which helps to reduce carbon emissions and air pollution.

4.90 HDC should include the provision of accessible car club parking spaces and/or include contributions towards the provision of car clubs in the vicinity of developments. Any such policy wording should ensure that car club vehicles are 'clean', i.e. powered by alternative fuels to minimise harmful impacts on the environment.

4.91 According to the Department for Transport (DoT), Local authorities have a role to play in promoting car clubs by ensuring policies and interventions supporting car clubs are integrated with wider local transport and net zero strategies **[See reference 137]**. In addition to net zero targets, car clubs can help HDC deliver against wide-ranging objectives such as Objective 10 of the local plan for reducing:

- impacts to air quality,
- impacts to road traffic on local communities by increasing vehicle occupancy rates and reducing parking pressures and congestion
- offering a sustainable transport option that can fill gaps in public transport provision

4.92 Car clubs may also include electric vehicles (EVs) which can have additional benefits for emission reduction. The DoT states that car clubs have a higher proportion of hybrid and zero emission vehicles, with battery EVs making up 12% of the current UK car club fleet, compared to 1% of private vehicles. The promotion of car clubs can also serve as a means of behavioural change towards more sustainable travel modes within the borough. HDC could require that all car clubs provide only low-emissions vehicles.

4.93 Although this represents an urban case, the technical and/or financial viability of delivering this policy in the context of Huntingdonshire is not dissimilar where applied for large-scale developments or the development of new communities.

4.94 This policy option should be tailored to specific development types considering minimum markets needed to satisfy demand, applying to large scale and/or new community (1000+) development sites coming forward. However, for smaller sites, particularly where new developments do not provide a sufficient market to support a car club, new policy may require developers to contribute to new car clubs within in the locality.

4.95 Examples of policy wordingIslington's draft local plan includes wording in Policy T3: Car-free development which supports car clubs where they use EVs:

> "The Council will support the provision of car clubs, including the provision of accessible car club parking spaces and/or contributions towards the provision of car clubs in the vicinity of the development, where appropriate. Car club vehicles must be 'clean,' i.e. it must be powered by alternative fuels to minimise harmful impacts on the environment."

4.96 Policy T6.1 Residential parking of the London Local Plan incorporates consideration for car club spaces stating that:

> Outside of the Central Activities Zone (CAZ), and to cater for infrequent trips, car club spaces may be considered appropriate in lieu of private parking. Any car club spaces should have active charging facilities.

4.97 The supporting text states that in some areas, car club spaces can help support lower parking provision and car-lite lifestyles by enabling multiple households to make infrequent trips by car.

Technical Feasibility

4.98 Considerations for car clubs should be straight forward to deliver if considered from the outset of the site design process, relating to the masterplanning and urban design of new streets and communities.

4.99 There is evidence of the successful implementation of car clubs in London's boroughs. The London Borough of Kensington and Chelsea now has over 210 dedicated car club bays, in addition to provision for one-way flexible services and back-to-area parking areas **[See reference 137]**. Since the introduction of car clubs into the borough, the council has worked to progressively expand the number of vehicles available to residents. The London Borough of Lewisham also created a 'floating' car club permit to allow a set number of car club vehicles to park in permit-controlled spaces across the borough.

4.100 Local authorities should identify stakeholders and engage early with the community where car club vehicles are planned to manage expectations, build trust and address potential concerns. There are a number of companies willing to support local authorities and developers who have planning obligations to provide car clubs to local residents or staff such as Hiyacar **[See reference 138]** and Enterprise car club **[See reference 139]** .

4.101 Local authorities should use their marketing and communications teams to engage with residents in advance of implementing a car club. For instance, the Bath Riverside development was designed to promote sustainable travel options and residents are offered incentives to take up walking and cycling, join the car club or use public transport. The development is well served by buses and residents are offered a one month free bus pass, free car club membership and a £100 cycle voucher. The Bath and North East Somerset Council included the Bath Riverside development in its local plan site allocations. Developers then made provision for sustainable travel and car clubs on site, with Enterprise providing the car club.

Cost Implications

4.102 The inclusion of car club policies is not expected to add significant uplift where considered at the design stage. The only exception is for car clubs parking with electric vehicle infrastructure.

4.103 As with all EV infrastructure, early engagement with distribution network operators (DNO) on charge point installations for EV car clubs, will allow developers to understand local grid constraints and the potential upgrade costs to enable chargepoints.

Benefits

4.104 Car clubs provide a cost-effective alternative to driving a private car which can reduce carbon emissions and air pollution, whilst relieving parking pressure and congestion.

4.105 For local authorities, there are benefits for reducing tailpipe emissions from air pollutants (NOx and particulate matter) resulting in better health outcomes, reducing demand for residential parking spaces, encouraging the release of brownfield land for redevelopment – where developments include car clubs, less space is required for parking, which allows for the inclusion of more shared amenity space and for the development of sites previously thought too small, because they lacked space for parking.

4.106 For communities, car clubs can enable access to newer, more environmentally-friendly vehicles and remove the costs and hassle of vehicle ownership, and provide access to employment opportunities and services where public transport is less viable.

Limitations

4.107 The major limitation of this approach is the minimum level of demand required to make car clubs viable. Car clubs may require a minimum level of demand to make them viable and may therefore only be suitable for larger-scale developments. However, when considering neighbouring properties, demand may be sufficient. Additionally, developers could be asked to contribute towards the delivery of car club schemes nearby if they are unable to provide these on-site.

4.108 There is still limited information of the effectiveness of car clubs due to the lack of standardised data sharing, limiting the full realisation of benefits.

4.109 There could be a general lack of awareness of car clubs, which can limit demand and use.

HDC should include the provision of accessible car club parking spaces and/or include contributions towards the provision of car clubs in the vicinity of developments. Any such policy wording should ensure that car club vehicles are 'clean', i.e. powered by alternative fuels to minimise harmful impacts on the environment.

In new strategic-scale and 1,000+ development sites coming forward in Huntingdonshire ('new communities) policy on car clubs must be applied. However, for smaller sites, particularly where new developments do not provide a sufficient market to support a car club, new policy may require developers to contribute to new car clubs within in the locality.

Developers can include designated parking spaces for car club vehicles in their site layout plans. This might involve showing specific bays for car club cars, ensuring they are easily accessible to residents. A Desing and Access Statement (DAS) can outline how the car club infrastructure will be

designed to be accessible, including pathways and signage that guide users to the car club vehicles. HDC will be able to monitor compliance through the DAS.

Water Efficiency

4.110 Water efficiency concerns the management of water use and demand. New developments need to achieve a significant degree of water efficiency to limit new pressures on an already stressed local water system. This can often be achieved relatively cost effectively by specifying water efficient fixtures and fittings (e.g. low flow showers and taps, dual flush toilets) and using simple rainwater harvesting (e.g. water butts) to capture rainwater for non-potable uses such as irrigating gardens.

4.111 Policy LP12: Sustainable Design and Construction Methods of the local plan states that proposals "make efficient use of energy, water and other resources, such that all new homes comply with the optional building regulation for water efficiency, as set out in Approved Document G…".

4.112 The Building Regulations Part G requires new homes to limit water use to 125 litres/person/day, however, the optional technical standards states that "Where there is a clear local need, local planning authorities can set out Local Plan policies requiring new dwellings to meet the tighter Building Regulations optional requirement of 110 litres/person/day" **[See reference** 140**]**.

RECOMMENDED POLICY: Require a maximum 85 l/p/d for new developments

4.113 Huntingdonshire's current policy LP12 requires that new homes comply with the optional Building Regulation for water efficiency (110 l/p/d) (see above)

and that non-residential uses meet BREEAM standards (or successor or equivalent standards) 'Good' as a minimum;

4.114 This report recommends that this policy is expanded in ambition. To respond, not only to the rising and anticipated problem of water scarcity as a result of climate change but also to the current problems of scarcity in the Cambridge Water service area, HDC should consider implementing a policy requiring new homes achieve a limit of 85 litres per person per day (l/p/d).

4.115 Huntingdonshire lies within one of the driest parts of England and infrastructure has not kept apace with development or is able to cope with increasingly long dry periods experienced in the region. Water Resources East, overseeing water management planning in the East of England projects water shortages of 800 million litres per day by 2050, equal to a third of current regional water use **[See reference** 141**]** National government is particularly aware of water scarcity challenges in the region and has set up a taskforce to address water supply issues in the Greater Cambridge area, particularly in the context of rising development **[See reference** 142**]**

4.116 Ambitious policy wording could encourage residential developments to meet a water consumption standard of 85 litres per person per day to further minimise the impact of the development on water resources and water quality. This would be in line with national and local efforts to reduce water demand from new development. DEFRA set out in its Environment Improvement Plan (2023) and Plan for Water (2023) **[See reference** 143**]** a roadmap to water efficiency in new developments and retrofits, to be delivered over the next decade. The government has decided that this needs to be brought forward in the Cambridge area given the challenges of allowing for development amidst such water scarcity.

4.117 Setting water efficiency targets relative and going beyond the optional Building Regulations is an approach already employed by local authorities under water stress and has been endorsed by water companies, and the Environment Agency **[See reference** 144**]**. This policy addresses the issue of water resources in new development by requiring applicants to secure the

agreement of water companies with regards to water supply before development commences.

4.118 There is currently no government guidance on setting water efficiency standards for non-residential development. As with residential development it is important to consider how to increase water efficiency while avoiding perverse outcomes. For example, setting a high water efficiency target that requires the installation of greywater recycling systems could lead to the installation of measures that are complex, energy intensive (resulting in carbon emissions) and/or hard to maintain. For non-residential development in Huntingdonshire, water efficiency requirements could still be set via BREEAM, but scores should go beyond 'Good' as a minim on water efficiency.

Examples and Case Studies

4.119 Mid-Sussex's District Plan 2021-2039 (Reg 18) **[See reference** 145**]** contains within its 'General Development Principles for Housing Allocations' a requirement for new developments, stating that new developments:

> "Meet a maximum water consumption standard of 85 litres per person per day (including external water use) to minimise the impact of the development on water resources and water quality. Rainwater harvesting and greywater recycling measures should be incorporated into the development as well as using water efficient fittings and appliances. Water neutral developments will be encouraged where this is possible."

4.120 The Central Lincolnshire Local Plan (Reg. 19) **[See reference 146]** contains the 110 l/p/d standard as a requirement, but encourages use of the stricter 85 l/p/d target in its Policy S12 Water Efficiency and Sustainable Water Management:

To minimise impact on the water environment all new dwellings should achieve the Optional Technical Housing Standard of 110 litres per day per person for water efficiency as described by Building Regulation G2. Proposals which go further than this (to, for example, 85 litres per day per person) would be particularly supported.

4.121 As part of Lancaster City Council Climate Emergency local plan review **[See reference** 147**]**, a policy on water efficiency has been included. An excerpt from the proposed modified Policy DM30a, which is subject to potential modification, states that:

"All major non-residential development should incorporate water conservation measures so that predicted per capita consumption does not exceed the appropriate levels set out in the applicable BREEAM 'Excellent' standard. Where the 'Excellent' Standard cannot be achieved, evidence must be submitted with an application to the satisfaction of the City Council. The BREEAM 'Very Good' standard must be met as a minimum. The design of new developments should optimise the inclusion of water efficiency and consumption measures, such as rainwater or greywater recycling, low flow taps and showers, low flush toilets, rain gardens and water butts in the construction of new buildings."

Technical Feasibility

4.122 A study by JBA Consulting on behalf of Crawley Borough Council, Chichester District Council, and Horsham District Council concluded that 85 litres/person/day target is a 'realistic achievable' target for new homes in the region **[See reference** 148**]**. With regards to non-residential developments, the study states that new developments should achieve a score of three credits within the water (Wat 01 Water Consumption) issue category for the BREEAM

New Construction Standard, achieving 40% reduction compared to baseline standards. The study showed that this target can be achieved through various means, including water efficient fittings, rainwater harvesting and/or greywater recycling systems and there is also evidence that some LPAs are also proposing higher targets).

4.123 This standard of water efficiency has the benefit of being achievable with cost-effective water efficient fixtures and fittings, without necessarily having to resort to rainwater harvesting (which could still be encouraged) and grey water recycling, which is more complex (e.g. requires energy use and maintenance).

4.124 This policy option may require some training for HDC officers to understand how to interpret such schemes in planning applications, and what to include as conditions on planning permissions. It may also need additional resources to ensure that monitoring of new developments can be carried out. Alternatively, this could be achieved through reference to BREEAM water efficiency standards which would place the responsibility for assessing compliance with third party assessors.

Cost Implications

4.125 A fittings-based approach, which involves selecting water efficient taps, showers, baths, toilets, etc., can be achieved at minimal additional cost, approximately £350-£430/dwelling according to the JBA Consulting study cited previously. Note that, if occupants replace these fittings with less efficient alternatives, this would result in higher water consumption.

4.126 Rainwater harvesting systems cost £1,500-£4,000 per property whereas greywater recycling systems cost closer to £4,000 per dwelling. The costs related to the management and maintenance of greywater recycling systems can be significant and would also need to be considered.

4.127 Water neutrality is a stretching requirement which would likely add significant costs to development, albeit it would provide significant carbon and financial savings for householders.

4.128 By reducing the per capita consumption of water and reducing water usage, it should lead to cost savings for residents from water bills. Incentives may even be offered to householders and developers who can achieve exacting standards of water efficiency. Defra encourage water companies to provide developer incentives for meeting a standard of 110 l/p/d or lower, which could relieve some of the burden. Examples of this include the discount or zero charge provided by United Utilities, Severn Trent and Northumbrian Water. The United Utilities discount has saved developers more than £25 million and created a potential saving of 3.8 million litres of water per day. Thames Water also provide a £200 per home developer incentive for using the fittings-based approach. Cambridge Water and Anglian Water are working with the government to ensure they provide such a scheme going forward **[See reference** 149**]**.

Benefits

4.129 Water efficiency measures will produce savings for householders and minimise the risk of enforced consumption bans.

4.130 Water efficiency measures such as rainwater and greywater harvesting can be incorporated as part of development-level sustainable drainage schemes, addressing other local planning objectives.

4.131 A recent study from Waterwise (2021) **[See reference** 150**]** estimated that around 112,000 litres of water could be saved every year for every water neutral home built. This would also equate to around 43.8kgCO_2e per year per household in carbon savings. Water neutrality is also estimated to provide annual savings on water and energy bills of £44 per home per year by reducing water demand to 85 l/p/d. The additional benefits include reducing the

environmental impact of new developments, improving resilience to future climate change and reducing the amount of water entering the sewage network.

Limitations

4.132 More ambitious water targets are likely to be challenged by developers, requiring a strong evidence base to support it through the adoption process. However, strong targets are emerging in the region and can likely be justified on recent local developments on water scarcity and development and a rigorous evidence base to support a more ambitious water efficiency target would not be resource intensive to produce nor challenging to construct given the wealth of data justifying this position.

4.133 Although higher targets can be met via a fittings-based approach, there is a risk that in the longer term the benefits are reduced as homeowners replace the fittings with conventional ones.

HDC should require that new homes achieve a limit of 85 litres per person per day (l/p/d). Commercial properties should also be expected to achieve Very Good on the Wat 1 Category.

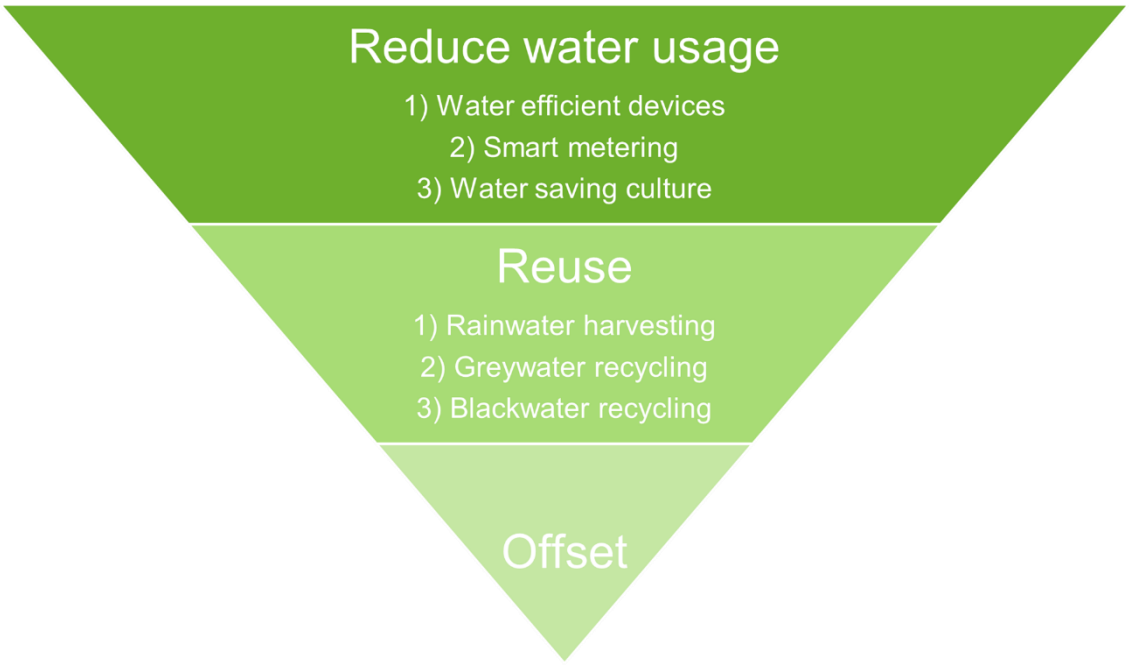
To help see targets achieved, HDC should consider a requirement for developers to provide a water efficiency statement that shows how they intend to achieve water efficiency. Rather than requiring the use of specific tools, such as rainwater and greywater harvesting, HDC should allow developers the flexibility to decide the best or most efficient collection of measures that would see them satisfy the policy.

RECOMMENDED Policy: Require developers to provide a water efficiency statement with applications

4.134 This policy recommendation should be read in tandem with the recommendation above to install a target for new homes of 85 l/p/d water consumption and 'Very Good' on the BREEAM Wat 1 category.

4.135 A water efficiency statement typically outlines strategies and technologies developers intend to use to minimise water use and promote sustainable water use in a development. Any statement should explain how the principles of the sustainable water hierarchy, shown in **Figure 7.5,** below, have been adhered to and ensure that developers consider water efficiency from an early stage of project development. The overarching principle is for water demand to be addressed (reduced) first before additional water supply infrastructure is deployed, and to make these considerations at an early stage of project development.

Figure 6.3: The water hierarchy (adapted by LUC)



Examples and case studies

4.136 There is limited examples of LPAs requiring water efficiency statements in local plans, however, the principle of the water hierarchy can be found in the Mid-Sussex's District Plan 2021-2039 (Reg 18) **[See reference 151],** which contains within its 'General Development Principles for Housing Allocations' an ambitious requirement for new developments which includes context for water neutral developments, stating that new developments:

> "Meet a maximum water consumption standard of 85 litres per person per day (including external water use) to minimise the impact of the development on water resources and water quality. Rainwater harvesting and greywater recycling measures should be incorporated into the development as well as using water efficient fittings and appliances. Water neutral developments will be encouraged where this is possible."

4.137 Water efficiency statements, are, however, a common practice in the built environment. They mirror the practice of energy efficiency statements, long used in planning to ensure developments reduce their energy consumption.

Technical Feasibility

4.138 The production of the water efficiency statement should not be an onerous task and should merely confirm the design choices made to achieve the quantitative target, with workings to justify this achievement.

4.139 If the developer can justify that they need to resort to offsetting (see water hierarchy above, **Figure 6.3**) as other water efficiency arrangements were not sufficiently feasible within the development, they may need to utilise an offsetting scheme.

4.140 An Offsetting Scheme lead by HDC will require an operating body that will administer it, collect funding, pay offset providers and monitor results. When a developer submits a planning application, a water neutrality statement will need to be provided. This will identify the type of development, how much new water demand will be generated, the water efficient fittings and technologies to be applied, and details of any offsetting to be delivered by the developer or a third-party. The developer will then pay a fee per litre of offsetting required (where offsets are provided via HDC's approved partners. This would be collected by the Offsetting Scheme and used to deliver the appropriate level of offsetting within the WRZ. Potential offsetting measures that were considered and assessed in the JBA Study (see Technical Feasibility in policy recommendation, above) included the use of flow restrictors retrofitted to existing properties, water efficiency in schools, non-household rainwater harvesting, alternative sources of water for irrigation of golf courses or supply of other recreational facilities such as sports grounds, swimming pools and leisure centres.

4.141 An offsetting scheme, known as a 'water credits system' is currently being piloted in nearby Cambridge in tandem with central government, where developers can offset their development through the purchase and sale of water

credits to ensure they have a neutral impact on water scarcity within Cambridge **[See reference** 152**]**. HDC may be able to align with or join such a scheme in the near future.

Cost Implications

4.142 The most significant cost implications of such a statement stem from thw water efficiency measures chosen. The discussion under Cost Implications in the recommended policy above on a quantitative water target provide an indication of likely costs for developers which are not onerous.

4.143 Water and energy bills may be reduced by around £44 per home per year by reducing water demand to 85 litres per person per day. Additional benefits include reducing the environmental impact of new developments, improving resilience to future climate change and reducing the amount of water entering the sewage network, all of which are key considerations in an area of water stress for local authorities which bring wider public costs to burden **[See reference 153]**.

4.144 The production of the water efficiency statement itself should not be a costly task and should merely confirm the design choices made to achieve the quantitative target, with workings to justify this achievement.

Benefits

4.145 The requirement for a water efficiency statement puts the onus, but also freedom to innovate, on developers when in tandem with a rigorous quantitative water efficiency target (see policy recommendation above). It allows developers to choose the best method, whether on cost or technical feasibility, to achieve targets rather than dictating methods that may either be costly or even unnecessary to reach targets that can often be reached merely through efficient design.

Limitations

4.146 Some developers may be unfamiliar with the requirements of a water efficiency statement. HDC may also require new in-house expertise to interpret such statements (although training, as opposed to new human resource, may be sufficient).

HDC should require developers to provide a water efficiency statement showing how they intend to meet water efficiency targets.

This requirement would be deployed in tandem with the recommended policy of requiring a maximum of 85 litres per person a day in new homes and similarly exacting standards in new commercial developments. The statement would be used to show that developers are able to meet the target.

Any statement should display how the principles of the sustainable water hierarchy have been adhered to and ensure that developers consider water efficiency from an early stage of project development

Require rainwater and greywater harvesting in new developments

4.147 HDC can demand that developers optimise the inclusion of water efficiency and consumption measures, such as through rainwater or greywater recycling, low flow taps and showers, low flush toilets, rain gardens and water butts in the construction of new buildings. This would help developers achieve exacting quantitative water efficiency targets expressed in other policy (see

policy recommendation above 'Require a maximum 85 l/p/d for new developments'). However, this has not been chosen as a policy recommendation in this report as it is felt that this may place undue restrictions on the freedom of developers to ascertain the best method of achieving water efficiency and affect likely cost viability.

4.148 Water UK's 'Water resources long-term planning framework (2015-2065)' states that a 'twin-track' approach of increasing supply and reducing demand is required in order to secure the resilience of water supplies over the next 50 years **[See reference 154]**.

4.149 Both rainwater harvesting and greywater recycling systems offer potential decentralised solutions in reducing water demand and increasing available water supply. There are also additional benefits from rainwater harvesting such as potential cost saving from water supply and a reduction of flood risk in urban areas.

4.150 Approved Document H: Drainage and waste disposal) provides guidance on the storage of greywater and rainwater. Further guidance on systems for greywater and rainwater re-use can be found in the Water Regulations Scheme leaflet No. 09-02-04 Reclaimed Water System.

4.151 The NPPF also supports sustainable drainage systems which can include grey water harvesting.

4.152 According to the Environment Agency, harvested rainwater will not be regulated provided its use does not harm the environment - either alone or combined with other abstractions or transfers **[See reference 155]**. Rainwater harvesting within a catchment must not affect the normal watercourse flow.

4.153 An abstraction licence is not needed to use water that only consists of harvested rainwater. However, a water abstraction licence may be needed if harvested rainwater is combined with ground or surface water.

4.154 Rainwater harvesting is an efficient way to use water where harvested rainwater is:

- collected from roofs and other above ground surfaces
- collected via a system of above ground pipes and tanks
- isolated from inland waters or groundwater

4.155 On the other hand, greywater recycling involves reusing wastewater from sources like showers, baths, and sinks for reuse in non-potable purposes.

Examples and case studies

4.156 Policy DM30a of the Lancaster Sustainable Design, Energy Efficiency and Renewable Energy Generation SPD (still awaiting decision) **[See reference 156]** states that:

> All major non-residential development should incorporate water conservation measures so that predicted per capita consumption does not exceed the appropriate levels set out in the applicable BREEAM 'Excellent' standard. Where the 'Excellent' Standard cannot be achieved, evidence must be submitted with an application to the satisfaction of the City Council. The BREEAM 'Very Good' standard must be met as a minimum. The design of new developments should optimise the inclusion of water efficiency and consumption measures, such as rainwater/ or greywater recycling, low flow taps and showers, low flush toilets, rain gardens and water butts in the construction of new buildings.

Technical Feasibility

4.157 To date, both rainwater harvesting and grey water recycling systems have been implemented with mixed experience in the UK. Technical concerns regarding water quality, potential cross connections and issues around the social acceptability of using recycled water have all been barriers to uptake. Further to this a 2011 Environment Agency report on the carbon implications of these systems suggested that due to pumping and treatment they are often more carbon intensive than the public water supply **[See reference 157]**. However, an independent review of the costs and benefits of rainwater harvesting and grey water recycling options in the UK concluded that carbon emissions vary depending on the type of system installed and that recent innovations have led to lower energy demands relative to mains water **[See reference 158]**. Additionally, the payback periods and return on investments can be obtrusive for some systems but may benefit from economies of scale if they are introduced at a development scale or centralised within an existing community.

Cost implications

4.158 Although expensive, the impact rainwater and greywater harvesting systems would have on addressing developments' impact on local water stress would still be significant. Rainwater harvesting systems cost around £1,500-£4,000 per property, whereas greywater recycling systems cost closer to £4,000 per dwelling (as stated in the JBA Study referred to in the Water Efficiency section above).

Benefits

4.159 Water efficiency measures such as rainwater and greywater harvesting will produce savings for householders and minimise the risk of enforced consumption bans. They would allow developers to achieve exacting water efficiency targets, such as those proposed in this report for Huntingdonshire.

Limitations

4.160 Developers are likely able to achieve greater water efficiency targets through a mix of measures, some involving fittings, harder infrastructure like rainwater and greywater harvesting tools and through better, earlier design choices. Placing restrictions on the freedom of developers to ascertain the best method of achieving water efficiency may limit their willingness to engage and affect likely cost viability.

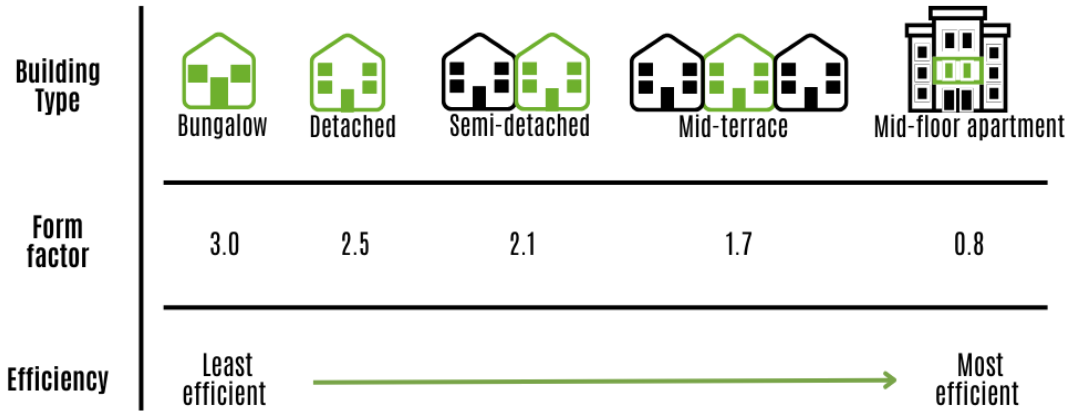
Designing for Adaptation

4.161 A building's form and orientation can have a significant effect on efficiency and the need for energy for heating, cooling and lighting.

4.162 For instance, a building with forms consisting of larger and more exposed surface area, through a complex shape, can result in more heat loss, wind exposure, and solar gain, compared to a building of the same scale with a simpler form. The illustration in the figure below shows the relationship between form factor and efficiency in different dwelling types.

4.163 Figure 6.4 shows the range of efficiency, from least efficient to most efficient for different types of dwellings.

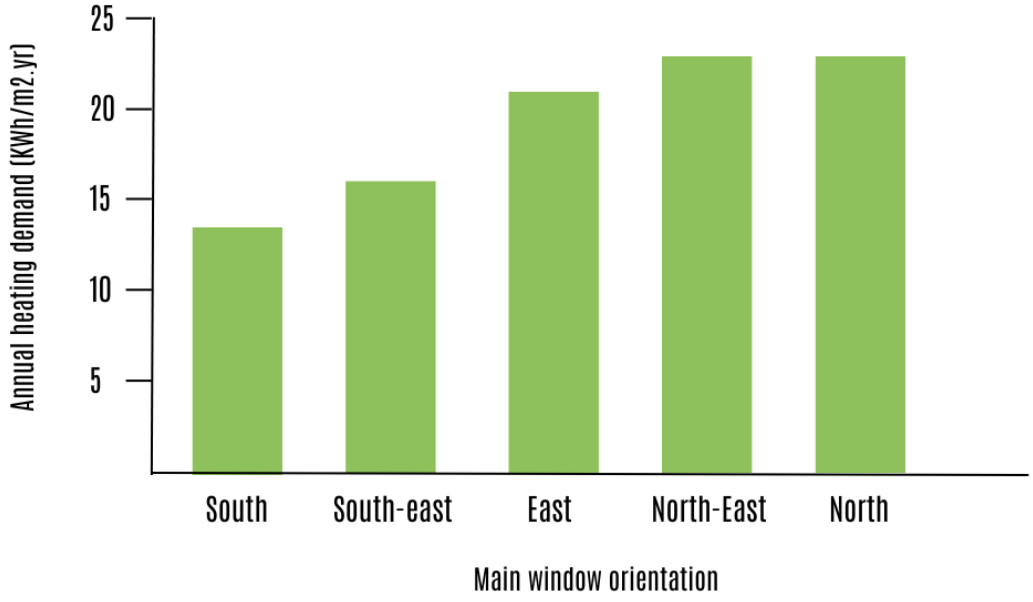
Figure 6.4: Types of homes and their form factor [See reference **159**]



4.164 In the same way, the position of a building in relation to the sun's paths and to prevailing wind can also have impacts on a building's overall energy consumption. For instance, useful solar gains with south facing positioning should be optimised (for free winter warming), and significant overshadowing in winter should be prevented by considering the relationship to other surrounding buildings or other tall elements. Similarly, dual aspect homes should be encouraged as they allow the through flow of air from sun-exposed surfaces of a building to shaded surfaces. The optimum glazing ratios for the UK climate are up to 25% glazed on the southern elevation, no more than 20% on the East/West elevations and as little as possible on the Northern elevation.

4.165 The illustration in the **Figure 6.5** below shows annual heating demand for different building orientations (source: LETI within the Climate Emergency Design Guide).

Figure 6.5: LETI orientation guidance [See reference **160**]



4.166 The illustration suggests changes to a building's orientation, can result in an increase of up to 11 kWh/m^2/year in space heating demand.

4.167 Document B suggested that foundation designs going forward should take account of increasing risks of subsidence from as a result of climate change. This is not explicitly recommended here as foundation design is covered by Building Regulations.

RECOMMENDED POLICY: Introduce new local plan policy on adaptation

4.168 The Huntingdonshire Design Guide SPD **[See reference** 161**]** includes guidance relating to the form and orientation of developments stating that buildings should be designed "with suitable size, scale and massing for its context, location, land use and density" and developers should "Enable street orientation to optimise natural daylight and the solar potential for buildings by

having its longest dimension along east- west axis (or within 30 degrees of south)".

4.169 This recommendation is for HDC to include within the Local Plan update a policy requirement that embeds this guidance and takes it further, requesting that applicants submit plans that show that such practice has been considered in designing buildings adapted to a warmer climate. This will enshrine principles of good building design responding to the threat of overheating, making this a requirement, rather than a hope for new applicants.

4.170 Any new such policy may need to state required principles of adaptation-related design have been followed, within the policy wording (as shown in the Bristol example, below) (there is an overall aspiration for Local Plans to become shorter and simpler, which HDC will also need to consider) or may point to other new or existing guidance and expect developers to show they have considered such principles via plans at application stage.

4.171 As discussed above (in 'Retrofitting and/or Retaining Existing Buildings'), SPDs are being phased out from local authority planning but other options exist for providing this kind of guidance explored below. HDC will need to review the content of the design guide and decide whether this information should form written instruction within the local plan, whether it can remain in its present form within the SPD, or whether it needs to be updated if it is to support a new policy and therefore require the production of a Supplementary Plan. In its present form, the design guide does not offer developers much guidance on adaptation matters.

4.172 Similarly, with an understanding of intentions for new planmaking under the evolving planning system, HDC may consider guiding applicants via new plan policy towards coding and guidance in a new 'design code' that more explicitly states expectations around form, orientation and similar matters responding to adaptation. We have recommended the production of a design code above in response to desires for use of sustainable materials and a circular economy. That same design code could also provide material weight on specific design matters for adaptation. For the design code to be able to include

firm coding on adaptation, it requires this coding to link to existing local plan policy. Therefore, any intentions for a design code featuring instruction on adaptation need such local plan policy in Huntingdonshire to be instituted ahead of time.

4.173 HDC can also implement changes through a toolkit for developers, delineating these best practice principles or directing them to existing guidelines. This may take the form of 'Local Guidance' or simply a toolkit sitting outside of the plan process.

4.174 Any review of the SPD content could promote the adoption of building designs that are simple and compact, discouraging features that contribute to heat loss such as stepped roofs and roof terraces; and highlight the need to design buildings to manage summertime overheating (e.g. by using brise soleil and solar mass) alongside securing wintertime solar gains. sizing for heat loss/gain management, with smaller windows positioned on the northern side and larger ones to the south. The LETI Climate Emergency Design Guide **[See reference** 162**]** provides a starting point for such discussions.

4.175 HDC's current design guidance does not contain information on insulation, airtightness, and ventilation for energy efficiency, warmth and cooling. Efficient insulation reduces heat loss from a building thereby requiring less energy to heat in cold temperatures and airtightness, involving the control of air leakage, eliminates unwanted drafts through the building's external fabric. HDC should promote the use of smart insulation, airtightness and ventilation as part of applicants' achievement of low and zero carbon development policy requirements and homes able to withstand overheating.

4.176 In addition, HDC's guidance could also advise on the use of robust materials and construction techniques in buildings, infrastructure and the public realm that are resilient to the threats of climate change. Specifically, they need to be able to withstand higher temperatures and heatwaves as well as storm events and driving rain. This addresses concerns over new buildings' integrity in addition to the welfare of residents and users (adaptation) and the reduction of

energy use (mitigation) which is the main concern of this policy recommendation.

4.177 Part O of the Building Regulations 2010, which focuses on the prevention of overheating through design, serves as a valuable reference point. The Passivhaus Design Easi Guide **[See reference** 163**]**, also provides significant advice on how form and orientation can improve energy efficiency in new housing.

Examples and Case Studies

4.178 Policy DM29: Design of New Buildings of the Bristol Local Plan, adopted 2014 **[See reference** 164**]**, states that:

> "Proposals for new buildings will be expected to:
>
> i. Be clearly organised in terms of their form and internal layout and circulation to reflect the hierarchy of function they will accommodate, the uses they will serve and the context they will address; and
>
> ii. Incorporate active frontages and clearly defined main entrances facing the public realm that emphasise corners and reinforce the most prominent frontages; and
>
> iii. Respond to the solar orientation of the building to support energy efficient design while ensuring as far as possible that active rooms face the public realm; and
>
> iv. Provide appropriate natural surveillance of all external spaces; and

v. Ensure that existing and proposed development achieves appropriate levels of privacy, outlook and daylight; and

vi. Allow for future adaptation or extension to accommodate alternative uses or to respond to the changing future needs or circumstances of occupiers by means of their internal arrangement, internal height, detailed design and construction; and

vii. Provide appropriately for inclusive access and circulation; and viii. Incorporate opportunities for green infrastructure such as green roofs, green walls and green decks that may be accessed and used where appropriate; and

ix. Incorporate exteriors and elevations that provide visual interest from a range of viewing distances and are visually organised and well-proportioned; and

x. Incorporate high quality detail of an appropriate scale and proportion, arranged in a coherent way that contributes positively to the overall design approach of the building; and

xi. Employ high quality, durable and sustainable materials of an appropriate texture, colour, pattern and appearance that contribute positively to the character of the area."

4.179 Policy SI4: Managing heat risk of the London Plan 2021 states that:

"Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and

reliance on air conditioning systems in accordance with the following cooling hierarchy:

- 1) reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
- 2) minimise internal heat generation through energy efficient design
- 3) manage the heat within the building through exposed internal thermal mass and high ceilings
- 4) provide passive ventilation
- 5) provide mechanical ventilation
- 6) provide active cooling systems"

4.180 Cross-planning authority design guides that inform on how to promote worthwhile form and orientation for sustainability are increasingly common, such as the 'Net Zero Carbon Toolkit' produced by West Oxfordshire District Council, Cotswold District Council and Forest of Dean District Council. HDC would be advised to consult these to inform future guidance creation and any guidance it would like to produce or refer to for supporting it. The Net zero Carbon Toolkit signposts the Passivhaus Easi Guide Design **[See reference** 165**]** which includes relevant guides that support climate change adaptation such as:

"The window design should be based on orientation, daylight and summer comfort, and should work in tandem with other architectural design factors like proportion and elevational composition. Excessive glazing is the main cause of overheating in the summer and heat loss in the winter.

Effective ventilation is vital for ensuring good indoor air quality, the ability to mitigate heat build-up and to remove excess moisture. Homes should include background and purge ventilation:

- Background ventilation should provide a constant rate of ventilation throughout the day and across the seasons. All homes will need mechanical ventilation with heat recovery (MVHR) for background ventilation.
- Purge ventilation provides bursts of fresh air to rapidly cool or renew the indoor air, typically achieved with openable windows."

Technical Feasibility

4.181 HDC will need to consider by what form guidance on form, orientation, insulation and ventilation is expanded and whether this should form a new design guide as Local Guidance, design code/supplementary plan or whether small instructions can be included explicitly within the updated Local Plan.

4.182 These early-stage design considerations can significantly improve efficiency and the liveability of homes and other developments and are not expected to add to construction and development costs.

4.183 Developers are also familiar with using guidance documents when making design decisions. However, HDC would need to make any changes clear through appropriate signposting.

Cost Implications

4.184 The development of any design guidance is not expected to require extensive resources and could be a collaborative effort with other local councils with similar goals, which could reduce expected resources and costs. However,

the wider production of the document it is produced within, may entail moderate resources to be spent by the Council.

4.185 It is for developers to prepare designs that are resilient and adaptable to future social, economic, technological and environmental requirements. Additional build costs should be minimised if these considerations are designed in from the start. There may be a small additional cost associated with consultancy work to undertake the overheating assessment or use of the GHA "Overheating in New Homes" Tool.

4.186 Form and orientation measures are not expected to be capital intensive for developers. The Passivhaus Design Easi Guide **[See reference** 166**]**, also provides significant advice on how form and orientation can improve energy efficiency in new housing. Case studies of successful large-scale construction of Passivhaus-certified homes, as seen in Hastoe's development of 14 units at Wimbish, Essex, and other national developments, underscores the economic viability of such housing models, which boast significantly reduced energy consumption and heating costs. Recently constructed social housing in Norwich achieved Passivhaus standard alongside attractive design that won it the prestigious RIBA Stirling Prize in 2019 **[See reference** 167**]**. Passivhaus home average energy bills are around 62% cheaper than the national average **[See reference** 168**]**.

4.187 HDC is therefore well positioned to promote sustainable and resilient housing developments through form and orientation.

4.188 The cost of efficient insulation, ventilation and the cost of achieving appropriate airtightness can vary depending on efficiency, building typology and size. It is anticipated that more efficient systems will create additional cost burdens for developers (e.g. see information on Passivhaus in Chapter 2). However, it is also expected that more efficient systems will lead to significant cost savings on energy bills for occupiers over time.

Benefits

4.189 An approach considering form and orientation at the design stage can lead to significant savings for residents/householders in running costs as well as reduce energy consumption and carbon emissions from operation.

4.190 A new plan policy will dovetail well with a net zero approach chosen from Chapter 4. Whilst developers are to be given freedom in how they meet the requirements implemented by plan policy chosen from this chapter, developers may still overlook the threat of adaptation over mitigation unless required to do so. Additionally, as Building Regulations are, hopefully, strengthened on requirements relating to the energy and carbon performance of buildings, they will become increasingly in line with Passivhaus-like standards on energy efficiency, overheating, etc. Scaling up local expectations on design demands and internal resourcing on evaluating such design choices will futureproof HDC against such changes to national standards.

4.191 Promoting early design considerations towards efficient insulation, airtightness, and ventilation can significantly reduce a building's energy demand, leading to substantial savings for residents' energy bills over time.

4.192 The impacts of efficient wise form and orientation, along with airtightness and effective ventilation systems extend beyond Huntingdonshire's net zero targets, also supporting the health and wellbeing of residents through comfort and air quality.

Limitations

4.193 Officers may need to have a firm understanding of related policies and how they can be implemented to be able to negotiate with applicants where they claim a development is unable to meet orientation and/or form considerations (due to site specifics and other constraints). Supplementary

checklists or other support tools may be useful to support planning officers in their negotiations with developers.

4.194 Early design considerations may result in additional costs for developers. However, the likely cost of further design work at this stage may be dwarfed by both the benefits to household users of efficient systems and the costs of retrofitting already-developed homes with new machinery to improve a development's energy efficiency/carbon profile (such as ventilation systems and cavity walls). If energy prices stay relatively high then this is also likely to drive increased consumer demand for more energy efficient properties, so increased costs may be offset by increased sales rates or prices.

HDC's new local plan should include a policy requiring applicants to submit plans that show adaptation to a heating climate has been considered.

This will consider issues of form, orientation, insulation and ventilation. Developer responses should be informed and led by guidance either contained in brief form within the plan policy itself, newly constructed guidance or a new design code specifying particular design responses required to meet the threat of overheating and other adaptation challenges.

As with other policy recommendations in this report, enough freedom should be given to developers to show how they may realistically respond to the challenge, in this case adaptation, whilst also expecting them to show adherence to key principles of design – in this case those chosen by HDC (which may include the use of green infrastructure, cooling strategies or simply developer responses on form, orientation, insulation and ventilation).

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