Runnymede Borough Council

Climate Change Study

Low carbon development and sustainable design principles

Final Report
Prepared by LUC
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Runnymede Borough Council

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Chapter 1
Introduction

This report assesses the options for the revised Local Plan to ensure development mitigates and adapts to current and future climate change impacts, drawing on best practice case studies from other local authorities and the latest developments in policy and standards/metrics. It will also provide an overview of the tools available to RBC to strengthen their current policy suite.

1.1 In 2016, the UK became a signatory to the Paris Agreement, thus joining an international effort to keep global temperature rise 'well below' 2°C above pre-industrial levels, while aiming for a temperature rise of no more than 1.5°C.

1.2 The UK Climate Change Act, first adopted in 2008 and amended in 2019, aligns with this international commitment by setting a legally binding target for the UK to achieve a 100% reduction in net emissions by no later than 2050.

1.3 Section 19 of the Planning and Compulsory Purchase Act 2004 places a legal duty on local planning authorities (LPAs) to ensure that development plans *"include policies designed to secure that the development and use of land in the LPA's area contribute to the mitigation of, and adaptation to, climate change"*.

1.4 The Planning and Energy Act 2008 enables local authorities to impose 'reasonable requirements' on developers in terms of renewable energy, low carbon energy and energy

efficiency. Furthermore, The National Planning Policy Framework (NPPF) states that the planning system should *"shape places that contribute to radical reductions in greenhouse gas emissions"*. It goes on to say that plans should consider suitable areas for renewable and low-carbon energy sources, and that new development should be planned in such a way that GHG emissions are reduced. Paragraph 153 of the NPPF requires that development plans should take a proactive approach to mitigating and adapting to climate change in line with the objectives and provisions of the Climate Change Act 2008.

1.5 Setting ambitious targets and requirements for new development is one of the key ways in which LPAs can embed climate change mitigation into their Local Plan policies. This report will provide RBC with an overview and analysis of the potential policy options that could be included in the upcoming Local Plan review.

1.6 Policies in the Runnymede 2030 Local Plan implement the vision and objectives of development in the area, essentially setting out what development will be needed and where it should occur, as well as identifying key areas that should be protected.

1.7 There is a clear commitment within the Local Plan to attempt to mitigate and address the impact climate change will have in the Borough. Within the Local Plan objectives, the following objective is set out in this regard:

- Enhancing our environment:
  - 6) To increase resilience to climate change, including flood risk, to reduce greenhouse gas emissions and promote water efficiency and the use of renewable and low carbon energy;
  - 7) To protect the Borough's soil, mineral and groundwater resources by making the most efficient use of land, reduce air, land and noise pollution and improve water quality;
  - 8) To protect and enhance the Borough's heritage assets, both designated and non-designated and promote their use as part of the Council's leisure and tourism offer;
  - 9) To protect and enhance the Borough's biodiversity, habitats and species and to contribute to net gains in biodiversity;
  - 10) To protect and enhance the Borough's most valued landscapes and its green spaces as well as the general extent of the Green Belt; and
  - 11) Revitalising areas in need of physical improvement and proactively seeking opportunities for regeneration to assist with place shaping and the enhancement of the built environment.

1.8 Key policies that relate to climate change are SD3 (Active & Sustainable Travel), SD7 (Sustainable Design), SD8 (Renewable & Low Carbon Energy), EE11 (Green Infrastructure), EE12 (Blue Infrastructure) and EE13 (Managing Flood Risk).

1.9 Although these policies, to an extent, mitigate and adapt to the effects of climate change, there is a need to increase the level of ambition if the Borough is to achieve its aims set out in the Climate Change Strategy 2022-2030[1]. Within this, the Borough has committed *"To support the international climate change response to limit global warming to a 1.5 degrees centigrade temperature increase while simultaneously delivering a prosperous, caring, healthier borough where people are valued and cared for and where strong communities pull together"*. In order to achieve this, significant reductions in Borough wide emissions are needed.

1.10 Planning policy has the potential to support this commitment. However, to do so RBC's planning policies will need to increase their level of ambition. This is reflected in messaging from both the Town and Country Planning Association (TCPA) and Climate Change Committee (CCC) who state respectively that planning should *"embed the principles of net zero carbon and climate resilience at all levels; nothing should be planned without having successfully demonstrated that it is fit to take its place in a net-zero emissions future"*[2] and that *"The*

[1] Runnymede Borough Council (2022) Climate Change Strategy 2022-2030 [pdf]. Available at: https://www.runnymede.gov.uk/downloads/file/1533/climate-change-strategy

[2] Town and Country Planning Association (2023) The Climate Crisis: A Guide for Local Authorities on Planning for Climate Change [pdf]. Available at: https://www.tcpa.org.uk/wp-content/uploads/2021/11/TCPA-RTPI-Climate-Guide-4th-edition-1.pdf

planning system must have an overarching requirement that all planning decisions must be taken giving full regard to the imperative of Net Zero"[3].

1.11 Therefore, if planning polices do not currently lead to planning decisions that support and embed the principles of Net Zero, they will not be contributing to the national imperative of achieving Net Zero nor RBCs Climate Change Strategy. Climate change is a strategic policy for both national and local policy, and therefore ambitious action on climate change should be embedded and integrated into policy preparation, particularly in RBC's Local Plan review.

1.12 Furthermore, The Climate Change Committee state that *"Local Authorities currently developing Local Plans should gather evidence to support policies that require developments to exceed current building standards"*[4]. Recent decisions from the Planning Inspectorate underline the need to clearly justify policies based on a sound evidence base. The aim of this report is to provide this evidence base for RBC.

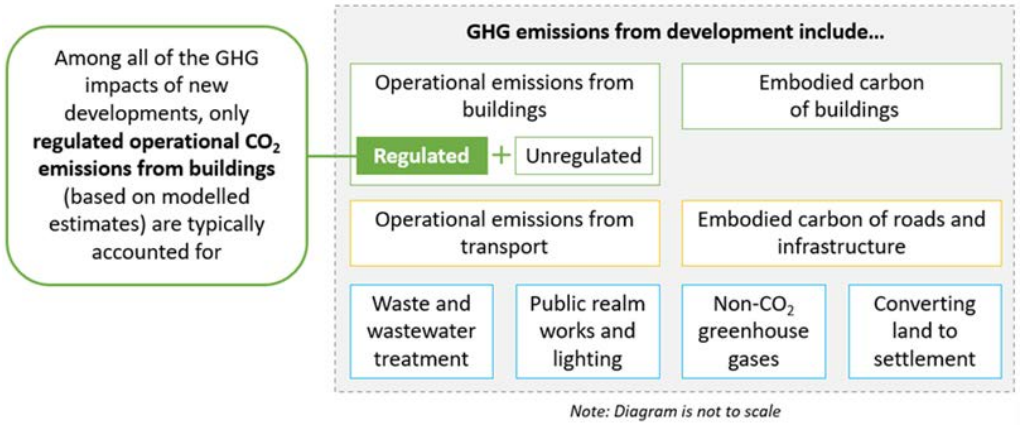
1.13 This report assesses the options for strengthening the greenhouse gas (GHG) reduction policies in the Local Plan, drawing on best practice case studies from other LPAs and the latest developments in policy and standards/metrics. The report is broken down into the following sub-sections.

- Building performance standards/requirements;
- Renewable and low carbon energy policy;
- Addressing the performance gap;
- Embodied carbon;
- Sustainable travel;
- Offsetting options;
- Interim guidance; and
- Sustainable design principles.

1.14 Taking a holistic approach to carbon reduction policy – as indicated by the broad range of themes covered above – is important as key sources of emissions include energy use in buildings but also embodied energy in the construction of buildings and emissions resulting from car use associated with the occupation of buildings.

1.15 Figure 1.1 illustrates the range of sources of GHG emissions from new development. Only those emissions shown in the green box tend to be quantified in planning or Building Regulations approval processes. Yet we know embodied carbon, transport emissions and unregulated building emissions can all be significant.

Figure 1.1: GHG emission sources from new developments



Note: Diagram is not to scale

[3] Climate Change Committee (2023) Progress in reducing emissions: 2023 Report to Parliament [pdf]. Available at: https://www.theccc.org.uk/wp-content/uploads/2023/06/Progress-in-reducing-UK-emissions-2023-Report-to-Parliament.pdf

[4] Climate Change Committee (2020) Local Authorities and the Sixth Carbon Budget [pdf]. Available at: https://www.theccc.org.uk/wp-content/uploads/2020/12/Local-Authorities-and-the-Sixth-Carbon-Budget.pdf

Chapter 2
Existing Building Regulations

This chapter provides an overview of current Building Regulations and upcoming changes whilst also providing the rationale for RBC to set targets that exceed upcoming changes.

2.1 The Building Regulations 2010 (the Building Regulations) set out the required standard for building work in England. The 'technical requirements' are the key legal requirement to which all building work must meet to comply with the Building Regulations. A summary of the key technical requirements of the Building Regulations can be found in the appendix.

2.2 Building Regulations (Part L) require that the energy and carbon intensity of a new building is measured against a National Calculation Model (NCM). This is usually achieved by using SAP (Standard Assessment Procedure) (residential) and SBEM (Simplified Building Energy Model) (non-residential) tools.

2.3 On the 15th of December 2021, the government announced changes to the Building Regulations. This is in an attempt to ensure that 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 current standards along with a 27% reduction for new non-domestic buildings, including offices and shops. These changes have come into effect as of the 15th of June 2022.

Future Homes and Building Standards

2.4 The Government has announced its intention that a Future Homes Standard (FHS) and Future Buildings Standard (FBS) will be implemented from 2025 onwards. The expectation is that these will result in c. 75-80% lower regulated CO_2e emissions compared with Part L 2013, but the details and technical standards have not yet been set, and the timing is not guaranteed.

2.5 The Government's proposed FHS and FBS are framed around the concept of new buildings being 'zero carbon ready'. During the 2019 FHS consultation, the Government stated its intention that in the future *"All homes will be 'zero carbon ready', becoming zero carbon homes over time as the electricity grid decarbonises, without the need for further costly retrofitting work"*. Similarly, for non-domestic buildings, in the 2021 FBS consultation the Government stated that *"Buildings built to the Future Buildings Standard will be zero carbon ready, with the ability to decarbonise over time alongside the national grid without any further energy efficiency retrofit work"*.

2.6 In this context, the key components of a 'zero carbon ready' building are 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).

2.7 Relying on grid decarbonisation to address operational emissions is a risky approach as the scale and pace of grid decarbonisation is not guaranteed. This could ensure carbon emissions are locked into new developments until grid decarbonisation is achieved (target is 2035), whereas Runnymede needs to start taking action now to achieve its climate change targets.

2.8 It is also important to note that many sources of energy use or emissions associated with buildings fall outside the remit of Building Regulations; these are known as 'unregulated' emissions (e.g. emissions related to household appliances) in contrast to 'regulated' emissions (e.g. emissions related to heating and fixed lighting) that are covered by the Building Regulations. Therefore, although the Government has said that new buildings from 2025 onwards will be 'zero carbon ready', it is likely that this will only apply to regulated emissions so arguably it does not go far enough (albeit, as highlighted above, if the grid does fully decarbonise in future then both regulated and unregulated emissions associated with electricity consumption would drop to zero). Embodied carbon emissions (the amount of carbon emitted during the construction of a building) are also excluded.

Going beyond Building Regulations

2.9 Although Building Regulations are showing the right direction of travel, at present it is not clear if or when the Government will require buildings to be net zero in operation. Given the urgent need to respond to the threats of climate change, there is clear justification for local authorities to set standards that exceed Building Regulations. Interim uplifts in Building Regulations generally fall short of current best practice in the market.

2.10 In recent years, there have been a series of announcements and policy U-turns that have resulted in uncertainty whether local authorities are allowed to set standards for energy performance or GHG emissions that exceed Building Regulations, particularly for homes. Timelines for new policy implementation are also likely to slip due to political uncertainties and decision making.

2.11 A prime example of this is the UK Government's U-turn on zero carbon homes in 2015. In backtracking on this policy, a policy gap emerged that is still affecting planning policy to this day. This has caused confusion as to whether LPA's can set energy and carbon targets beyond national requirements. This was further enhanced by the Written Ministerial Statement (WMS) in 2015 stating that LPAs should not set energy efficiency standards higher than the Code for Sustainable Homes Level 4 equivalent or develop new technical standards relating to the construction, internal layout or performance of new dwellings.

2.12 Despite this, the NPPF states that planning should *"shape places in ways that contribute to radical reductions in greenhouse gas emissions"* but also emphasises the importance of evidence on deliverability, with policies underpinned by relevant and up-to-date evidence.

2.13 Therefore, it is crucial that any policy and requirement that goes above and beyond Building Regulations is backed by robust evidence. If there is a Local Plan strategic policy in place and new policies have been justified by evidence, including being viability tested and consulted upon, there should be no legal issues in adopting these policies. Despite this, as evidenced by the Planning Inspectorate's decision on the Lancaster District Strategic Policies and Land Allocation Development Plan Document (DPD) and the Development Management

DPD (the Plans), Inspectors may potentially give weight to the 2015 WMS[5]. This will need to be carefully considered with any proposed updates to energy efficiency standards.

2.14 However, at the time of writing (May 2023), setting standards that exceed Building Regulations is permitted. This was clearly stated in the Government's response to the FHS consultation in 2021, and has been re-affirmed by published correspondence between Bath and North East Somerset (BANES) Council and the Department for Levelling Up, Housing and Communities (DLUHC) in 2022 which said *"Plan-makers may continue to set energy efficiency standards at the local level which go beyond national Building Regulations standards if they wish"*[6].

2.15 This view is supported by Guildford Borough Council's summarisation (included as a submitted document as part of their Local Plan review) that *"There remains the Written Ministerial Statement, but the view advanced by the Council, and apparently accepted by the LPSS inspector who did not raise an issue over whether the plan was empowered to set carbon emission standards, is that the government cannot fetter the legal powers of LPAs by issuing policy (i.e. the WMS cannot restrict the provisions of the Planning and Energy Act)"*.

2.16 Looking at the bigger picture, it would not be consistent with RBC's and national climate commitments (as outlined in 1.9-1.12) – whether legal or voluntary – to allow new development to come forward when there is a risk that those buildings will not be compatible with a net zero future. This is further supported by policy and legislation at the highest level. The Climate Change Act (2008) has a legally binding requirement to deliver Net Zero by 2050. To achieve the sixth carbon budget (enshrined in law)[7], all new development should target net zero as soon as possible. Therefore, setting ambitious local plan policy targets to achieve net zero development is in line with national legal and policy obligations set at the highest level.

2.17 Therefore, relying on escalating Building Regulations and grid decarbonisation to ensure that new homes are net zero by 2050 is not recommended. The following two options discuss pathways that take a more proactive approach to ensuring that new developments can meet this net zero target.

Table 2.1: Summary of arguments for using a Building Regulations (BR) approach

Positives	Negatives
No need to update local plan policies as BRs will potentially slowly increase to achieve Net Zero in line with national policy.	Risk that the implementation of standard uplifts are delayed or scrapped due to political U-turns or complications.
Low risk approach.	Perceived as risk adverse approach from wider stakeholders and the public.
Generally in line with national policy objectives and Runnymede's Climate Change Strategy.	Given that progress towards national policy has recently stalled and that to achieve the 2030 Nationally Determined Contribution Goal of at least a 68% fall in territorial emissions from 1990 levels, the emissions reduction outside the power sector must almost quadruple, relying on BRs will not achieve the level of climate mitigation urgently needed in the built environment and transport sectors both locally and nationally.
Fewer resources required by Local Planning Authority in assessing Net Zero standards at development management stage (as this would be managed at Building Control stage).	This approach could lead to a plethora of missed opportunities and wider benefits that come with decarbonising the built environment and transport sectors.

[5] Lancaster City Council (undated) Local Plan Examination [online]. Available at: https://www.lancaster.gov.uk/planning/planning-policy/local-plan-examination

[6] Ministry of Housing, Communities and Local Government (2021) The Future Homes Standard: 2019 Consultation on the changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations for new dwellings – Summary of responses received fand Government response [pdf]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/956094/Government_response_to_Future_Homes_Standard_consultation.pdf

[7] Department for Business, Energy and Industrial Strategy, Prime Minister's Office, 10 Downing Street, The Rt Hon Kwasi Kwarteng MP, The Rt Hon Sir Alok Sharma KCMG MP, and The Rt Hon Boris Johnson MP (2021) UK enshrines new target in law to slash emissions by 78% by 2035 [online]. Available at: https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035

Chapter 3
Low/Zero Carbon Buildings

This chapter provides an overview of the policy options available to RBC when requiring new developments to achieve low or 'net zero' carbon.

3.1 Key policy approaches for setting carbon performance requirements for buildings include:

- Requiring developments to achieve energy/carbon reduction standards beyond current Building Regulations requirements; and
- Use 'off the shelf' assessment tools, such as Home Quality Mark (HQM), to ensure that developments meet required standards.

3.2 Each policy option will be presented in the following format:

- Background
- Example policy wording
- Viability
- Summary of each approach

Policy Option 1 – Require developments to reduce emissions relative to Building Regulations

Background

3.3 For LPA's considering low or zero carbons targets for new developments, there are two main overarching questions.

1. Should a target be included in the first instance?

2. If so, at what level should these be set at for different types of development?

3.4 Higher targets (beyond those in Building Regulations) are arguably critical to helping RBC achieve its zero carbon ambitions and guard against any delays to the strengthening of carbon targets in Building Regulations, or delays to decarbonisation of the national grid. This would also align with the NPPF's stipulation that plans should take a *"proactive approach"* to mitigating climate change.

3.5 Setting higher targets will mean higher performance buildings but at increased cost for developers. However, the impact on viability may be offset by potentially higher demand/prices for energy efficient homes/buildings, particularly if energy costs stay high for an extended period, and reduced prices paid for land by developers (if the policy wording gives certainty to developers).

3.6 The 'Merton Rule' was the first piece of planning policy in the UK that attempted to address carbon emissions in the built environment. Adopted in 2003, the policy required that new commercial buildings over 1,000 square meters had to generate at least 10% of their energy needs using on site renewable energy generation. Since then, policy has shifted to setting targets for the carbon performance of developments as a whole, often relative to the minimum requirements set by Building Regulations.

3.7 Policy SD8: Renewable & Low Carbon Energy of the adopted Runnymede Local Plan states that *"development proposals of 1,000sqm or more of net additional floorspace will be expected to incorporate measures to supply a minimum of 10% of the development's energy needs from renewable and/or low carbon technologies unless it can be demonstrated with evidence that this is not feasible or viable"*. This policy is broadly similar to the Merton policy outlined above. Policy has moved forward in this area since then, and there is significant scope to improve the requirements placed on new developments in the Borough in the form of more ambitious planning policy.

Example Policy Wording

3.8 Examples of the highest carbon reduction targets included in adopted planning policies (excluding 'net zero carbon' policies which we come to later) are provided below:

- London Plan policy SI2 requires *"A minimum on-site reduction of at least 35 percent [carbon reduction] beyond Building Regulations [2021] 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"* (NB excludes minor development). The GLA's Energy Assessment Guidance[8] provides further advice on how to comply with these policies and can be updated to reflect changes in Building Regulations.
- Sutton Local Plan (2018, policy 31) mirrors these targets but also includes a requirement that *"all minor residential developments should achieve at least a 35% reduction in regulated CO_2 emissions on site"*[9].

3.9 Other local plans have lower targets or include no target and defer to requirements in the Building Regulations.

3.10 It is important to be aware when considering setting carbon targets that the requirements in the Building Regulations are being progressively tightened, as highlighted earlier. Given this context, newer Local Plan policies often refer to these national changes in their policies to future proof them. For example, Solihull's Local Plan (currently at examination/ not yet found sound) includes the following policy wording (Policy P9):

> *"All new dwellings to achieve 30% reduction in energy demand/carbon reduction improvement over and above the requirements of Building Regulations Part L (2013) at the time of commencement up to March 2025.*
>
> *From April 2025, for all new dwellings to be net zero carbon."*

[8] Greater London Authority (2022) Energy Planning Guidance [online]. Available at: https://www.london.gov.uk/programmes-strategies/planning/planning-applications-and-decisions/pre-planning-application-meeting-service/energy-planning-guidance

[9] Over 2013 Building Regulations.

3.11 It is not generally necessary to repeat national policy in local plan policies, but Solihull's approach is interesting in that it appears to be locking in a requirement for dwellings to be net zero carbon from April 2025, whether or not the Building Regulations (BRs) are actually updated to require the same. This is one way of reducing the risk that the national policy is not actually implemented or is delayed.

3.12 The adopted partial local plan update for Bath and North East Somerset (2023) sets out the first net-zero housing policy in England – Policy SCR6 states that new residential development must achieve zero operational emissions. The adoption of this policy shows that well-evidenced and progressive policies to address the climate crisis can be found sound. Key to the adoption of this policy was a robust viability assessment showing that housing delivery would not be negatively impacted by higher energy standards.

3.13 Other planning policies set a net zero-carbon target (this tends to apply to 'regulated energy' i.e. building energy consumption resulting from fixed building services and fittings including heating, cooling, lighting and hot water, as covered by the Building Regulations). For example, 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). This is a stretching requirement well ahead of Building Regulations, but it does help to deliver new development with no net additional carbon emissions from its operation. Clearly this brings added costs for developers (both in terms of maximising onsite measures and buying any offsetting required) and the impact on development viability in Runnymede would need to be considered.

Viability

3.14 Setting targets above and beyond these revised Building Regulations requirements will clearly bring added costs for developers and the impact on the viability of different development typologies needs to be considered.

3.15 Published viability studies carried out on behalf of Cornwall, Greater Cambridge and Winchester Councils on average suggest that, for domestic developments, net zero carbon development (net zero carbon emissions from total energy use, i.e. 'regulated' and 'non-regulated' energy) development can be achieved at a cost uplift of 3-5% compared against Part L 2021, depending on the dwelling typology in question.

3.16 Similarly, the Net Zero Carbon Toolkit[10] (Forest of Dean, Cotswold and West Oxfordshire Councils) 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. The report also estimated that the retrofit cost for a home originally built to the Part L notional specification, even when involving a relatively small reduction in space heating demand, is significant.

3.17 On the other hand, Guildford Council found that (whilst considering implementing carbon emissions standards that were more demanding than the June 2022 Building Regulations) costs jump significantly when improvements increase from 30% to 35%, and the LPDMP viability testing shows that this uplift on build costs along with the wide range and significant impact of other development and policy costs may jeopardise the viability of some schemes[11].

3.18 For non-residential developments, evidence suggests that net zero regulated emissions could be achieved at a cost uplift of approximately 5%, while net zero regulated and unregulated emissions could be achieved at a cost uplift of approximately 10%. However, the costs are likely to vary significantly depending on the scheme in question – they could be higher or lower.

3.19 Highly energy efficient, zero carbon buildings offer a range of other benefits, including much lower energy bills for occupants (up to 50% savings) and higher rental/sale prices (up to a 10% increase).

[10] Levitt Bernstein, Elementa, Passivhaus Trust and Etude commissioned by West Oxfordshire, Cotswold and Forest of Dean District Councils, funded by the LGA Housing Advisers Programme.

[11] Guildford Borough Council (2022) Topic paper: Climate Change and Sustainable Development

Summary

Table 3.1: Positives and negatives of setting carbon targets relative to BRs

Positives	Negatives
Tried and tested approach in adopted local plans.	Added costs to developers, increasing as target is increased towards net zero.
Carbon offsetting (which might need to be allowed as a last resort where it is demonstrated a developer cannot achieve net zero on-site) could generate funds to invest in energy efficiency improvements to existing homes, reducing emissions and fuel poverty.	Lack of in-house expertise/resource to: review energy calculations/verify calculations are robust; or – if carbon offsetting was pursued – to identify relevant carbon reduction projects and run the scheme.
Ensures that carbon reduction in the built environment is achieved even if political delays to future Building Regulations occur.	Uncertainty that targets over and beyond BRs will be found sound at examination.

Policy Option 2 – Use 'off the shelf' assessment tools

Background

3.20 To assess if a carbon reduction or net zero target has been achieved, LPAs often set out requirements for the submission of an energy statement which sets out the relevant calculations and assumptions. RBC, like many local planning authorities, may be limited in their ability to expand resources and technical capacity to assess detailed energy or sustainability statements in-house. An alternative option which is less resource-intensive is to set policy with reference to 'off the shelf' third party accreditation schemes. This would mean that RBC could simply seek proof of certification/performance rather than reviewing detailed energy modelling. The council could have confidence in the ratings given they are completed by independent assessors.

3.21 The key options here relate to which type of standard to specify, if any, and what performance level to require. Standards tend to apply to a limited number of types of development e.g. domestic or non-domestic developments only. The options that have been explored in this chapter relate to BREEAM and Home Quality Mark.

Example Policy Wording

BREEAM

3.22 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.

3.23 Islington local plan Policy S3 (at examination, not yet adopted) includes a range of specific BREEAM requirements for different types of development. This includes.

- A BREEAM 'Excellent requirement' for major residential refurbishments but also includes the same requirement for minor residential developments involving refurbishment or extensions and stipulates that the rating should be a final (post-refurbishment) certified rating under BREEAM Domestic Refurbishment 2014 (or equivalent scheme) and must make reasonable endeavours to achieve an Outstanding rating.
- 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.
- 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.

3.24 RBC could consider specifying additional BREEAM requirements in this way. For example, by specifying that all major non-residential developments must achieve maximum credits 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 net zero regulated emissions.

3.25 The benefit of setting such additional requirements under BREEAM schemes is that checks of BREEAM reports to verify compliance would be relatively straight forward (and much simpler than 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)

3.26 HQM is a relatively new scheme for new build homes (also from the BRE). Like BREEAM, it considers a range of sustainability topics, including energy performance but also design and construction quality, running costs, and measures to promote occupant health and wellbeing[12].

3.27 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_2-eq emissions.

3.28 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.

3.29 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".

3.30 As with BREEAM above, the council could consider setting requirements for minimum HQM credit scores in specific areas e.g. to require a higher level of energy/carbon performance. For example, 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).

Passivhaus

3.31 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.

3.32 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[13]. 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.

3.33 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.

3.34 Achieving the standard creates added construction costs and requires skilled labour – a recent analysis by AECOM[14] 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

[12] BRE (2018) Home Quality Mark ONE: Technical Manual – England, Scotland & Wales [pdf]. Available at: https://www.homequalitymark.com/wp-content/uploads/2018/09/HQM-ONE-Technical-Manual-SD239-.pdf
[13] Climate Change Committee (2019) UK housing: Fit for the future? [pdf]. Available at: https://www.theccc.org.uk/wp-content/uploads/2019/02/UK-housing-Fit-for-the-future-CCC-2019.pdf
[14] AECOM (undated) Debunking the myth that Passivhaus is costly to achieve [online]. Available at: https://aecom.com/without-limits/article/debunking-the-myth-that-passivhaus-is-costly-to-achieve/

qualified construction workers to build to the exacting Passivhaus standard could also be a constraint.

3.35 The Passivhaus standard has not been widely used in planning policies in England to date. However, there are some examples. One of the strongest is Bristol City Council's policy CCS2 in the Local Plan Review (2019, not yet adopted) which actively encourages use of this standard by reducing wider policy requirements on Passivhaus schemes.

3.36 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. 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 as set out below.

3.37 Other councils such as Cambridge City and Havant simply indicate their support for schemes that use the Passivhaus standard.

3.38 Given the robustness of the Passivhaus standard, we recommend that RBC 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.

Viability

3.39 Most costs for BREEAM and HQM compliance are expected to arise from meeting the energy and GHG performance requirements set in policy (e.g. net zero carbon; see viability section on zero carbon above). The scale of uplift in build costs depends on the energy/GHG performance requirements set.

3.40 With regard specifically to the certification process, published research suggests that the BREEAM certification process on its own would incur a 1% to 2% uplift in costs when compared with the previous (Part L 2013) Building Regulations[15]. However, since those regulations were updated in 2021, the cost uplift would be smaller and is considered negligible. HQM is similarly not expected to have any significant additional capital cost impact.

3.41 A key point to understand is that both schemes address topic areas other than energy and GHG performance. The benefit of this is that they prompt developers to consider wider sustainability issues.

3.42 Some other points to consider are.

- **Futureproofing:** The schemes are updated semi-regularly. This is necessary to keep up with changes in Building Regulations, otherwise credits could be awarded to buildings that perform at or below the minimum national standard. However, the timing of updates is uncertain; at the time of writing (March 2023) BREEAM has been updated to reflect Part L 2021 but HQM has not. If the Local Plan policy specifies specific ratings or credit requirements, this introduces a risk of the policy being superseded within the next few years. Policy wording therefore needs to be outcome-oriented and/or caveated to reduce the emphasis on achieving overall ratings or credits within either of these schemes.
- **Promoting a shift to renewable energy and heating:** BREEAM and HQM, like the Building Regulations themselves, are designed to offer flexibility in terms of how a developer achieves the target energy and GHG performance. So, while achieving these ratings would probably require some combination of energy efficiency measures and on-site renewables, there are few specific requirements. For example, they would not necessarily prohibit the use of gas boilers, or mandate the use of PV, to achieve a certain number of credits.

Table 3.2: Uplift in costs associated with achieving BREEAM standards[16]

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%

[15] BREEAM (2016) Briefing Paper – The value of BREEAM: A review of latest thinking in the commercial building sector [pdf]. Available at: https://tools.breeam.com/filelibrary/Briefing%20Papers/BREEAM-Briefing-Paper----The-Value-of-BREEAM--November-2016----123864.pdf

[16] BREEAM (2016) Briefing Paper – The value of BREEAM: A review of latest thinking in the commercial building sector [pdf]. Available at: https://tools.breeam.com/filelibrary/Briefing%20Papers/BREEAM-Briefing-Paper----The-Value-of-BREEAM--November-2016----123864.pdf

Rating	School	Industrial	Retail	Office	Mixed Use
Outstanding	5.8%	4.8%	10.1%	9.8%	4.8%

Summary

Table 3.3: Positives and negatives of "off the shelf" policy options

Positives	Negatives
By securing specific credits under HQM and BREEAM schemes, developments will be demonstrating that they have achieved or gone beyond net zero regulated emissions.	Added costs to developer, increasing as target is increased toward net zero.
This approach will help to safeguard against the risk of potential delays to the building regulation updates, which would result in higher GHG emissions over the Local Plan review period.	RBC will not have control of quality assurance. Also relying on BRE to update their methodologies as time goes on.
Using HQM and BREEAM to secure net zero developments is pragmatic if there is a lack of in-house technical expertise/capacity to interrogate energy statements.	RBC will have less engagement with the process compared with other assessment methods.
Tried and tested approach in many local plans. Less risk that this approach will be challenged.	
BREEAM and HQM assess a wide remit of sustainability considerations in the built environment. Therefore, these tools could be used in a wide range of policies to create cohesion throughout the Local Plan and reduce the burden on developers who could use the tool to demonstrate compliance across a broad spectrum.	

Policy Option 3 – Set specific energy use efficiency performance targets (i.e. the LETI approach)

Background

3.43 In recent years, some local authorities have chosen to take a different approach and set absolute performance targets or other metrics, rather than targets based on Building Regulations or third-party assessment schemes.

3.44 There are a variety of targets and metrics, including standards set by the UK Green Building Council (GBC), Royal Institute of British Architects (RIBA) and London Energy Transformation Initiative (LETI), that could be specified based on emerging industry best practice. These generally follow the same broad characteristics.

- Very 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 100% of energy use can be met through on-site renewables, not allowing any fossil fuel combustion on-site; and
- Reducing the performance gap and prioritising as-built performance, rather than modelled design-stage estimates, as the most important measure of whether the building can be considered net zero in operation.

3.45 The key argument put forward by the LETI design guide[17] is that energy use targets are more transparent and robust than carbon reduction targets and are a better way to ensure zero carbon homes are delivered in practice. The guidance suggests that the Approved Document L of the Building Regulations using carbon emissions as the basis of determining compliance

[17] London Energy Transformation Initiative (2020) LETI Climate Emergency Design Guide: How new buildings can meet UK climate change targets [pdf]. Available at: https://www.leti.uk/_files/ugd/252d09_3b0f2acf2bb24c019f5ed9173fc5d9f4.pdf

causes unintended consequences when relying on this methodology. These include the carbon intensities of energy fuel supply adversely influencing on-site efficiency measures and the neglect of building envelope efficiency in favour of mechanical systems' efficiencies. By setting operational targets, these will be relatively consistent throughout the building's lifetime.

3.46 LETI defines net zero operational carbon as a new building that does not burn fossil fuels, is 100% powered by renewable energy and achieves a level of energy performance in-use in line with national climate change targets.

3.47 At its simplest, LETI energy use efficiency targets could be summarised as the following for different development types.

Table 3.4: LETI EUI targets

Homes	35kWh/m^2/yr (GIA)
Offices	55kWh/m^2/yr (GIA)
Schools	65kWh/m^2/yr (GIA)
Space Heating Demand (all)	15kWh/m^2/yr
Fossil Fuels	All buildings should be fossil fuel free.

Example Policy Wording

3.48 Two examples of this approach being used in adopted plans are set out below.

Bath & North East Somerset Local Plan Partial Update (LPPU) – adopted 2023

Policy SCR6 Sustainable Construction Policy for New Build Residential Development
3.49 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.

Major Residential Development
3.50 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.

Policy SCR7 Sustainable Construction Policy for New Build Non-Residential Buildings
3.51 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.

3.52 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.

Cornwall Council Climate Emergency DPD – adopted 2023

3.53 Cornwall's Climate Emergency DPD includes a policy requiring residential proposals to achieve net zero carbon emissions and sets specific targets for space heating demand and total energy consumption, allowing offsite contributions where this cannot be achieved on-site. Major non-residential schemes are required to achieve BREEAM Excellent *"or an equivalent better methodology"*.

Policy SEC1 – Sustainable Energy and Construction

3.54 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.

- (a) 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.
- (b) 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.

3.55 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.

3.56 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.

3.57 It should be noted that due to the lack of non-residential housing in Cornwall, there was insufficient time to test the viability of a non-residential EUI target in the region. Therefore, BREEAM requirements were set.

Other Examples

3.58 There are similar policies in draft plans for authorities such as North East Cambridge, Winchester, Leeds, and Lancaster, which are at different stages of consultation[18, 19, 20, 21]. 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 an encouraging 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"*[22].

Viability

3.59 Table 3.5 below summarises the projected increased costs from Climate Change Committee (2019) recommendations. These costs represent the lifetime costs associated with achieving energy efficient performance standards for a range of building archetypes that were then set against a counterfactual of a home built the Part L 2013 notional specification with gas heating. The figures below represent model outputs fort homes using an Air Source Heat Pump

[18] Greater Cambridge Shared Planning (2021) Proposed Submission North East Cambridge Area Action Plan Regulation 19 [pdf]. Available at: https://consultations.greatercambridgeplanning.org/sites/gcp/files/2021-11/NECAAPNorthEastCambridgeAreaActionPlanReg192020v22021.pdf
[19] Winchester City Council (2022) Winchester District Local Plan – Regulation 18 Consultation Plan
[20] Leeds City Council (2022) Local Plan Update
[21] Lancaster City Council (2022) Climate Emergency Review of the Development Management DPD Submission Local Plan
[22] Town and Country Planning Association (2022) The application of net zero in local plan policy

and District Heating and show the modelled cost uplift of meeting a 15kWh/m^2/yr target as specified by the LETI guidance.

3.60 Table 3.6 outlines the estimated costs of different building standard approaches and their uplift in costs compared to the current baseline of Part L BR's as of 2021, including LETI targets.

3.61 Please also refer back to the viability section above on the costs of delivering zero carbon buildings.

Table 3.5: Cost uplift associated with alternative building standard approaches

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

Table 3.6: 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					
Part L 2025	-2.4%	-2.0%	-2.4%	-2.0%	0.4%	0.4%
Park 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 in **Table 3.4**.

Summary

Table 3.7: Positives and negatives of "energy use efficiency" policy option

Positives	Negatives
Aligned with the Climate Change Committee's recommendation for 15-20kWh/m^2 limits for space heating and cooling by 2025 at the latest.	The LETI approach is dependent on all principles being followed, as they are interrelated. Therefore, LETI targets and policy could not be implemented in isolation, they require a complete shift to EUI targets and create a substantial review workload for any in-house energy specialist.
As the LETI approach focuses on best practice energy demands limits, this negates the issue of the decarbonising energy grid convoluting emission calculations.	Added costs to developers.
LETI targets (that do not calculate carbon) can be used alongside building standards, as these metrics do calculate carbon use. Therefore, the two different sets of metrics do not come into conflict.	Need for in-house specialist to interrogate energy statement/verify calculations are robust.

Positives	Negatives
Sets a recognised path on how new buildings can operate at net zero levels by 2030.	Using EUI would require developers to complete separate energy calculations from those needed for Building Reg compliance.
Provides significant energy bill reductions for occupiers.	

Other Sustainable Design Considerations

Resource Requirements to Assess Compliance

3.62 A person without any specialist knowledge could easily check whether the requisite HQM and BREEAM credits have been achieved. An understanding of sustainable building design would, however, be needed to interrogate and push back against any proposals that do not meet the required standard.

3.63 Whether RBC chooses to adopt a policy that requires the use of bespoke net zero metrics or third-party assessment schemes, ideally applications would be evaluated by individuals who are competent to assess them. This is a specialist field of knowledge that would require dedicated officer resource in the future. Depending on the policies adopted, the type of qualifications that are necessary might include:

- Understanding of third-party assessment schemes e.g. BREEAM, HQM, Passivhaus or other certification schemes;
- Experience of energy modelling and building physics e.g. SAP or BRUKL calculations;
- Expertise in lifecycle carbon assessments, material science or engineering in order to evaluate Whole Life Cycle emissions or proposed construction materials;
- Officers to monitor planning applications and conduct post-occupation surveys where relevant;
- Ability to collect and interpret energy data to contribute towards the development of future standards or benchmarks;
- Knowledge of how to design, set up and administer offsetting scheme(s), which may relate to energy efficiency improvements, renewable energy systems, or nature-based solutions, and how these interact with the implementation of the Community Infrastructure Levy; and
- Awareness of the wider policy and legal position regarding GHG mitigation and building performance standards.

3.64 This is a challenging area for Local Authorities, recognising the constraints on officer time and resources along with budget cuts. Research commissioned by UK100, a network of local government leaders, has identified the lack of time, capacity and knowledge amongst planning officers as one of the barriers to net zero carbon development[23]. However, it will need to become a priority going forward if RBC is to meet its Climate Change Strategy goals and as greater attention is paid to the GHG impacts of new development.

Fossil Free Heating

3.65 Heating homes using fossil fuels such as gas generates significant carbon emissions. The NE Cambridge Area Action Plan Regulation 19 version (Nov 2021)[24] includes the following requirement in Policy 2:

- All heating should be provided through low carbon fuels (not fossil fuels); and
- No new developments should be connected to the gas grid.

3.66 We recommend that RBC consider adopting a similar approach, imposing a requirement for all new heating to be provided through low carbon fuels (i.e. not oil or gas) ahead of the

[23] Quantum Strategy and Technology Ltd on behalf of UK100 (2021) Power Shift: Research into Local Authority powers relating to climate action
[24] Greater Cambridge Shared Planning (2021) Proposed Submission North East Cambridge Area Action Plan Regulation 19 [pdf]. Available at: https://consultations.greatercambridgeplanning.org/sites/gcp/files/2021-11/NECAAPNorthEastCambridgeAreaActionPlanReg192020v22021.pdf

planned national ban on gas boilers in new homes from 2025 (albeit this is subject to further consultation)[25].

Conclusions

3.67 Table 3.9 provides an overview of the main policy options that have been discussed in this chapter. This includes a summary of the positives/negatives of each approach and a professional judgement of their suitability for RBC.

Table 3.8: Chapter conclusion

Option	Positives	Negatives	Suitability for RBC
Stick with existing application of energy hierarchy and a 10% renewables requirement and rely on escalating BRs requirement.	Simple and no need for additional calculations or expertise.	BRs requirements may not increase in 2025 as anticipated; and grid may not decarbonise as anticipated. To achieve net zero in the borough, there is a need to reduce any avoidable emissions as much as possible. Local plan could be accused of lacking ambition in reducing carbon emissions from the built environment – arguably not in accord with NPPF emphasis on taking a proactive approach to tackling climate change.	Low/not considered a reasonable option.
Set an onsite carbon target in local plan – may involve separate targets for domestic and non-domestic and major/minor schemes depending on feasibility and viability; if set a net zero regulated emissions target then carbon offsetting might need to be introduced (as a last resort where it is demonstrated cannot achieve net zero on-site).	Tried and tested approach in a number of adopted local plans. Carbon offsetting could generate funds to invest in energy efficiency improvements to existing homes, reducing emissions and fuel poverty.	Degree of uncertainty as to whether targets in excess of Building Regulations will be found sound at examination, though we expect Government/PINS will mitigate this by providing further clarity soon. Added costs to developers, increasing as target is increased towards net zero. Lack of in-house expertise to review energy calculations/verify calculations are robust. If carbon offsetting was pursued, lack of in-house expertise and resources to identify relevant carbon reduction projects and run the scheme. Carbon offsetting in itself is a problematic industry and may not be politically suitable.	Medium.

[25] HM Government (2021) Heat and Building Strategy [pdf]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1036227/E02666137_CP_388_Heat_and_Buildings_Elay.pdf

Option	Positives	Negatives	Suitability for RBC
		Need to futureproof carbon targets to account for future uplift in Building Regulations standards (e.g. with introduction of full Future Homes and Buildings Standard)?	
Set carbon targets in local plan via specific requirements for minimum numbers of energy credits under BREEAM and HQM schemes.	Approach has been used in adopted local plans. Can have confidence in ratings as completed by independent, third-party assessor. Makes use of an existing accreditation scheme that could help meet policy requirements for other sustainability issues such as waste reduction and ecology.	Added costs to developers, increasing as target is increased towards net zero. Additional resources required by developers to sign up to schemes and demonstrate compliance consistent with scheme requirements? Risk that schemes are not updated rapidly enough to align with future uplifts in Building Regulations?	High.
Set EUI targets in accordance with LETI guidance.	New pioneering approach that takes into account both regulated and unregulated energy use. Provides a singular metric to assess performance against. Becoming more commonplace in Local Plans.	Increased developer costs to undertake additional calculations/reporting to demonstrate compliance with LETI standards, over and above Building Regulations compliance. Requires specialist in house knowledge to review calculations.	Medium.

Chapter 4
Renewable and Low Carbon Energy Policy

The key debate within renewable energy policy is whether criteria-based policy approaches to renewable and low carbon energy go far enough and if further work should be done to create policies that identify 'suitable areas' for the various types of renewable and low carbon energy, most notably wind.

Identification of 'Suitable Areas for Wind Energy'

4.1 In line with the NPPF, when considering applications for wind energy development, local planning authorities should only grant planning permission if the development site is in an area identified as suitable for wind energy development in a Local or Neighbourhood Plan. Although the NPPF is currently being updated, the draft NPPF still requires onshore wind sites to be in a designated or identified area.

4.2 When identifying suitable areas for wind, the PPG does not dictate how suitable areas for renewable energy should be identified, but in considering locations, local planning authorities will need to ensure they take into account the requirements of the technology and, critically, the potential impacts on the local environment, including from cumulative impacts and views of affected local communities. It also makes reference to the former Department of Energy and Climate Change's (now part of the Department for Business, Energy and Industrial Strategy) methodology on assessing the capacity for renewable energy development. LUC was involved in the preparation of this guidance. The guidance notes the value of landscape character

assessments in identifying which technologies are appropriate in different locations, including the appropriate scale of development.

4.3 The assessment of technical potential as set out in **Chapter 4** is based on a refinement of the methodology and identifies those areas which are technically viable for wind energy – i.e. they are not constrained by infrastructure, environmental or heritage constraints.

4.4 One of the key factors determining the acceptability or otherwise of wind turbines is their potential impacts on the local landscape – this is due to their height and the movement they introduce into the landscape (i.e. rotating blades). Different landscapes present different opportunities for renewable energy, and landscape sensitivity studies can assist both planners and developers in identifying what scale of development may be appropriate in which areas. This approach is endorsed by the PPG which states that *"landscape character areas could form the basis for considering which technologies at which scale may be appropriate in different types of location"*.

4.5 A separate landscape sensitivity assessment could be undertaken and overlaid with the technical constraint maps, in order to identify areas which are likely to be less sensitive to the different scales of wind turbines and hence identify locations where proposals are more likely to be supported.

4.6 It is important to note that if areas of suitability are identified in the Local Plan or Neighbourhood Plans they should be broad areas rather than site allocations and would not therefore provide a definitive statement of the suitability of particular location for wind energy. Site specific assessment and design would still be required and all applications would still be assessed on their individual merits. It is also not possible at a strategic level, to take into account cumulative effects. Residential amenity, the setting of heritage assets, telecommunications, ecology and air traffic safety etc., would also need to be carefully considered at a site level.

4.7 All applications would also have to meet the second test set out in the NPPF, i.e. that it can be demonstrated that the planning impacts identified by affected local communities have been fully addressed and the proposal has their backing. It is therefore recommended that such policies are also supported by development management criteria against which individual planning applications will be judged (see section on criteria-based policies above). As outlined in the TCPA/RTPI Climate Change Planning Guidance (2023)[26], whether a proposal has the backing of the affected local community is a planning judgement for the local planning authority, and the courts have ruled that 'addressed' does not mean 'resolved' or 'eliminated'. It is also important to note that plans can allocate areas as suitable for wind turbines and do not have to follow the more onerous route of allocating actual sites, as is sometimes mistakenly assumed. Opportunities in Runnymede Borough are however limited due to highly constrained nature of the area, but such policies can nevertheless indicate the areas most worthy of further study.

4.8 Examples of where identification of 'suitable areas for wind energy' has been included in local plans include Bath and North East Somerset, Eden, Hull and Exmoor National Park – note that these are not necessarily examples of best practice, but serve to illustrate different approaches taken. The Redcar and Cleveland Local Plan[27] adopted in May 2018 includes Renewable and Low Carbon Energy Policy SD 6 which identifies areas with potential for wind and solar technologies in the Proposal Map accompanying the Local Plan. These areas were identified by undertaking a technical assessment of wind and solar potential overlaid with the findings of a landscape sensitivity assessment. Stroud District Council has also taken a similar approach in their Pre-Submission Draft Plan 2021. Cornwall's Climate Emergency DPD (2023) utilises a combined approach, Policy RE1 sets out criteria for various renewable energy technologies as well as identifies suitable areas for wind energy within the Policies Map.

Table 4.1: The strengths and weaknesses of adopting identified 'suitable areas for wind energy'

Strengths	Weaknesses
Enables planners to have informed discussions with developers and communities about potential opportunities for wind – i.e. proactive rather than reactive planning.	There may be concern that it will lead to multiple wind energy applications within the areas identified as being suitable for wind. However, all applications would still need to be assessed on their own merits, in isolation and in combination with existing

[26] Town and Country Planning Association (2023) The Climate Crisis: A Guide for Local Authorities on Planning for Climate Change [pdf]. Available at: https://tcpa.org.uk/wp-content/uploads/2021/11/TCPA-RTPI-Climate-Guide-4th-edition-1.pdf

[27] Redcar and Cleveland (2018) Local plan [online]. Available at: https://www.redcar-cleveland.gov.uk/planning/local-plan

Strengths	Weaknesses
	developments, and it would not be a replacement for detailed site studies.
Meets NPPF, PPG and Ministerial statement that LPAs should consider identifying suitable areas for renewable and low carbon energy sources and supporting infrastructure.	It does not provide a definitive statement on the suitability of a certain location for wind turbine development – each application must be assessed on its own merits. It is not a replacement for detailed site studies.
Can act as a useful tool for neighbourhood planning.	

Development of 'Energy Opportunities Maps'

4.9 The NPPF and PPG encourage local planning authorities to *"consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure"*. The Council should therefore consider identifying suitable areas for other forms of renewable and low carbon energy sources, and supporting infrastructure, where this would help secure the development of such sources.

4.10 Clearly identifying and mapping an area's renewable and low carbon sources of energy represents a positive and proactive way to spatially plan for renewable and low carbon energy generation. With a spatial map illustrating energy opportunities it is easier for local authorities to work with local communities and developers to identify the areas that would be most appropriate for development in strategic terms, accelerating the planning and development processes and avoiding conflict.

4.11 Energy opportunities maps can provide a spatial summary of the key opportunity areas (in terms of their technical potential) for various forms of renewable energy. These can be used to inform development decisions and discussions and guide development towards the most suitable areas.

4.12 With regards to heat networks, in order to encourage low carbon district heating schemes, search area maps can identify locations that have greatest potential to locate district energy schemes, based on heat mapping outputs – see **Chapter 5**. In London, the Mayor has identified Heat Network Priority Areas, which can be found on the London Heat Map website[28]. The London Plan (2021) states that major development in Heat Network Priority Areas should follow the heating hierarchy in policy SI3.

4.13 In addition to The London Plan, other examples of plans which have included policies regarding district heating networks include the adopted East Devon Local Plan[29], Kirklees Local Plan[30], Cheshire West and Chester Local Plan[31] and the Adur District Council Supplementary Planning Document[32].

4.14 A policy could be included in the plan stating that new development should incorporate efficient zero-heating carbon systems that minimise running costs and should be selected in accordance with the following heating hierarchy:

1. Connect to local existing or planned heat networks.
2. Create a site-wide heat network and commit to extending the network beyond the site where viable.
3. Install communal heating systems which minimise the cost of future connection to a heat network.
4. For extremely thermally efficient (such as Passive House standard, see paragraph 6.13 above) and/or small-scale developments where 1-3 are not viable, install individual-premises heating systems.

4.15 At the scale of neighbourhood planning, energy opportunities maps can provide a useful tool for communities and other stakeholders to identify the key opportunities for renewables

[28] Centre for Sustainable Energy on behalf of Greater London Authority (2019) London Heat Map [online]. Available at: https://maps.london.gov.uk/heatmap
[29] East Devon District Council (2016) East Devon Local Plan 2013 to 2031 [pdf]. Available at: https://eastdevon.gov.uk/media/1772841/local-plan-final-adopted-plan-2016.pdf
[30] Kirklees Council (2019) Kirklees Local Plan – Strategy and Policies [online]. Available at: http://consult.kirklees.gov.uk/portal/pp/kirklees_local_plan/klp-sp?pointId=s1551718560001
[31] Cheshire West and Chester Council (2015) Local Plan (Part One) Strategic Policies [online]. Available at: https://consult.cheshirewestandchester.gov.uk/kse/
[32] Adur and Worthing Councils (2017) Supplementary Planning Documents (SPD), Supplementary Planning Guidance (SPG), & Design Bulletins (Adur) [online]. Available at: https://www.adur-worthing.gov.uk/adur-ldf/spd-and-guidance/

within their area. It is important to note, however, that it is not possible to identify locations for all types of renewable energy, as many technologies such as building integrated solar, heat pumps, farm-scale anaerobic digestion, and small-scale biomass can be located in nearly all areas.

Table 4.2: The strengths and weaknesses of adopting 'Energy Opportunities Map'

Strengths	Weaknesses
Enables planners to have informed discussions with developers and communities about potential opportunities for renewable and low carbon energy technologies – i.e. proactive rather than reactive planning.	Not possible to identify locations for all types of renewable energy technologies.
Meets NPPF, PPG and Ministerial statement that LPAs should consider identifying suitable areas for renewable and low carbon energy sources and supporting infrastructure.	It does not provide a definitive statement on the suitability of a certain location for a particular development – each application must be assessed on its own merits. It is not a replacement for detailed site studies.
Can act as a useful tool for neighbourhood planning.	May identify potential areas for renewable energy development that are unpopular.

Allocating Sites for Standalone Renewable and Low Carbon Energy Schemes

4.16 The Local Plan could allocate sites specifically for standalone renewable developments. This could provide more strategic direction to the siting of renewables for developers, investors, the local authority, statutory stakeholders and communities. It may be possible to allocate sites which have the greatest potential for sustainable energy and carbon reduction or sites that could potentially be developed for other purposes (e.g. resulting in the sterilisation of potential sites).

4.17 If sites exist that have potential for standalone renewable or low carbon energy use but are constrained in a way that would make them less attractive to commercial developers, then allocating the site is a way of promoting that site for renewable/low carbon development to a wider audience such as landowners or co-operatives. Alternatively or in addition, the Council could undertake a 'call for sites' exercise for renewable and low carbon development and consider the merits of promoted sites in isolation or in combination with other planned types of development. It should however be noted that such call for sites exercises tend to generate a relatively poor level response.

4.18 Again, it would be important that site allocations only highlight appropriate schemes/areas; site developers and communities would still be required to undertake detailed site-based assessment work to support individual development planning applications and if required Environmental Impact Assessments. Furthermore, site allocations should be framed such that they do not preclude projects in other locations.

Table 4.3: Strengths and weaknesses of allocating sites for standalone renewable and low carbon energy schemes

Strengths	Weaknesses
Provide direction to the siting of renewables.	Very resource intensive to gather necessary evidence to justify allocation.
May promote sites to a wider audience such as co-operatives.	Would be desirable to secure agreement of landowner which may be resource intensive.
	May identify potential sites for renewable energy development which when subject to detailed site surveys are not appropriate for development.

Encouraging Community Renewables

4.19 The NPPF states that local authorities should support community-led initiatives for renewable and low carbon energy, including developments being taken forward through neighbourhood planning. Community-led renewable energy projects are increasingly being seen as an attractive option for local communities wishing to contribute to local/national climate change targets and as a way to generate local revenue to directly benefit the community. For

example, the Westmill Wind Farm Co-operative[33] in Swindon was the first 100% community owned wind farm to be built in the south of England.

4.20 Community groups can face considerable challenges in the pre-planning stage and there are a number of opportunities for local authorities to provide advice and guidance throughout this stage, including the provision of early advice on planning requirements and lending support to consultation activities within the community. Engaging communities in the earliest stages of plan-making and providing clear information on local issues and the decision-making process can aid the development of community renewable energy projects.

4.21 Examples of plans that include policies to support community renewable energy schemes include the adopted Bath and North East Somerset Local Plan[34].

4.22 The Council's emerging Local Plan could broaden its support for community renewable schemes by stating that the Council would actively support community renewable energy schemes which are led by or meet the needs of local communities. Such developments would normally be conceived by and/or promoted within the community within which the renewable development will be undertaken, delivering economic, social and/or environmental benefits to the community. Neighbourhood plans provide a particular opportunity to define detailed local site allocation policies for renewable and low carbon technologies.

Supplementary Planning Document

4.23 Where there is not scope to include the relevant level of guidance within the Local Plan, this could be set out in an accompanying Supplementary Planning Document. This could include further guidance on the various renewable energy technologies, what is required in an Energy & Climate Statement, the findings of the Landscape Sensitivity Assessment and how this should be interpreted and/ or further development management guidance on how applications will be considered. It could also cover issues not just related to renewable and low carbon energy development but also climate change adaptation.

Criteria Policies

Background

4.24 The key options for this policy type relate to whether criteria-based policy approaches to renewable and low carbon energy go far enough and if further work should be done to create policies that identify 'suitable areas' for the various types of renewable and low carbon energy, most notably wind.

4.25 The NPPF states that local authorities should design their policies to maximise renewable and low carbon energy development while ensuring that adverse impacts are addressed satisfactorily. The PPG provides helpful guidance for local authorities on how to develop robust criteria-based policies in relation to renewable and low carbon energy projects. Key points include:

- The criteria should be expressed positively (i.e. that proposals will be accepted where the impact is or can be made acceptable).
- Should consider the criteria in the National Policy Statements as these set out the impacts particular technologies can give rise to and how these should be addressed.
- Cumulative impacts require particular attention, especially the increasing impact that wind turbines and large-scale solar farms can have on landscape {including designated landscapes such as national parks and AONBs) and local amenity as the number of turbines and solar arrays in an area increases.
- Local topography is an important factor in assessing whether wind turbines and large-scale solar farms could have a damaging effect on landscape. Recognise that the impact can be as great in predominantly flat landscapes as in hilly areas.
- Care should be taken to ensure heritage assets are conserved in a manner appropriate to their significance, including the impact of proposals on views important to their setting.

[33] Westmill Wind Farm Co-operative Limited website. Available at: https://www.westmillwind.coop/

[34] Bath and North East Somerset Council (2023) Local Plan (Core Strategy and Placemaking Plan) Partial Update [pdf]. Available at: https://beta.bathnes.gov.uk/sites/default/files/2023-01/Adopted%20LPPU%20Jan%202023.pdf

- Protecting local and residential amenity is an important consideration which should be given proper weight in planning decisions.

4.26 Drawing on the guidance outlined in the PPG, after expressing positive support in principle for renewable and low carbon energy development, Local Plans should list the criteria that will be taken into account in considering specific applications. This should not be a long negative list of constraints, but it should set out the range of safeguards that seek to protect the environment – including landscape and townscape.

4.27 It is important that policy does not preclude the development of specific technologies other than in the most exceptional circumstances and does not merely repeat national policy but is relevant to the process of decision-making at the local level, focusing on locally distinctive criteria related to local assets, characteristics, and sensitivities.

4.28 Furthermore, RBC should align with the ambition set in the Net Zero Strategy: Build Back Greener which states that the UK should be powered entirely by clean energy by 2035 to achieve its overall target of net zero by 2050.

4.29 The example policy wording below draws heavily on the Lancaster Regulation 19 Partial Review Local Plan Part 2 (not yet adopted – uncertainty surrounding the planning inspectorate's decision) Policy DM53: Renewable and Low Carbon Energy Generation and BANES Local Plan Partial Update (adopted) Policy CP3. These are criteria-based policies that go further than most policies by setting out criteria separately for onshore wind, hydro, solar, other renewable and low carbon technologies, heating and cooling networks and energy storage.

4.30 It may also be appropriate for more detailed issues and guidance to be included in a Supplementary Planning Document (SPD) on renewables. We recommend that any criteria-based policy designed to manage the development of renewable and low carbon technologies should be supported by the findings of the renewable energy study.

Example Policy Wording[35]

4.31 The following text provides wording examples that RBC could use to further develop renewable energy policy in the Local Plan.

Solar Energy

4.32 The Council will support proposals for solar energy generation, providing they are in conformity with this policy and other policies in the Local Plan. For standalone solar panel arrays, it is expected that.

- Where necessary, the site will be screened (wherever possible with coppice, hedges or trees) and measures taken to mitigate harm to visual amenity;
- The impact of glare and glint will be considered;
- Site security (if used) will aim to be unobtrusive;
- Applications will include quantified plans for biodiversity net gain;
- Seasonal grazing of livestock should be considered; and
- It will not adversely affect the use of the best and most versatile agricultural land.

Wind Energy

4.33 The Council will support wind energy development proposals where they lie within an opportunity landscape area identified as being potentially suitable for this type of development, as shown on [document name – map of areas of wind energy potential].

4.34 Applicants would need to clearly demonstrate that adverse impacts on the landscape can be satisfactorily mitigated in these areas.

- Demonstrate that, following consultation, the planning impacts identified by the affected local community have been fully addressed by the proposal.

[35] To note, due to the very limited wind potential in Runnymede we have not included example policy wording for wind energy.

- There is sufficient separation from the proposed wind turbines and/or mitigation measures, to protect residential amenity as a result of noise, shadow flicker and visual intrusion.
- The proposals have addressed any potential adverse effects on the safety of aviation operations and navigational systems.
- Potential interference to television and/or radio reception and information and telecommunications systems will be avoided and/or mitigated.
- The proposed site access arrangements and access routes are suitable for the construction phase, including the delivery of turbine components and construction materials, the operational phase, and the decommissioning of the proposed wind farm. The use of aggregates, concrete batching and provision of grid connection infrastructure ensure adverse impacts are avoided or satisfactorily mitigated.
- Ensure flight paths and habitat corridors of protected mobile species, such as birds and bats, and functionally linked habitat associated with protected sites (SACs; SPAs; SSSIs) are not adversely affected.

Hydro Energy

4.35 The Council will support proposals for hydropower providing proposals are in conformity with this policy and other policies in the Local Plan. Any applications for hydropower schemes will be expected to be accompanied by a Flood Risk Assessment, Water Framework Directive Compliance Assessment and evidence of discussions with the Environment Agency around requirements.

4.36 Consideration must be given to the location, siting and design of the scheme, ensuring that there are no significant individual or cumulative adverse impacts on the environment and amenity. In all cases mitigation will be required to protect river flow, river continuity for fish and provide for sediment transfer.

Other Renewable and Low Carbon Technologies

4.37 The Council will support renewable or low carbon energy schemes that are compatible with this policy, other policies within the Local Plan, and where impacts can be satisfactorily addressed.

4.38 In addition to the above renewable and low carbon energy sources, other renewable and low carbon technologies include: heat pumps; geothermal heat; energy and/or heat from waste; biomass; solar thermal; combined heat and power; and battery storage (see below).

Thermal Energy Distribution: Heating and Cooling Networks

4.39 The Council will support proposals for, and encourage the inclusion of, heating and cooling distribution networks, providing they are in conformity with Local Plan policies.

4.40 Where feasible, new major development should connect to existing networks, or provide new/purpose built heating/cooling networks. It is expected that heat networks:

- Are designed for cost effective future connection to a proposed or planned network;
- Employ individual or communal sustainable, renewable, or low carbon heating and/or cooling;
- Make use of ambient or secondary heat sources (in conjunction with heat pumps where required;
- Demonstrate compliance with appropriate technical standards (currently CIBSE's Heat Networks Code of Practice for the UK);
- Be registered with the Heat Trust;
- Use renewable and/or low carbon sources for their energy centre or provide an evidenced timeline and technology pathway towards system decarbonisation by 2050;
- Provide heat and/or cooling services at a fair and affordable price; and
- Where refrigerants are to be used, the global warming potential should be considered.

Energy Storage

4.41 The Council will support proposals for battery storage facilities and infrastructure providing that they are in conformity with Local Plan Policies and that:

- A clear and evidenced operational lifespan for the facility is defined;
- It is clearly stated which type of batteries will be used and of what size the units are;
- A clear and funded plan for site failure including fire and material leakages is provided;

- A clear definition of what the human and environmental receptors for smoke and materials from potential fires are, and that a plan for mitigating receptor risk is provided; and
- An evidenced decommissioning plan is put into place prior to site development. The plan must include:
  - The responsible party for decommissioning;
  - A disposal plan for all solid and hazardous waste including proposed receiving waste facility/facilities;
  - Information detailing how a decommissioning fund structure has been set up with a funding timeline (with the fund preferably held by a third party);
  - Evidenced cost estimates for site decommissioning;
  - A clear outline of how the decommissioning fund will be kept current and up to date; and
  - An evidenced timeline for facility decommissioning and site restoration.

Certainty and Feasibility

4.42 Criteria-based policies create greater certainty for developers, supporting deliverability, by clearly setting out the circumstances where renewable energy proposals will and will not be permitted.

4.43 The renewable energy assessment undertaken as part of this study provides an overview of what energy technologies are suitable where. However site specific assessment and design will still be required, and all applications would still be assessed on their individual merits.

4.44 It is for developers of renewables and low carbon energy schemes to undertake a detailed assessment of sites and project feasibility (considering local factors that can affect the development of sites that cannot be fully understood until detailed site based assessments are undertaken e.g. issues relating to the setting of heritage assets, aviation, telecommunication and landownership, cost of grid connection), informed by the policy and evidence established by RBC, and determine if a project is feasible and has a strong business case.

Chapter 5
Performance Gap Policy

This chapter provides policy advice on how RBC could strengthen Local Plan policies to address the 'performance gap' often found in buildings.

Background

5.1 Various studies have shown that completed buildings often do not perform as well as what was anticipated when they were designed. The difference between anticipated and actual performance is known as the 'performance gap'. Factors that contribute to this gap include inaccurate energy calculations, poor quality construction and insufficient post-construction testing and commissioning. The Climate Change Committee[36] has highlighted this issue and identified the need for greater levels of inspection and stricter enforcement of building standards, alongside stiffer penalties for non-compliance.

5.2 National policy currently does not set out requirements regarding the performance gap. However, LPAs are in a good position to create policy to address this, and some authorities are already doing so.

5.3 RBC could include a policy to secure post-occupancy monitoring of buildings to help to close the 'performance gap'.

Example Policy Wording

5.4 Examples of potential policy wording are set out below, highlighting three different approaches.

[36] Climate Change Committee (2019) UK housing: Fit for the future? [pdf]. Available at: https://www.theccc.org.uk/wp-content/uploads/2019/02/UK-housing-Fit-for-the-future-CCC-2019.pdf

Option 1 – Comprehensive Approach

5.5 The London Borough of Islington's draft local plan (at examination) sets out detailed requirements. Policy S4 states that major developments must:

- 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.

Option 2 – London Plan Approach

5.6 London Plan Policy SI2 sets out how development should follow the energy hierarchy with the final stage being *"be seen: monitor, verify and report on energy performance"*. Supplementary guidance indicates the requirement is to monitor and report energy performance post-construction. Web templates are provided to share the required information. RBC could potentially adapt these templates for their use.

Option 3 – "Off the Shelf" Standards

5.7 Alternatively, given technical energy capacity constraints in planning, we suggest the performance gap could be managed by simply prescribing additional credit requirements in the BREEAM and HQM policy. 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."*

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

5.9 Developers should share their POE information with the built environment sector to ensure transparency and inform wider lesson learning.

Viability

5.10 The HQM and BREEAM schemes include credits covering post-occupancy evaluation, which is recognised as an effective way of getting the best possible performance out of a building and learning lessons to inform future policy and improve industry practices.

5.11 Developers would be required to undertake some post occupancy monitoring in accordance with the requirements set out in the BREEAM and HQM schemes.

5.12 Such requirements would help the council to collect data and monitor the performance gap, potentially informing future Local Plan reviews (enforcement of under-performance would likely be challenging due to the variety of potential causes highlighted above and challenges of attribution). Anecdotal evidence from Islington Council suggests that simply requiring such information can also help to ensure that design stage energy and carbon calculations are handled with due care and attention.

5.13 According to the Post Occupancy Evaluation Guidance by RIBA[37], 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.

[37] Royal Institute of British Architects (2020) Post Occupancy Evaluation

Summary

Table 5.1: Summary table on performance gap policy options

Options	Pros	Cons
Comprehensive approach: Require detailed energy modelling, testing and monitoring and reporting of actual performance (as per Islington policy).	Adhere to Climate Change Committee's recommendation to tackle the performance gap.	Added costs and complexity of undertaking comprehensive modelling, testing and monitoring, including after occupation. Lack of in-house expertise to review assessment and verify that calculations are robust.
London Plan approach: Requirement to monitor and report energy performance post-construction.	Approach used in a number of adopted local plans. Templates could be adapted from London Plan.	Added costs and complexity for developer, though more limited than option above.
BREEAM/HQM approach: Prescribe additional credit requirements in the BREEAM and HQM schemes relating to post occupancy evaluation (POE).	Approach used in a number of adopted local plans. Can have confidence in ratings as completed by independent, third party assessor. Makes use of existing schemes that could help meet other policy requirements which address sustainability issues.	Added costs and complexity for developer, though more limited than options above as uses existing building rating schemes already being used by developer to comply with other policies.

Chapter 6
Embodied Carbon

This chapter provides policy advice on tackling embodied carbon emissions.

Background

6.1 Around 80% of annual carbon emissions associated with buildings today are related to their operational use. However, as buildings become more energy efficient and electricity generation decarbonises, greater priority should be given to buildings' embodied carbon.

6.2 Embodied carbon is the amount of carbon emitted during the construction of a building. The extraction of raw materials, the manufacturing and refinement of materials, transportation, installation and disposal of old supplies can all produce embodied carbon emissions. Essentially, embodied carbon is built into the fabric of building.

6.3 In new low carbon buildings, embodied carbon may represent 40% to 70% of whole life carbon. Indeed, zu Ermgassen et al. (2022)[38] estimate that embodied emissions from new housing construction (based on the government's targeted housing delivery rate) could consume 8% and 27% of the national carbon budgets for 2038-2042 and for 2043-2050 respectively.

6.4 Construction methods and materials that are low in carbon, as well as efforts to prevent unnecessary demolition and re-construction of buildings, will increasingly become a key factor in decarbonising our built environment.

6.5 The Climate Change Committee's 2019 report[39] on housing recommends that *"we need more focus on the whole-life carbon impact of new homes, including embodied and*

[38] Zu Ermgassen et al (2022) A home for all within planetary boundaries: Pathways for meeting England's housing needs without transgressing national climate and biodiversity goals [online]. Available at: https://www.sciencedirect.com/science/article/pii/S0921800922002245

[39] Climate Change Committee (2019) UK housing: Fit for the future? [pdf]. Available at: https://www.theccc.org.uk/wp-content/uploads/2019/02/UK-housing-Fit-for-the-future-CCC-2019.pdf

sequestered carbon". It also promoted the use of wood in construction to displace high-carbon materials such as cement and steel and 'lock up' carbon over the long-term in buildings. Local timber production for buildings could support the local economy, although impacts on the 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.

Option 1 – Whole Life Carbon Assessment (WLC)

6.6 RBC could require that all major developments undertake whole life-cycle carbon assessments (WLC, sometimes referred to as life-cycle carbon assessments or LCAs). These assessments then inform and require steps to be taken for developments to reduce their embodied carbon emissions.

6.7 The Environment Audit Committee has recommended that the Government should introduce a mandatory requirement to undertake whole-life carbon assessments for buildings[40]. The Government's response (Sept 2022) to this report agreed that WLC are likely to have a significant role to play in delivering decarbonisation across the sector.

6.8 This could be demonstrated through achievement of relevant credits in HQM, BREEAM, or equivalent.

6.9 BREEAM includes up to 7 credits for category 'Mat 01' which can be secured if developers reduce buildings' environmental life cycle impacts through conducting a WLC assessment and integrating its outcomes in the design decision-making process.

6.10 In HQM the relevant assessment category is 'Environmental Impact of Materials' which has the aim *"To reduce the effect construction products have on the environment by recognising and encouraging the selection of products with a low environmental impact, including embodied carbon over the life cycle of the building"*. This covers environmental topics other than embodied carbon but the latter is one of the outputs.

6.11 Tools are prescribed by BREEAM and HQM for WLC, identifying opportunities to reduce environmental impacts and submitting the results to independent assessors.

6.12 The **Greater London Authority's adopted London Plan** and its 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."*

6.13 The supporting text highlights the increasing importance of embodied carbon emissions as operational carbon targets become more stringent and thus flags the importance of a *"whole life-cycle approach"* to capture unregulated emissions (see earlier section) and embodied emissions. Further guidance on how to complete a WLC is provided in dedicated supplementary guidance[41]. A reporting template is also provided along with suggested wording for a planning condition to secure the assessment in line with this guidance.

6.14 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. In other words, it does not apply to smaller schemes. Furthermore, the policy does not include a quantitative target for embodied carbon.

6.15 A 'Whole Life-Cycle Carbon Assessments London Plan Guidance' document has been produced for guidance on delivering accepted WLCs.

Viability

6.16 As WLC can be achieved using tools prescribed by BREEAM and HQM, these methods are well established. Targets within BREEAM and HQM have been set at a level that should be readily deliverable and developers should be familiar with such requirements.

[40] House of Commons: Environmental Audit Committee (2022) Building to net zero: costing carbon in construction – First Report of Session 2022-23 [pdf]. Available at: https://committees.parliament.uk/publications/22427/documents/165446/default/. See report for a discussion of current practice on whole life carbon and the expectations of MPs for revising national policy with regards to whole-life carbon assessments.

[41] London City Hall (undated) Whole Life-Cycle Carbon Assessments Guidance

6.17 The use of accreditation schemes which are already required by other policies should also reduce burdens for developers.

6.18 By applying the stipulation of assessments to major developments only, initially, the costs of meeting these requirements will not be significant.

6.19 RBC would be able 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 judge assessments.

6.20 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"*[42]. Therefore, it is clear that viability issues should not pose a barrier should RBC decide to implement a WLC policy requirement. Moreover, it is expected that WLCs and related efforts will become national policy in the near future[43]. By pointing local developers towards these categories within HQM and BREEAM, whole-life carbon assessments would become commonplace in Runnymede prior to national implementation, preparing local developers for this coming transition.

Summary

Table 6.1: Summary of the positives and negatives of utilising Whole Life Carbon Assessment

Positives	Negatives
Consideration of carbon profile at an early stage of design should facilitate efficient, cost-effective solutions. For example, there may be opportunities to use specific low-carbon materials such as wood to displace high-carbon materials such as cement and steel and store carbon long-term in buildings.	RBC might prefer to set more ambitious targets than contained within BREEAM and HQM requirements.
Use of external resources by RBC for assessing WLC assessments.	Assessment expectations and carbon targets add costs to developers.
Using well-established accreditation methods reduces burden for developers.	
Targets from BREEAM and HQM are readily achievable.	
Place local developers in line with upcoming national requirements.	

Option 2 – Embodied carbon targets

6.21 To ensure limits on embodied carbon in construction materials, specifically, RBC could set requirements for developments to achieve minimum scores against set embodied carbon targets.

- Targets could be constituted by the construction materials categories key building standards such as BREEAM and HQM. These look across the environmental impacts of construction materials. However, to use a target specifically focused on embodied carbon, RBC could select LETI's embodied carbon emission targets for building elements for domestic and non-domestic developments.
- This works against a baselining of building elements for a development before carbon saving measures are developed, allowing the designer to focus attention on areas where greater carbon mitigation interventions can be instituted? Subsequently, an embodied

[42] House of Commons: Environmental Audit Committee (2022) Building to net zero: costing carbon in construction – First Report of Session 2022-23 [pdf]. Available at: https://committees.parliament.uk/publications/22427/documents/165446/default/. See report for a discussion of current practice on whole life carbon and the expectations of MPs for revising national policy with regards to whole-life carbon assessments.

[43] House of Commons: Environmental Audit Committee (2022) Building to net zero: costing carbon in construction – First Report of Session 2022-23 [pdf]. Available at: https://committees.parliament.uk/publications/22427/documents/165446/default/. See report for a discussion of current practice on whole life carbon and the expectations of MPs for revising national policy with regards to whole-life carbon assessments.

carbon reduction strategy would identify a list of alternative measures and quantify the magnitude of carbon abatement that each would provide.

- LETI recommends a baseline of 800kgCO_2/m^2 for domestic developments and a target of 300kgCO_2/m^2. For non-domestic properties, a baseline of 1000kgCO_2/m^2 and a target of 350kgCO_2/m^2 is recommended.

6.22 The **Bath and North East Somerset Council (BANES)** in its approved Local Plan Partial Update (2023) introduced the following Policy SCR8:

> *"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 900kgCO2e/m^2 can be achieved within the development for the substructure, superstructure and finishes."*

6.23 Similar to the GLA policy on WLCs (above), the BANES policy is aimed at larger developments. It is a rare example of a quantitative embodied carbon target in an adopted local plan. As such, it is an example of best practice.

Viability

6.24 Embodied carbon targets have been set at a level that should be readily deliverable. The cost of procuring such materials is, therefore, not an onerous burden for developers. RBC could also consider, alongside target setting, the promotion of the use of wood in construction to displace high-carbon materials such as cement and steel and 'lock up' carbon over the long-term in buildings. The Climate Change Committee's 2019 report[44] on housing promotes the use of wood in construction to displace high-carbon materials such as cement and steel and 'lock up' carbon over the long-term in buildings.

- Together with embodied carbon targets for building materials, promoting the use of wood in Runnymede could stimulate a local timber production industry for buildings, boosting the local economy.
- Local timber production for buildings could support the local economy, although impacts on the 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.

Table 6.2: Summary table of positive and negatives of embodied carbon targets

Positives	Negatives
Directly targets developers' choice of materials and their carbon content.	Only focusses on embodied, and not operational, carbon.
As above, relying on BREEAM external assessors would provide a resource for assessing developers' embodied carbon strategies.	If using BREEAM's embodied targets, BRE has indicated that operational and embodied carbon credits, which are currently split across the energy and materials categories, will be consolidated in future[45]. Any future policy wording from RBC that references specific credits would therefore need to be suitably caveated to futureproof the policy against future changes.
Using well-established accreditation methods reduces burden for developers.	If using LETI or another target system, RBC would need to develop in-house or contracted resource to be able to assess developers' embodied target strategies.
	Converting building use to residential (as opposed to demolition and redevelopment) carries the risk that lower standards in space

[44] Climate Change Committee (2019) UK housing: Fit for the future? [pdf]. Available at: https://www.theccc.org.uk/wp-content/uploads/2019/02/UK-housing-Fit-for-the-future-CCC-2019.pdf

[45] BRE (undated) Net zero carbon buildings: Built environment solutions to support routes to net zero carbon [online]. Available at: https://bregroup.com/products/breeam/breeam-solutions/breeam-net-zero-carbon/

Positives	Negatives
	and quality accommodation are achieved compared to new residential developments.

Option 3 – Prioritise retention and retrofit of existing buildings over demolition

6.25 One of the most effective ways of ensuring the local built environment's carbon profile remains low is to prevent unnecessary demolition and construction. Retention, supported by retrofit, can, in many cases, respond to local development needs without resource-intensive construction.

6.26 Policy SL21 in the Runnymede Local Plan indicates a preference for retention of residential properties. This policy could be bolstered.

6.27 RBC local plan policy could specify that retention and retrofit of existing buildings and structures are to be prioritised. In such a policy, demolition would only be valid where it has been demonstrated that retention and retrofit are unviable.

6.28 Please see 'Flexible building design' below for options on retrofitting buildings to improve the sustainability profile of existing buildings.

6.29 Camden Council's adopted Local Plan Policy CC1 provides an insight into the potential wording on a future policy at RBC. This policy includes a requirement that:

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

6.30 This policy puts the onus on the developer to prove that retention and refurbishment was not possible. The supporting text to the policy indicates 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."*

Islington Council's Policy CS10 (G) requires that all development is to be designed and managed to promote sustainability during their operation. Its Sustainable Design SPD further sets out that to meet this Policy, buildings will need to be 'long life, loose fit'. This concept requires that buildings will be operable and habitable for many years but also, importantly, that they are adaptable to new uses other than those planned for at the start of their life. The SPD goes on to explain how a development can show and achieve 'long life, loose fit'.

Viability

6.31 For applications demanding demolition and re-build where policy prioritises retention, it will be necessary for RBC to establish where responsibility lies for establishing the validity of retaining the building or structure, the mechanisms to be used and the resources allocated.

6.32 On greenfield sites, or other cases where retrofit is clearly not possible, it would still be important for RBC to address embodied carbon in the new construction. Options for addressing embodied carbon in construction are shown above.

6.33 There are specific cost implications of encouraging retention of buildings over demolition and construction for developers. Whilst developers are currently disincentivised from pursuing retention by the tax system, there will be significant savings from pursuing this lighter form of development. Although new build projects have a zero VAT rate compared to retrofit's 20%

VAT rate on projects[46], avoiding the costs of demolition, waste disposal, and constructing new foundations and structural elements represents major savings for developers.

Table 6.3: Summary table of prioritising building re-use over demolition

Positives	Negatives
Avoiding the costs of demolition, waste disposal, and constructing new foundations and structural elements represents major savings for developers.	A bolstered planning policy on retention and retrofit would inform and regulate those seeking to re-develop properties. Alternative schemes to encourage retention and retrofit (which may need to come from central government) would have a much bigger impact on carbon savings by encouraging existing properties to retrofit irrespective of plans to re-develop.
Local communities benefit from avoiding the problems normally incurred by demolition and construction.	Pursuing retention and retrofit may impede intentions to densify local housing sites; or may constrain the options for redevelopment. In the context of significant housing need and the draft NPPF's stated intentions to drive housing delivery through density[47] discouraging the demolishing of low-density sites where they could make way for new high-density developments reduces one major method for densification. This is particularly so in an area, like Runnymede where few completely vacant brownfield sites exist for new developments. Retrofit-first policy could, therefore, be seen as moving against a national planning agenda.
Significant embodied carbon savings from retaining existing structures.	Infrastructure contributions via CIL are not expected as a result of properties that retrofit. The proposed Infrastructure Levy may require that change of use retrofits make a contribution but at much lower rates than new developments[48]. This poses a problem for RBC's infrastructure commitments, particularly where retention and retrofit is used to support a conversion – such as office to residential – which would place a strain on local infrastructure without the usual developer contribution to fund necessary capital spend or other infrastructure responses.
	Change in use (from commercial to residential for example) can lead to lower space standards compared to what would be achieved in a new residential development.

Option 4 – Provide guidance on sustainable retrofit for larger and small buildings

6.34 RBC could provide guidance on sustainable retrofitting, either by signposting to existing guidance or through the creation of a Supplementary Planning Document. The guidance could refer, in the main, to the Building Regulations.

- 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

[46] The government has, however, recently introduced a zero VAT rate for installation of certain Energy Saving Materials.
[47] Lichfields (2023) The draft NPPF – 'Density and the implications for suburbia' [online]. Available at: https://lichfields.uk/blog/2023/january/11/the-draft-nppf-density-and-the-implications-for-suburbia/
[48] Department for Levelling Up, Housing and Communities (2023) Technical consultation on the Infrastructure Levy [online]. Available at: https://www.gov.uk/government/consultations/technical-consultation-on-the-infrastructure-levy/technical-consultation-on-the-infrastructure-levy

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.

6.35 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; and
- Applying measures proposed in a recommendations report accompanying an Energy Performance Certificate.

6.36 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.

6.37 RBC could consider including the various consequential improvements above within policy or guidance for smaller buildings as well, encouraging developers and residents to make consequential improvements.

- Such guidance could also refer to the Passivhaus EnerPHit standard[49] which is a version of the Passivhaus standard adapted for whole house retrofits.

6.38 There are multiple examples of similar policies that have been employed elsewhere.

6.39 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.

6.40 Similarly, **Epping Forest** have recently published sustainability guidance for householders on refurbishments and extensions.

6.41 T**he 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).

6.42 Cornwall Council have produced a report providing guidance for local authority staff, professionals, contractors and building owners to upgrade the energy efficiency of historic buildings while retaining character. 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.

Viability

6.43 An SPD, as it would be based, in part, on existing Building Regulations content, would not be too onerous to produce.

6.44 To have a significant impact, policies or guidance to support retrofit should be combined in tandem with policy support against the unnecessary demolition of buildings in the Borough. Please see the **Chapter 9** for more details on how this could be implemented.

6.45 There are specific cost implications of encouraging retention of buildings over demolition and construction. Whilst developers are currently disincentivised from pursuing retention by the tax system, there will be significant savings from pursuing this lighter form of development.

[49] Passivhaus Trust (2023) Passivhaus Retrofit [online]. Available at: https://www.passivhaustrust.org.uk/competitions_and_campaigns/passivhaus-retrofit/

6.46 Heritage buildings (pre 1919) offer a unique challenge regarding reuse and retrofit. There are planning constraints on how many heritage buildings can be repaired or altered. These buildings also often behave very differently to modern buildings due to their building materials and construction methods. Therefore, they are not compatible with modern building standards and often incorrectly assessed in current Building regulations. Sustainable retrofit can be achieved by adopting a Whole Building Approach whereby there is integration of the fabric measures (such as insulation, new windows, draught proofing), and services (particularly ventilation, heating, controls and renewables) along with proper consideration of how people live and use the building. All of these must be adapted to the context of the building (its exposure, status, condition, form etc). More detail can be found in Historic England's publication *"Energy Efficiency and Traditional Homes"*[50].

Summary

Table 6.4: Summary table of sustainable retrofit guidance

Positives	Considerations/Negatives
Relying on existing Building Regulations requirements would avoid extra expectations being placed on developers or homeowners beyond that which is currently recommended.	The availability of appropriate financial incentives from Government (e.g. grants and loans) will ultimately drive the retrofit sector. In their absence, planning policy will not support significant retrofit activity.
If an SPD was paired with recommended new policy requiring the retention and refurbishment of buildings (see 'Prioritise retention and retrofit of existing buildings over demolition' above), it would likely provide a crucial role in providing advice to developers and residents on satisfying the policy.	In the absence of national government initiatives (above), a local 'zero carbon' policy for new homes backed by a carbon offset fund for existing buildings could help generate funding for such upgrades. However, RBC would need to identify resource for in-house energy or carbon expertise to implement such a scheme (e.g. to identify and work up appropriate carbon reduction projects to fund).
	The Passivhaus EnerPHit standard, mentioned earlier, is a very demanding standard typically resulting in a building that outperforms current new-build properties in terms of energy and comfort. The standard would only be achievable for a very limited, ambitious audience of developers and residents.

[50] Historic England (2020) Energy Efficiency and Traditional Homes – Historic England Advice Note 14 [pdf]. Available at: https://historicengland.org.uk/images-books/publications/energy-efficiency-and-traditional-homes-advice-note-14/heag295-energy-efficiency-traditional-homes/

Chapter 7
Sustainable Travel

This chapter provides policy advice on embedding sustainable travel within new developments.

Background

7.1 Transport is the largest contributor to UK domestic greenhouse gas emissions, responsible for 27% of all emissions in 2019[51]. Local authorities have a major part to play in addressing transport-related emissions across the country, given their management of much of the transport network and their ability to influence transport choices.

7.2 A range of policy options could be instituted by RBC that both encourage more sustainable transport decision-making and discourage less sustainable behaviour.

Option 1 – Sustainable travel hierarchy

7.3 RBC could incorporate within its future plans Surrey County Council's current sustainable travel hierarchy[52]. SCC's fourth local transport plan has a strong focus on reducing carbon emissions from transport to achieve net zero.

7.4 The location of services within or outside the development must be considered and an assessment of the suitability of walking and cycling to these services should be undertaken. This firmly establishes a movement hierarchy with priority given to active travel. Following

[51] Department for Business, Energy and Industrial Strategy (2021) 2019 UK Greenhouse Gas Emissions, Final Figures [pdf]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957887/2019_Final_greenhouse_gas_emissions_statistical_release.pdf

[52] Surrey County Council (2022) Local Transport Plan 2022-2023 [pdf]. Available at: https://s3-eu-west-2.amazonaws.com/commonplace-customer-assets/surreyltp4/Surrey%20Transport%20Plan.pdf

which, public transport movements should be considered and, finally, movement of general traffic.

7.5 Walking and cycling routes should be designed to be both convenient and attractive e.g., through greening measures such as tree planting, to encourage modal shift. Re-shaping the environment in this way can encourage people to walk and cycle as part of their daily lives.

7.6 Policy SD3 of the Runnymede Local Plan, seeking active and sustainable travel, could be bolstered by references to the pursuit of low carbon transport and the inclusion of the transport hierarchy. To ensure Policy SD3 is delivered 'on the ground', RBC should work to include key requirements for sustainable travel within site allocation policies. These would be site specific and take in to account the varied applicability of sustainable travel measures at each site, given sites' differing contexts (see Option 2, right).

7.7 Lessons could be taken from **Brighton & Hove City Council**. Local plan policy DM33 states the council's intention to prioritise active travel in the city. This includes supporting the objectives in its Local Transport Plan and ensuring that new development is designed to be accessible and promote active travel. Specific policy wording can be found below:

> *"The council will promote and provide for the use of sustainable transport and active travel by prioritising walking, cycling and public transport in the city. This will support the objectives, projects and programmes set out in the Local Transport Plan and other strategy and policy documents. New developments should be designed in a way that is safe and accessible for all users, and encourages the greatest possible use of sustainable and active forms of travel."*

Viability

7.8 To satisfy the demands of the sustainable travel hierarchy, infrastructure must be considered at the start of any development or masterplan process by developers and the Council alike. Travel infrastructure is far more challenging to incorporate at later stages.

7.9 As such, incorporating the concepts of the user and street hierarchy into local policy should mean that sustainable travel is required to be considered from the onset of any development proposal. This does not necessarily add cost to the development process but may require greater coordination between developers and local transport authorities.

7.10 Agreeing with developers on the validity of design choices made to support a sustainable travel hierarchy and encourage active travel may be difficult. The production of a design code for Runnymede would help planning officers and developers understand local expectations for supporting a movement hierarchy. Any new design code for Runnymede can build upon the recently published Healthy Streets for Surrey design code, indicating place-specific requirements for sustainable travel infrastructure.

Option 2 – Request suitable sites adopt key requirements necessary to achieving 20-minute neighbourhoods

7.11 Surrey County Council's Liveable Neighbourhoods concept is a key part of its fourth Local Transport Plan, discussed above, and its intentions of making the county net zero by 2050. The SCC sees borough and district's Local Cycling and Walking Infrastructure Plans (LCWIPs) as a key element in the delivery of Liveable Neighbourhoods. An LCWIP is currently being delivered in Runnymede.

7.12 The Liveable Neighbourhoods concept has much in common with the '15' or '20-minute' neighbourhood concept, although such language has not been used.

7.13 Although the merits of the *"20 minute neighbourhood"* have been the centre of strong discourse recently, a focus on the 20-minute concept by RBC would ensure that it maintains a focus on delivering its core principles - a street network and mix of uses that ensures that most residents' daily needs can be met within a short walk or cycle from home.

7.14 Requiring large scale new developments to embody the 20-minute neighbourhood concept will support more permeable and mixed-use development, with key local services provided on new sites if existing services are further than 20 min walk/cycle and/or safe, attractive walk/cycle routes being provided to existing provision. This will further encourage active travel and ensure that residents can meet their daily needs without being dependent on cars, avoiding the associated negative impacts on carbon emissions, air quality and congestion.

7.15 Policy SD3 in the Runnymede Local Plan could be bolstered. Where reference is made to supporting developments which integrate with or provide new sustainable travel networks, the 20 minute concept could be included, with its further reference to the creation of 'place' as well as sustainable travel networks.

7.16 Recent analysis, however, by RBC has shown that only some site allocations in the draft plan can satisfy the demands of a 20-minute neighbourhood. As such, the Council should prioritise the most suitable sites and require that they deliver necessary infrastructure and design elements that ensure sustainable and active travel as part of a 20-minute neighbourhood lifestyle. Policy SD3 would state that the 20-minute concept would only apply to selected sites.

7.17 Sites able to achieve 20-minute neighbourhoods would be identified via the Sustainability Appraisal. The Appraisal can also inform the key requirements to be specified for each site. However, specific transport-related assessments will need to be carried out.

7.18 Leeds City Council has included a policy on 20-minute neighbourhoods in its latest Local Plan update. The policy draws on evidence to provide guidelines for the application of the policy (e.g. in relation to distance from amenities and average densities), whilst acknowledging differences in town centre, suburban and rural contexts. The key aim is to integrate key services and features into communities to allow people to live locally, and direct development to locations that offer the best opportunity for active travel, use of public transport and minimise use of private motor vehicles, which will help to minimise carbon emissions.

7.19 To evidence the policy, Leeds City Council commissioned 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.

Viability

7.20 These requirements relate to the masterplanning and urban design of new streets and communities. They should be straightforward to deliver if considered from the outset of the site design process.

7.21 The provision of associated infrastructure at the development scale, such as bike storage and appropriately designed street networks is particularly low-cost as a proportion of construction costs. A greater challenge would be sourcing funds for related infrastructure beyond developments – such as cycle lanes and supporting green infrastructure. This would need to become a key consideration as part of updating the Council's Infrastructure Delivery Plan which identifies necessary active travel infrastructure requirements to support new development, potential funding sources, and would support the implementation of the revised Local Plan's strategic infrastructure delivery policies. Any revisions to the CIL rates to support the funding of such infrastructure would need to be assessed for viability separately.

Option 3 – Policies to support Demand Management of private vehicles, including distance-based charging

7.22 SCC's fourth local transport plan contains a policy on demand managements for cars. Demand management is the use of measures to reduce the convenience and/or increase the cost of private car use.

7.23 Liveable Neighbourhoods, above, although primarily aimed at active travel rather than preventing car use, might be considered a method of demand management. More direct 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.

7.24 Further demand management-supporting policies would help influence the creation of places that prioritise active travel, public transport and high quality placemaking (for example where cars and space for car parking are less dominant) as well as address climate goals.

7.25 London already has a number of road user charging schemes in place, including the Congestion Charge, the Low Emission Zone (LEZ) and the Ultra Low Emission Zone (ULEZ). As part of a consultation last year on the Mayor of London's Transport Strategy and the ULEZ expansion, TfL asked for views on the future of distance-based road user charging and how it might be implemented. More information on distance-based road user charging for Local Authorities can be found in the Local Government Association's report *"Understanding local authorities' views on a national road user charging system"*[53].

[53] Local Government Association (2022) Understanding local authorities' views on a national road user charging system [online]. Available at: https://www.local.gov.uk/publications/understanding-local-authorities-views-national-road-user-charging-system

Viability

7.26 Parking charges, traffic calming and reductions in the amount of parking are low-cost interventions and may raise revenue in some cases. Rather than cost, ensuring effective consultation on the sensitive subject of measures to restrict local car use is a greater challenge.

7.27 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.

Summary

Table 7.1: Summary table of demand management policies

Positives	Negatives
Demand management directly impacts the ease of using private vehicles. This may have a greater impact in reducing car use and 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.	No decisions have yet been made on how or when SCC will deliver demand management policies, or which types of journeys will be affected. It has stated that it would prefer any policy or scheme to follow a regional or national scheme.
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 Runnymede'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 car users a clear gain if devoted to road expenditure.	Such policies are best applied when dovetailing with appropriate Liveable Neighbourhood-related policies. Efforts to make active travel more inviting may be insufficient to affect change without disincentives to use cars. Similarly, restrictions on car use are unhelpful and potentially damaging (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.

Option 4 – Electric vehicles and car clubs

7.28 RBC could establish policies for new developments to support electric vehicle charging points and car sharing clubs.

7.29 Both efforts respond to the needs of those who must use cars whilst still addressing the threats of climate change and the emissions created by private vehicle use.

7.30 The Local Plan's adopted policy SD7 requires compliance with SCC guidance on electric vehicle charging points[54]. For residential development, SCC's guidance is suitably ambitious.

7.31 However, for non-residential development, SCC's guidance requires 20% of parking spaces to be fitted with a fast charge socket and a further 20% of available spaces to be provided with the necessary infrastructure for future additional charging points. RBC could set a policy that is more ambitious, specifying that a majority, rather than a minority, 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 **Table 7.2**, in costs, this is feasible and deliverable. Charging infrastructure can be integrated into the delivery of wider parking infrastructure.

7.32 Approaches to strengthening policy in this area could follow similar wording to the following:

Leeds City Council have created policy so that all new developments that include parking spaces must meet the minimum standard of electric vehicle charging points. This is outlined in detail below.

Policy EN8: Electric Vehicle Charging Infrastructure

[54] Surrey County Council (2023) Vehicular, electric vehicle and cycle parking guidance for new developments – Recommended guidance for electric vehicle charging requirements [online]. Available at: https://www.surreycc.gov.uk/roads-and-transport/parking/strategy-and-guidance/development-parking-guidance#section-7

"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."

- **Salford City Council** included a policy on Electric Vehicle (EV) charging points in their local plan, so that new development would support the development of a network of EV infrastructure.

"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."

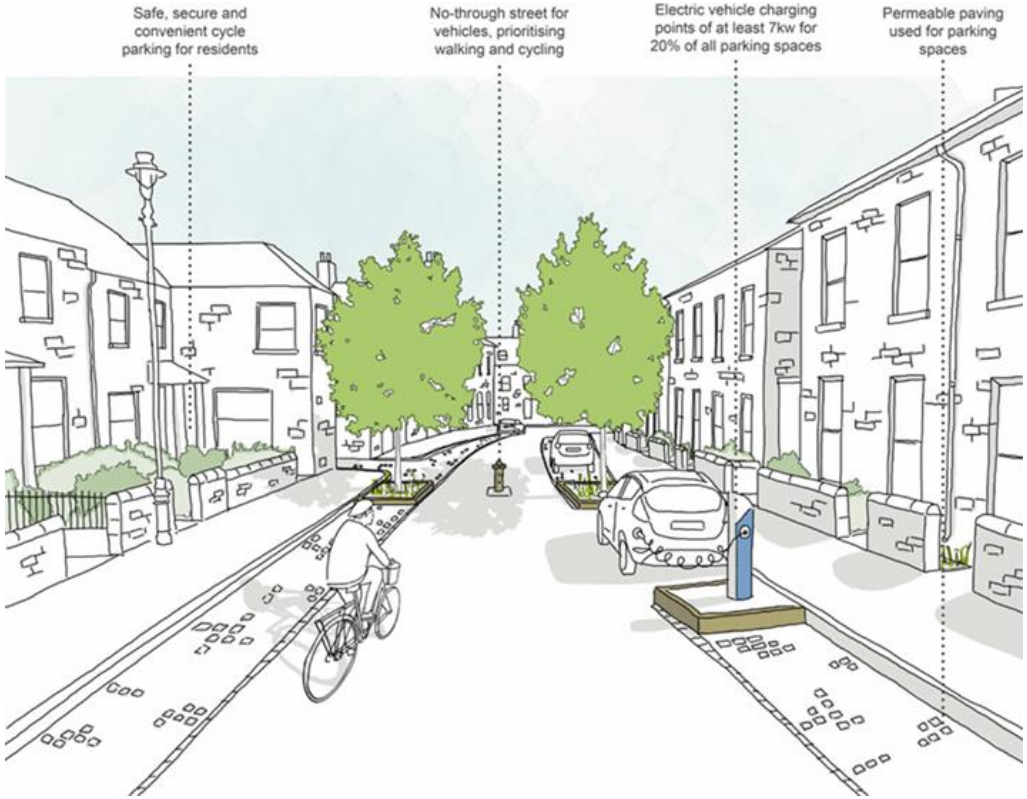
- Islington's draft local plan includes wording in Policy T3: Car-free development which supports car clubs where they use EVs.

"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."

7.33 On car clubs, RBC could include the provision of accessible car club parking spaces and/or contributions towards the provision of car clubs in the vicinity of developments, where appropriate. SCC provides guidance on minimum thresholds of development types for requiring car club provision. These could be consulted on by RBC to judge whether such thresholds should be maintained or revised for Runnymede which is, on average, a more densely populated Borough, which should provide more public transport options than other boroughs in Surrey.

7.34 SCC guidance also states that new car club vehicles in developments should be electric. RBC could state the same in any new car club policy.

Figure 7.1: Example of a street that incorporates sustainable travel features



Viability

7.35 SCC has already developed guidance for EV charging and car clubs (above) for developers and planners[55]. Runnymede's guidance would build on this existing effort and be understood by developers already familiar with SCC's expectations.

7.36 Table 7.2 below sets out indicative costs for domestic and public EV charging stations, indicating the limited cost per domestic and 'standard' space[56]. These prices are likely to decline over the coming years as the drive to support a transition to electric vehicles accelerates.

Table 7.2: Indicative charging infrastructure costs

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

7.37 The costs in **Table 7.2** are the concern of developers. 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, raising demand for charging points significantly.

[55] Surrey County Council (2023) Vehicular, electric vehicle and cycle parking guidance for new developments – Recommended guidance for Car Club requirements [online]. Available at: https://www.surreycc.gov.uk/roads-and-transport/parking/strategy-and-guidance/development-parking-guidance#section-6

[56] Typical domestic charger costs in **Table 7.2** are based on market research in 2023. Public charger in **Table 7.2** costs are taken from research by Cenex, Greencar and Systra on behalf of the Climate Change Committee (2018) Plugging the gap: An assessment of future demand for Britain's electric vehicle public charging network [online]. Available at: https://www.theccc.org.uk/publication/plugging-gap-assessment-future-demand-britains-electric-vehicle-public-charging-network/

Summary

Table 7.3: Summary table of supporting electric vehicles and car clubs

Positives	Negatives
Unlike alternative policies, support for EV infrastructure and car clubs reflects the need for car use in semi-rural settings whilst tackling the emissions that vehicles typically produce.	SCC's strong EV charging requirements for houses and flats (1 fast charge socket per house and per flat) may be too strong. By ensuring car infrastructure for all future dwellings, it negates concurrent efforts to implement the sustainable travel hierarchy. EVs are still relatively low in the hierarchy due to concerns around embodied carbon in their production and their contribution to congestion.
Like the provision of active travel services, support for car clubs may provide a lower cost transport option for those priced out of private vehicle ownership. Car clubs may allow those individuals greater freedom to move around or even re-locate in the Borough.	Need to consider capacity of grid to allow charging infrastructure connection.

Carbon Offsetting

Background

7.38 Carbon offsetting is the process of compensating for residual carbon emissions from a building by contributing, usually financially, towards measures to reduce emissions elsewhere.

7.39 Some LPAs operate carbon offsetting where a carbon target cannot be achieved on site. This involves developers making a payment into a carbon offset fund to pay for carbon reduction projects elsewhere in the LPA area (e.g. funding carbon emissions reductions from existing buildings by installing insulation, upgrading heating systems or solar PV panels).

7.40 As a matter of best practice in carbon management, offsetting should be understood as a last resort after all direct mitigation options have been exhausted. There is evidence[57] that low or medium rise domestic developments can generally achieve net zero regulated emissions without offsetting but that it is more challenging for non-domestic or higher density developments[58].

7.41 To achieve true net zero, eventually all sectors of the economy will need to make deep and expensive cuts, and not just rely on offsetting. Considering the economy as a whole, the CCC recommends that it should be reserved for 'hard to abate' sectors, such as aviation and heavy industry[59]. Therefore, although offsetting may need to be considered for some types of developments at present, it is important to understand that it is not a long-term solution to the challenge of GHG mitigation.

7.42 Offsetting has the potential to achieve net zero embodied carbon in new building developments, as well as net zero operational emissions, however offsetting both sources of emissions would incur significant costs. Thus, offset policies adopted in local plans to date focus on offsetting only operational emissions.

7.43 When it comes to operational carbon emission offsetting, there are two approaches to any future policy as summarised in **Table 7.4** below.

Table 7.4: Offsetting options

	Description	Pros	Cons
Carbon Offsetting	A £/tCO_2 price is set based on the avoided costs of generating	Easy to understand for developers.	Not compatible with EUI targets.

[57] Greater Cambridge Shared Planning (2021) Greater Cambridge Net Zero Carbon Evidence Base: Non-technical Summary [pdf]. Available at: https://consultations.greatercambridgeplanning.org/sites/gcp/files/2021-09/Greater%20Cambridge%20Local%20Plan%20Net%20Zero%20Carbon%20Evidence%20Base%20-%20Non%20Technical%20Summary%20FINAL.pdf

[58] Greater London Authority (2020) Energy Assessment Guidance: Greater London Authority guidance on preparing energy assessments as part of planning applications [pdf]. Available at: https://www.london.gov.uk/sites/default/files/gla_energy_assessment_guidance_april_2020.pdf

[59] Climate Change Committee (2019) Net Zero – Technical Report [online]. Available at: https://www.theccc.org.uk/publication/net-zero-technical-report/

	Description	Pros	Cons
	equivalent savings locally.	Easily traded with other sectors.	Does not account for grid decarbonisation.
Energy Offsetting	kWh shortfall is matched with an equal kWh of generation 'credits' offsite.	Easy to verify at the planning stage. Agnostic to grid decarbonisation. No fixed costs associated.	Not aligned with tradition carbon offsetting practices. Requires conversion to £/tCO_2. Lack of fixed cost makes alignment with an LPA offset fund more complex.

Specific Policy Wording (GLA approach)

7.44 The London Plan includes a net zero-carbon target for major development and they have published detailed guidance on carbon offset funds for LPAs (recently updated) including on how to calculate the amount of carbon to be offset. The aim of the net zero-carbon standard is to achieve significant carbon reductions on site and to get as close to zero-carbon as possible. Only then should offsetting be considered i.e. as a last resort measure. LUC concurs with this approach and would recommend RBC take a similar position as it ensures on-site carbon savings – which are more certain – are locked in before resorting to offsetting.

7.45 Carbon offsetting involves a cash in-lieu contribution (via Section 106 agreement) to the relevant LPA's carbon offsetting fund. Alternatively, the development can make up the shortfall off-site by funding a carbon reduction project directly, provided the LPA has approved this approach.

7.46 Offsetting funds can then be used for other important projects such as:

- Energy efficiency measures in the local building stock;
- Projects that help to shift towards the use of sustainable transport;
- Local renewable energy projects; and
- Tree planting and other forms of land management to promote carbon sequestration.

7.47 The London Plan requires LPAs to:

- Set up a carbon offset fund to collect carbon offset payments from developers to meet any carbon shortfall from new development and ring fence these funds to secure delivery of carbon savings within the relevant LPA;
- Set a price for carbon, i.e. price per annual tonne of carbon, that developers pay to make up any shortfall in on-site carbon savings, securing contributions through Section 106 agreements;
- Identify a suitable range of projects that can be funded through the carbon offsetting fund; and
- Put in place suitable monitoring procedures to enable reporting to the GLA.

Summary

Table 7.5: Summary table of offsetting options

Positives	Negatives
Although offsetting is not universally accepted as a viable way to achieve Net Zero, some organisations argue that offsets can play a critical role in the transition towards a state of net zero emissions.	Offsetting is still a controversial subject, with many arguing that the industry is slowing down real emission cuts.
High-quality schemes can generate additional value, such as enhancements to biodiversity, incomes for local people, improved climate-change resilience and safeguarding community land rights.	Does not address unregulated energy.
RBC have considerable flexibility for action, to benefit both their own communities and take forward action on climate change when implementing offsetting projects.	Requires in-house skills and expertise to establish and monitor fund – may demand an expansion of resource beyond that which focuses on the implementation of CIL (which is funded through a separate CIL

Positives	Negatives
	administration fee). In London, an Energy Services Team has been established to review energy strategies submitted with planning applications, calculate the offset payment required, identify suitable projects and prioritise those projects according to their feasibility and wider corporate objectives. Separate governance arrangements have also been established. Expansion of resource required in the Development Management team to draw up appropriate Section 106 agreements.
	Challenges in ensuring the offsetting projects adhere to best practice principles, such as making sure that emissions are additional.
	Challenges in ensuring that funds are spent on appropriate projects. The GLA faced significant underspending in the early years of implementation.

Further Offsetting Approach Examples

7.48 Although the GLA approach is the most comprehensive in setting clear boundaries and conditions for offsetting, there are other policy examples that could influence any final policy decision for RBC.

- The **City of Westminster** has created guidance on a carbon offset fund to ensure funding is secured from any new developments which are unable to fully achieve the carbon savings required at the development site. The guidance sets out similar principles to the GLA guidance, however it sets out essential and desirable criteria as well as a list of priority projects. The priority projects are divided by theme: public sector buildings and assets, commercial buildings, sustainable travel and transport, knowledge and learning, low carbon energy and homes and communities.
- The **Milton Keynes Council** Carbon Offset Fund (administered by the National Energy Foundation) was launched by Milton Keynes Council back in 2008. It applies to all residential developments of 11 or more dwellings and non-residential developments with a floor space of 1000sqm or more. Requirements are set out in a Sustainable Construction SPD. The scheme has helped over 8,000 households in Milton Keynes to receive measures such as free energy efficient light bulbs, and subsidised loft and cavity wall insulation. In Milton Keynes viability issues have emerged where developers have paid an inflated value for the land which then impacts on developer profitability and ability to pay s106 contributions. In response to this, Milton Keynes adopts a flexible approach regarding offset contributions where developments are complex, such as in Conservation Areas or where Listed buildings are being upgraded.
- **Bristol City Council** has also set out an approach to carbon offsetting in their Local Plan Review Draft Policies and Development Allocations (2019). The approach is broadly in line with the GLA's, focusing on reducing carbon emissions on site first and then allowing offsetting of residual emissions via a payment (same carbon cost of £95 per tonne of CO_2 calculated over 30 years) towards *"renewable energy, low-carbon energy and energy efficiency schemes elsewhere in the Bristol area"* or via agreeing *"acceptable directly linked or near-site provision"*.
- **Southampton City Council** has implemented carbon offsetting since 2012. In 2015 the approach was amended to apply only to new developments of over 10 dwellings or 1000sqm. The Southampton Carbon Offset Fund offsets one year of emissions rather than the lifetime of the development, at a cost of £210/ tCO_2.

Summary

7.49 The overarching issue for RBC in relation to carbon offsetting is RBC's lack of internal technical expertise/resource to set up and run a carbon offsetting fund, including setting a carbon price, securing payments, selecting/designing suitable projects for funding, delivering projects and monitoring/reporting.

7.50 Islington Council has been operating carbon offsetting since 2012 but they benefit from having an in-house Energy Services Team who review energy strategies submitted with planning applications (as part of the development management process), identify projects to receive carbon offset funding and prioritise and deliver them. However, some London boroughs have reported that limited staff resource has constrained their ability to spend offset funds.

According to the GLA's 2020 survey on carbon offset funds, 75% of collected funds remain unspent.

7.51 An offsetting study commissioned by the GLA in 2016[60] discussed how viability has been impacted in Local Authorities outside London that have adopted offsetting policies. It noted that these councils assess the viability of major development applications in line with the NPPF, and the developer must appoint a viability consultant and pay for the Council to appoint its own viability consultancy service.

7.52 If viability is a primary concern for RBC, following the approach of Ashford Council could mitigate these concerns. Ashford adopt best practice guidelines for assessing viability by using an independently assessed appraisal method. Affordable housing is the key priority for payment; the use of contributions is then prioritised for each application.

7.53 RBC currently lacks such in-house expertise so would need to either buy this in (e.g. note example above of Milton Keynes working with the charity, National Energy Foundation) or take a decision to build this expertise in the council. The council could also consider the opportunity to invest in a shared expert resource with other LPAs, with might improve cost efficiency.

Key Points To Consider

7.54 In summary, to establish and implement a carbon offsetting scheme, the key steps would include:

- Agreeing how to secure and fund the necessary expertise to establish and run a carbon offset fund (see key issue identified above);
- Developing a clear planning policy (and supplementary guidance as necessary) setting out when offsetting will be accepted (e.g. as a last resort after on-site measures have been maximised), how (and when) payment will be secured (i.e. via s106) and what types of projects it will be spent on;
- Setting up a carbon offset fund with appropriate governance and ring-fenced funding for carbon reduction projects;
- Setting a price for carbon (simplest approach would be to use nationally recognised approach as per GLA and Bristol);
- Identifying the types of projects to be funded and setting out clear eligibility and marking criteria to assess potential projects; and
- Establishing monitoring and reporting procedures (e.g. annual reporting on spend and delivery) to ensure that funds are being spent effectively and efficiently and that delivery of the projects is achieved.

[60] National Energy Foundation on behalf of the Greater London Authority (2016) Review of Carbon Offsetting Approaches in London [pdf]. Available at: https://www.london.gov.uk/sites/default/files/gla_cof_approaches_study_final_report_july_2016.pdf

Chapter 8
Interim Guidance

Recognising that a revised Local Plan will take some years to deliver, this chapter provides an overview of tools that RBC could use alongside the existing 2030 Local Plan to strengthen their approach to securing low/zero carbon development in the interim.

Design Codes

Background

8.1 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). Design codes should deliver a framework for high quality places that reflect local character and design preferences. Sustainability plays a large role in the formation of design codes, with The National Model Design Code setting a baseline standard of quality and practice which local planning authorities are expected to take into account when developing local design codes and guides and when determining planning applications, including:

- How new development should enhance the health and wellbeing of local communities and create safe, inclusive, accessible and active environments;
- How landscape, green infrastructure and biodiversity should be approached, including the importance of streets being tree-lined; and

- The environmental performance of place and buildings ensuring they contribute to net zero targets.

8.2 The main aim of a code is that it is clear and binary. It uses words like 'must' and 'shall' and include figures and parameters. Codes should set precise parameters within which there is large flexibility.

8.3 In the current plan-making system, Codes are to be adopted as Supplementary Planning Documents and so must hook off existing local planning policy. Therefore, if RBC were to develop a design code in the interim period, this should build upon existing policies set out in the 2030 Local Plan. In the proposed plan-making system, Design Codes would be adopted as Supplementary Plans and would carry equal weight to the policies of a Local Plan.

Recommendation

8.4 RBC could produce an illustrative authority wide design code. This would include simple, concise and illustrated parameters for physical development in the area; and could specify development principles and standards that relate to sustainable energy efficient design, renewable energy generation and green and blue infrastructure.

Justification

8.5 The NPPF indicates that local planning authorities should prepare design guides or codes consistent with the principles set out in the National Design Guide and National Model Design Code to provide maximum clarity about design expectations at an early stage.

8.6 A design code offers a means to help deliver high quality, low carbon sustainable places by complementing existing local plan policies and the Runnymede Climate Change Strategy 2022-2030. It could set out key principles and targets that go beyond national targets in the Building Regulations.

8.7 To carry weight in decision making, design codes should be produced either as part of a local plan or as a supplementary planning document. Given the aim of strengthening RBC's approach to securing low/zero carbon development whilst the 2030 Local Plan is under review, the SPD route would be most appropriate in the short-term.

Deliverability

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

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

8.10 There is a lack of emphasis on net zero carbon and the ecological emergency in the NMDC. For example, the NMDC does not provide sufficient guidance on how nature-based solutions and landscape-scale habitat restoration and creation can be facilitated through the development process.

Case Study

Lake District Design Code (currently under consultation)

8.11 The Lake District Design Code will help deliver more beautiful and sustainable places that function well in terms of accessibility, energy efficiency, biodiversity and carbon neutrality, and provide guidance to homeowners, developers and the local community on what constitutes good design.

8.12 The code contains information and prescriptions on multiple aspects of sustainable design, such as operational energy, sustainable design principles, embodied carbon, Green Infrastructure and active travel.

Sustainability Checklist

Background

8.13 To help developers and LPA staff understand the sustainability of planning applications, many LPAs require a sustainability checklist to be completed and submitted with applications. They are often used by used by LPAs to assess the extent to which sustainable development is being achieved through planning applications.

8.14 Checklists can be published as a standalone SPD (see section below) or constitute a guidance note/simple tool for applicants and development management officers to use to help demonstrate and test policy compliance.

Recommendation

8.15 RBC could draft a sustainability checklist that must be completed for specific types of development (e.g. both new and conversion residential schemes of 1 or more units or non-residential proposals in excess of 500sqm). The sustainability checklist would set out the key principles of sustainable development and help applicants to demonstrate that they are meeting the requirements of policy SD7 and SD8.

Justification

8.16 Sustainability checklists can help applicants demonstrate that they are meeting the requirements of policy SD7 and SD8 of Runnymede's Local Plan. Completing the checklist would encourage developers to consider the impacts of their proposal on the environment, and will encourage the implementation of sustainable design principles at the earliest stage of project design.

8.17 Sustainability checklists are designed to be used at four stages of the planning process.

1. Masterplanning: Checklists and associated guidance should be consulted at the earliest possible stage of the design process. This ensures that re-design at later stages of the process is avoided, saving costs for both developers and the Local Authority.
2. Pre-application: Checklists should be consulted pre-application to ensure that applications have considered and implemented sustainability measures from the outset of their design.
3. Application: The completed checklist is submitted alongside planning applications, and is required as part of the validation checklist.
4. Post-application: Planning conditions and obligations should be aligned to ensure that sustainability measures are delivered and achieved during construction and beyond.

Deliverability

8.18 Sustainability checklists are often used in conjunction with policies or an SPD to help developers to understand and demonstrate how they have met planning requirements and also to allow planners to make better informed decisions.

8.19 Checklists are commonplace in the planning system, and there are multiple examples that could be adapted to the local context in RBC.

Case Studies

8.20 Sustainability checklists vary in their degree of detail and complexity. The examples below demonstrate the different methods of implementation adopted by LA's.

Bath & North East Somerset Council – Sustainable Construction Checklist

8.21 This checklist contains key assessment tables that need to be submitted with applications for new build residential properties, major new non -residential buildings and medium development on existing buildings.

8.22 This SPD supplements the Local Plan Policies CP1, CP3, CP4, SCR5, SCR6, SCR7 and SCR8, which facilitate sustainable construction.

8.23 The document also includes detailed guidance on how developers can fill out the checklist, along with recommendations on how developers can achieve the targets that are needed to meet policy requirements.

8.24 This SPD represents a comprehensive approach and supports the Council's updated Local Plan. The checklist helps planning officers to decide if proposed developments have met the EUI targets that have been introduced by the Council. This approach may not be as applicable to RBC as current policies do not specify energy use targets.

Vale of White Horse District Council – Sustainable Construction Checklist

8.25 This checklist asks for information that shows that proposals are demonstrating that they are seeking to limit greenhouse gas emissions through location, landform, layout/building orientation, design, massing, landscape, and planting. This checklist must be completed for all applications to demonstrate compliance with policy requirements. The checklist also asks for

information that will be used to demonstrate compliance with Vale of White Horse Local Plan Core Policies 40: Sustainable Design and Construction and 43: Natural Resources.

8.26 All proposals that require Building Regulations Part L (Conservation of fuel and power) certification need to complete the relevant parts of the checklist.

8.27 This approach could be more suitable for RBC as this checklist does not ask for evidence that specific targets are being met. All the core principles set out in this chapter, along with **Chapter 3: Sustainable Design Principles**, could be integrated into a checklist for RBC. An example checklist question could look like the following:

Policy SD7: c: Maximises opportunities for passive solar gain and passive cooling through the orientation and layout of development

Please set out how passive solar gain and passive cooling have been used to reduce the energy needs of the proposed development, for example through efficient orientation and layout of the development.

Climate Change Supplementary Planning Document (SPD)

Background

8.28 The UK Government defines the role of SPDs as *"SPDs should build upon and provide more detailed advice or guidance on policies in an adopted local plan. As they do not form part of the development plan, they cannot introduce new planning policies into the development plan. They are however a material consideration in decision-making. They should not add unnecessarily to the financial burdens on development"*.

8.29 SPDs can cover a range of issues and can be thematic or site specific. Therefore, there is scope to produce a SPD on the theme of climate change/sustainability to provide further guidance to developers on the requirements expected from them during applications and to aid decision making.

Recommendation

8.30 RBC could develop a Climate Change SPD to support the implementation of key policies within the 2030 Local Plan that relate to climate change, sustainable design and construction and energy.

Justification

8.31 As the 2030 Local Plan includes strategic policies that relate to climate change, these can be used as a hook to produce a Climate Change SPD which sets out more detailed guidance on how to ensure that development proposals meet the requirements of relevant local plan policies. SPDs can help to ensure that proposals satisfy policy requirements at the earliest stage possible to avoid delays later in the application process. Whilst SPDs cannot create new policy, they carry weight in decision making.

Deliverability

8.32 A key consideration with developing any Climate Change SPD is that its guidance would be superseded by new requirements the Local Plan update, which will likely contain more ambitious policies regarding climate change, sustainable design and construction and energy. An SPD produced to supplement 2030 Local Plan policies would therefore need to be updated fairly quickly after a revised Local Plan comes into effect.

Case Studies

Waverley Council Climate Change and Sustainability SPD

8.33 This SPD is part of the Council's response to their declared climate emergency. It supports the current Waverley Borough Local Plan Part 1, which sets out strategic policies and development proposals for strategic allocated sites.

8.34 The SPD sets out the council's guidance on how development should minimise energy use, be sustainable in its layout, landscaping and orientation of buildings, be resilient and adapted to climate change, use sustainable resources and materials, be water efficient, and be designed to encourage use of sustainable forms of transport.

8.35 This SPD is a material consideration in the determination of planning applications. However, it also provides useful guidance for development permitted under a General Permitted Development Order, such as residential extensions.

8.36 The SPD covers the following purposes:

- Provide guidance on how to apply policies and what the applicants are required to deliver;
- Clarify what information should be provided with planning applications;
- Demonstrate what is possible and appropriate for developments in Waverley;
- Provide best practice and exemplar developments; and
- Provide links to latest guidance and codes of practice.

Guildford Climate Change, Sustainable Design, Construction and Energy SPD (adopted 2020)

8.37 This SPD:

- Summarises the policy within the Local Plan that is relevant;
- Sets out the information that should be included within energy statements and sustainability statements for major developments;
- Sets out the information that should be included within energy and sustainability information for non-major development;
- Provides a questionnaire that non-major developments can use instead of drafting energy and sustainability information;
- Provides guidance on good practice in sustainable design, construction and energy and climate change adaptation; and
- Sets out a methodology for calculating carbon emissions and savings for new buildings.

Chapter 9
Sustainable Design Principles

This chapter explores potential sustainable design principles that RBC could choose to promote to support carbon-friendly development in the borough.

9.1 Due to the changing climate, RBC will have hotter and drier summers and warmer and wetter winters. The area is already prone to flooding, and flood risk is likely to intensify further with the changing climate. Therefore, appropriate site layout, landscaping and orientation of buildings, green infrastructure, Sustainable Drainage Systems (SuDS) and other water retention solutions will not only reduce risk of flooding but also minimise the risk of overheating.

9.2 Each sub-section covers an area of sustainable design and its contribution to mitigating or adapting to climate change. Different policy options or approaches for delivering these design principles are explored, including the advantages and disadvantages of each option/approach. This is illuminated by case studies, indications of the cost of implementation (where possible) and other supporting context. The following key areas of sustainable design are covered:

- Energy efficiency through design;
- Form and orientation;
- Insulation, airtightness and ventilation;
- Sustainable materials; and
- Nature based solutions in urban developments.

9.3 Each area of sustainable design discussed will cover, where relevant:

- Different approaches;

- Viability; and
- Advantages as well as necessary considerations.

Background

9.4 Emissions from energy consumed within households make up a significant proportion of the UK's total carbon profile, around 14%[61]. Although the challenge of reducing the carbon content of domestic energy consumption is being addressed at a regional, national and global scale, the overall mission of reducing carbon emissions would be aided by reducing energy consumption within our homes completely. There are simple measures that can be taken at the development level to significantly reduce energy consumption.

9.5 Many of these are simple design features, such as maximising insultation and air tightness, that can be instituted in new (and sometimes, existing) homes, reducing the need for cooling, heating and lighting. Despite their simplicity, sustainable design principles require strong policy support to ensure their prominence in today's developments. Successfully reducing energy consumption at the development level will mean a reduced need for renewable energy generation locally and nationally.

9.6 Not only will such new homes positively contribute towards local climate goals and environmental outcomes but they also have the potential to be much cheaper to run for residents. Moreover, new buildings built to sub-standard levels of energy efficiency will have to be retrofitted in the next 20-30 years in order to achieve national ambitions on Net Zero. The cost of future retrofit is significantly higher than the cost of installing effective design features from the start.

9.7 The following sub-sections highlight some key principles related to energy efficient building design in terms of form and orientation and insulation/airtightness.

Form and Orientation

Context

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

9.9 Form refers to the shape, massing or configuration of a building. For instance, buildings might be designed with complex outer structures or simpler structures. They may feature small dimensions or large dimensions and may take on a range of shapes. Buildings optimised for the same use may still take on very different forms – e.g. a large residential tower with a complex shape and a low-rise residential block constituted by a single, simple shape. Form that produces a larger, exposed surface area, through a complex shape, for instance, will have a less efficient form, in terms of heat loss, wind exposure and solar gain, than a building of the same scale but with a simpler form. **Figure 9.1** below shows the relationship between form factor and efficiency in different dwelling types.

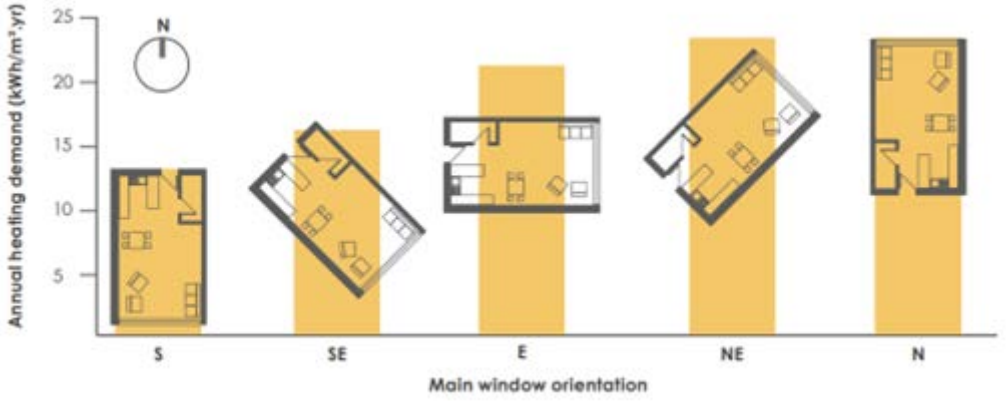
[61] Climate Change Committee (2019) UK housing: Fit for the future? [pdf]. Available at: https://www.theccc.org.uk/wp-content/uploads/2019/02/UK-housing-Fit-for-the-future-CCC-2019.pdf

Figure 9.1: Types of homes and their form factor (LETI, 2020)

9.10 Orientation is how a building is positioned in relation to the sun's paths and to prevailing wind patterns. The orientation of a building should be optimised, if possible, to allow useful solar gains with south facing positioning. Significant overshadowing in winter should be prevented by considering the relationship to or other surrounding buildings or other tall elements. Dual aspect homes should be encouraged as they allow the through flow of air from sun-exposed surfaces of a building to shaded surfaces. Such orientation of a building can significantly reduce the overall energy consumption of a building.

9.11 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. **Figure 9.2** shows the optimal glazing ratios recommended by LETI. It shows that purely by changing the building's orientation, the space heating demand increases from 13kWh/m^2/yr to 24kWh/m^2/yr.

Figure 9.2: LETI orientation guidance (LETI, 2020)



9.12 New developments should include a provision of natural shading through building overhangs, balconies, grouping, green walls and trees to reduce the risk of overheating during the summer and minimise heat loss in the winter. Secondary measures include internal blinds and thick curtains.

9.13 These are relatively simple considerations if conducted early in the design process, and do not necessarily add to construction and development costs. Appropriate form and orientation choices can significantly improve efficiency and the liveability of homes and other developments.

Options

9.14 RBC should work with developers to ensure that steps have been taken at the design stage to maximise solar gains, reduce heat loss and prevent overheating as much as feasible given site conditions and requirements of the development.

9.15 This would involve building forms that are as simple and compact as possible, including limiting the use of stepped roofs, roof terraces, overhangs and inset balconies as these features increase heat loss. It would involve optimised orientation and massing of buildings, including south facing dwellings with solar shading, dual aspect homes and offices and the prevention of overshadowing. It would also consider glazing, placing smaller windows to the north and larger windows to the south for heat loss/capture and the right choice of windows for balconies. The LETI Climate Emergency Design Guide[62] provides a starting point for such discussions.

9.16 RBC could consider producing a design guide or toolkit for developers to highlight such good practice principles, or signpost existing good practice guidance. This would then inform discussions between developers and Council officers at the design stage of masterplans. The Council could also consider whether such recommendations are contained within an SPD.

Viability

9.17 Producing a design guide on these principles need not be a significant undertaking. Resources needed to produce a design guide could be shared with other local councils – for example we note Surrey County Council has committed to develop guidance to planners on net-zero compatible policies and spatial planning guidance, including 'Surrey Street Design Guide: Healthy Streets for Surrey'[63]. Cross-planning authority design guides 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**[64]. RBC would now be able to point to Part O of the Building Regulations 2010, instituted in 2022, that focuses on designing out overheating through mitigation strategies, largely using the principles of form and orientation.

9.18 Guidance on light-touch design interventions to address climate resilience and adaptation now proliferate across the UK and are increasingly common to developers. One such guide is The Passivhaus Design Easi Guide[65], providing significant advice on how form and orientation can improve energy efficiency in new housing.

9.19 As an indication of the viability of delivering such resilient housing, developers are increasingly building ambitious Passivhaus-homes at scale. Example developments include Hastoe's development of 14 units – a mixture of houses and flats at Wimbish, Essex. The development is certified to Passivhaus standards, and average heating costs for the houses are £130/year. Other examples include Springfield Meadows in Oxfordshire, Goldsmith Street in Norwich, Agar Grove in Camden and many other developments across the Country. Like Wimbish, they have an energy consumption of approximately less than half of that of a typical home. Passivhaus is a challenging standard to meet but simple orientation and form decisions can be instituted in most developments that make significant contributions to energy saving.

Summary

Table 9.1: Summary table on form and orientation

Positives	Negatives
Appropriate orientation and form design choices can provide significant savings for residents/householders in running costs. Passivhaus home average annual bills are around 62% cheaper than the national average[66].	It would be necessary for RBC to develop a clear understanding of where a development is justified in being unable to meet orientation and/or form considerations due to the site and other constraints. This may

[62] London Energy Transformation Initiative (2020) LETI Climate Emergency Design Guide: How new buildings can meet UK climate change targets [pdf]. Available at: https://www.leti.uk/_files/ugd/252d09_3b0f2acf2bb24c019f5ed9173fc5d9f4.pdf

[63] Surrey County Council (2022) Surrey's Greener Future: Greener futures climate change delivery plan 2021 to 2025 – Build back greener: Planning, place-making and infrastructure [online]. Available at: https://www.surreycc.gov.uk/community/climate-change/what-are-we-doing/greener-futures-climate-change-delivery-plan-2021-to-2025#section-15

[64] XXX

[65] Passivhaus Trust (2020) Easi Guide Passivhaus Design: Medium density housing projects [pdf]. Available at: https://www.passivhaustrust.org.uk/UserFiles/File/research%20papers/easi%20guide%20PH%20design/Passivhaus%20easi-guide_screen_portrait.pdf

[66] Passivhaus Trust (undated) Goldsmith Street [online]. Available at: https://www.passivhaustrust.org.uk/projects/detail/?cld=101

Positives	Negatives
	need to be specified in any design guide or SPD to support officers in their negotiations.
As the Future Homes Standard is updated, it will likely come in to line with Passivhaus-like standards on overheating, overshadowing etc. Scaling up local expectations on design demands and internal resourcing on evaluating such design choices will bring RBC in to line with national standards ahead of time.	Form is often arranged around other priorities, such as access points, parking provision and existing character.

Insulation, Airtightness and Ventilation

Background

9.20 The specification of the fabric, materials and HVAC systems will all have a significant impact on the energy demand of a building. The building 'fabric' is made up of the materials that make up walls, floors, roofs, windows and doors. This also includes thermal bridges, where layers of insulation are not continuous and heat can escape in these gaps.

9.21 Unlike orientation and form, design interventions for improved insulation, airtightness and ventilation can be applied to existing buildings for improving energy efficiency, not just for new developments.

9.22 Upgrading insulation is about reducing heat loss from a building so that less energy is required to heat it when temperatures are cool. Airtightness is the control of air leakage – the elimination of unwanted draughts through the external fabric of a building. Upgrading insulation and airtightness is achieved through various methods applied to windows, doors or the external and internal walls of a building (e.g. upgrading loft insultation, double glazing windows, draught proofing). Existing homes in the UK have hugely varying insulation and airtightness and this significantly affects energy efficiency and comfort.

9.23 Effective insulation and airtightness works in tandem with appropriate ventilation. This is the circulation of air around a building so as to move warm or cool air to where it is needed. The most efficient way to provide ventilation, is through a mechanical ventilation and heat recovery system (MVHR). The equipment circulates air in a dwelling using a small fan, whilst recovering the heat from inside so it is not lost. However, all well-designed controlled ventilation systems help to limit uncontrolled infiltration of cold or hot air. Retrofitting controlled ventilation systems is the best way to maximise the potential of new interventions like new windows and other insulation. Appropriate ventilation is also important to prevent newly airtight homes avoid damp and humidity.

9.24 Alongside supportive policy on retrofitting homes in the Borough, RBC could produce a SPD that advises on appropriate retrofitting on insultation, airtightness and ventilation. This include targets that retrofitting programmes should achieve such as the AECB Retrofit Standard.

Viability

9.25 The table below shows prices for indicative retrofit interventions for a 90m^2 semi-detached dwelling[67].

Table 9.2: Retrofit interventions

Measure	Shallow	Deep
Fit 100% low energy lighting	£20	£20
Increase hot water tank insulation by 50mm	£50	£50
Loft insulation – add 400mm	£500	£500
Fit new time and temperature control on heating system	£150	£150

[67] West Oxfordshire District Council, Cotswold District Council and Forest of Dean District Council (2021) Net Zero Carbon Toolkit [pdf]. Available at: https://cotswold.gov.uk/media/05couqdd/net-zero-carbon-toolkit.pdf

Measure	Shallow	Deep
Improved draught proofing	£150	
100% drought proofing		£2,000
Cavity wall insulation – 50mm	£600	£600
Floor insulation		£1,500
Insulate all heating and water pipework		£500
Fit mechanical ventilation and heat recovery (MVHR)		£7,000
Condensing gas boiler	£3,800	
Air source heat pump		£9,000
Half glazed doors – double glazed	£1,500	
Half glazed doors – triple glazed		£2,000
External wall insulation		£11,000
Double glazing	£7,000	
Triple glazing		£8,400
Solar PV, 3kWp (21m2 area)		£6,500
Miscellaneous and enabling works	£1,000	£5,000

9.26 Although these interventions may make up a substantial part of any energy efficiency-driven retrofit, they would provide significant savings for the home user.

9.27 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.

Summary

Table 9.3: Summary table on insulation, airtightness and ventilation

Positives	Negatives
The most substantial energy savings across the borough are likely to take place in existing homes, given their number and given the varying levels of energy efficiency they currently display.	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 Surrey.
Insulation, airtightness and ventilation interventions are at their best when they are installed as part of a joint strategy of insulation and cooling. Economies of scale can be achieved when they are installed jointly.	In the absence of a government scheme to support homeowners retrofit homes, it may be hard to achieve significant take-up of any new policy on retrofitting. RBC could establish a carbon offset fund for existing buildings to help generate funding for such upgrades. However, RBC would need to expand their in-house energy or carbon expertise to implement such a scheme (e.g. to identify or assess proposed retrofit schemes).
	Retrofitting heritage building provides a unique set of challenges. Pre 1919 buildings require different understanding, skills and material solutions than modern buildings. Traditional buildings have links to locality and history that cannot be easily replaced. For this reason, there are planning constraints on how some heritage (Listed, Conservation Areas etc.) buildings can be repaired or altered.

Use of Sustainable Materials

9.28 Material use consists of one of the largest portions of embodied carbon. The extraction and processing of materials, along with their demolition, disassembly and waste processing contributes a significant amount of carbon. Different materials have different amounts of embodied carbon depending on their extraction method and origin. **Table 9.4** below shows the typical materials used in an average new build house.

Table 9.4: Materials used in a typical new build house

Materials		
Aggregate	Doors	Roofing Sundries
Blocks	Foundation	Roof Trusses
Bricks	Insulation	Screws and Fixes
Carcasing Timber	Lintels	Sheet Materials
Ceramics	Metalwork	Stairs
Concrete	Plaster	Sundry Materials
Concrete Products	Plumbing	Timber Mouldings
Decoration	Rainwater Goods	Timber Various
Door furniture	Roof Tiles	Window and Door Frames

9.29 Therefore, reducing the carbon impact of materials can reduce the overall carbon footprint of new developments considerably. **Table 9.5** highlights the variance in building materials, with wood and locally sourced stone possessing a low carbon value compared to common brick and steel.

9.30 As discussed in **Chapter 6: Embodied Carbon**, Runnymede could consider requiring a Life Cycle Assessment (LCA) to be performed and submitted with any planning application. LCA's are a useful tool in establishing the embodied carbon of any proposed development, including in materials. This allows comparisons of different options in relation to their embodied carbon values, encouraging the use of sustainable materials at the earliest possible stage of design.

9.31 One option could be to specify minimum credit requirements in BREEAM and Home Quality Mark (HQM) relating to materials use. For example, BREEAM includes 7 credits for Mat 01 which can be secured if developers reduce buildings' environmental life cycle impacts through conducting Life Cycle Assessment and integrating its outcomes in the design decision-making process. The aim of this BREEAM issue is to *"reduce the burden on the environment from construction products by recognising and encouraging measures to optimise construction product consumption efficiency and the selection of products with a low environmental impact (including embodied carbon), over the life cycle of the building"*. Similarly, HQM includes 25 credits for Environmental Impacts of Materials with the aim *"To reduce the effect construction products have on the environment by recognising and encouraging the selection of products with a low environmental impact, including embodied carbon over the life cycle of the building"*.

Life Cycle Assessment (LCA)

A multi-step procedure to quantify 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 **Figure 2.1**.

9.32 Timber, including carbon storage, is a carbon negative building material. RBC could encourage the use of timber in new developments in the borough. This could be in conjunction with the facilitation of modular housing, which typically utilises wooden panels as the main construction material. Modular housing, or off-site manufactured accommodation can range

from shipping containers to high- specification dwellings such as the Ladywell scheme in Lewisham[68].

Table 9.5: Different carbon footprints of common building materials (ICE Database V3.0, 2019)

Materials	Embodied Carbon ($kgCO_2e/kg$)
Traditional Building Materials	
Flint	0.079
Tile	0.780
Stone	0.079
Shale	0.002
Slate	0.007 to 0.063
Modern Building Materials	
Timber – Average of all data – Including Carbon Storage	-1.03
Timber – Average of all data – No Carbon Storage	0.493
Glass, General, per kg	1.44
General Concrete	0.103
General (Common Brick)	0.21
Steel (Average)	2.47

9.33 In summary, there are three key measures that can be taken to reduce the carbon impact of materials:

1. Ensure longevity of material and systems specifications.
2. Reduce the use of high embodied carbon materials.
3. Consider natural and renewable materials.

Case Study

9.34 The Lake District Design Code SPD (under consultation) places a strong emphasis on using local materials in new developments. Although the local materials in Runnymede are likely to differ from those in the Lake District, materials such as Bargate Stone should be encouraged to reduce the embodied carbon of new developments and reinforce the local distinctiveness of dwellings.

R.2.i Embodied Energy

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:

[68] RHSP (undated) PLACE / Ladywell [online]. Available at: https://rshp.com/projects/residential/place-ladywell/

– 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.

* Reconstituted materials

Nature Based Solutions in New and Existing Developments

Background

9.35 A highly-effective, multi-functional solution to overheating and the resultant discomfort and potential use of high-consumption air-cooling is the planting of trees in new and existing developments and other private and public spaces.

9.36 Trees prevent buildings warming as they 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 have a significant effect in urban areas where heat is stored in hard surfaces and released at night, preventing surrounding homes from cooling down.

9.37 RBC could encourage or require that all new development proposals are planned around a set of principles of green infrastructure design, including maximising tree planting opportunities, soft landscaping and use of green living roofs. Such measures could help to mitigate overheating risks and reduce energy consumption (e.g. green roofs can help to insulate roofs as well as cool the surrounding space) but could also meet other green infrastructure (GI) principles the Council is seeking to meet in its forthcoming Local Plan.

9.38 The aim of GI planning should not just be the creation of new green spaces or canopies that help mitigate heating demand in the urban environment but also the protection and enhancement of existing green and blue infrastructure assets.

9.39 RBC itself could seek to broaden existing tree planting efforts to specifically address climate resilience in existing properties through the enhancement of existing green assets and development of new urban trees, potentially through commitments in a Tree Strategy or a wider Green Infrastructure Strategy.

Viability

9.40 Urban tree planting is a particularly long-term investment with a slow but increasing return over time. Canopy cover, particularly where overheating and resilience are the main objective, takes many years to develop. 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.

9.41 However, particularly where appropriate species selection and soil preparation takes place, trees that can reach multi-decade and beyond 100+ years of growth, provide increasing benefits over time, particularly in comparison to street trees that need replacing every 10-15 years[69]. Moreover, ensuring that mature, existing trees can be maintained in developed spaces is an extremely cost-effective solution when the multi-functional benefits of these trees are considered[70].

9.42 There are a range of central government-level sources of finance for non-woodland tree planting that RBC could seek to access for its own tree planting efforts. 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.

9.43 Costs of other 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

[69] Greenblue Urban (2018) Street Tree Cost Benefit Analysis [pdf]. Available at: https://www.greenblue.com/wp-content/uploads/2018/08/GBU_Street-Tree-Cost-Benefit-Analysis-2018.pdf

[70] Greenblue Urban (2018) Street Tree Cost Benefit Analysis [pdf]. Available at: https://www.greenblue.com/wp-content/uploads/2018/08/GBU_Street-Tree-Cost-Benefit-Analysis-2018.pdf

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[71].

Summary

Table 9.6: Summary table on nature based solutions

Positives	Negatives
Tree planting and wider GI can reduce the demand for expensive and high energy-consumption air cooling methods in both new and existing properties. Moreover, unlike air cooling methods which may provide visual and noise nuisance complaints for planners to consider, such interventions are typically welcomed by residents due to the wider amenity and other benefits they provide.	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 and optimum performance of the investment.
Tree planting and other GI provides benefits beyond shading and overheating prevention. These include absorbing air pollution, storing carbon and the provision of amenity.	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.
Proximity to trees and greenspace has been shown to produce a premium on house prices[72]. Therefore, rather than simply necessary infrastructure, tree planting boosts the desirability and liveability of homes in the eyes of existing and future residents.	

Case Studies

9.44 Cornwall Council's Design Guide 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 and incorporating natural ventilation and trees to prevent overheating. This is supported by Policy G1 on Green Infrastructure Design and Maintenance that requires that GI is central to the design of schemes. This includes requirements to meet the principles of accommodating street trees and GI that minimises developments' environmental impact.

9.45 Belfast City Council has plans to plant 1 million native trees across Belfast by 2035 to reduce carbon dioxide levels, improve air quality, reduce flooding, increase urban cooling, support and enhance biodiversity, and improve the population's physical and mental health and wellbeing. Planners have advised on how to realise the multiple benefits of tree planting through the site identification assessment process – in line with both the council's Green and Blue Infrastructure Plan, adopted in early 2020, and the emerging new planning policies in the council's draft local development plan, which will see a significant focus on green and blue infrastructure as part of new development requirements.

[71] Homebuilding and Renovating (2021) Green Roofs: The Ultimate Guide [online]. Available at: https://www.homebuilding.co.uk/advice/green-roofs

[72] CABE Space (2005) Does Money Grow on Trees? {pdf]. Available at: https://parksmanagementforum.files.wordpress.com/2020/06/does-money-grow-on-trees-1.pdf

9.46 The **City of London's** 'Cool Streets and Greening' programme seeks to cool the urban realm and enhance biodiversity through new green infrastructure and is part of its Climate Action Strategy (2020-2027). The programme is investing £6.8m to improve the resilience of its streets, parks and open spaces to the impacts of climate change. A range of urban greening, climate-resilient planting and sustainable drainage projects are being trialled, alongside sensor-based environmental monitoring, to evaluate the effectiveness of the schemes.

Appendix A

Building Standards

Further details on the technical specifications of current Building Standards.

Table A.1: Key technical requirements of the Building Regulations

Lettered Parts from Schedule 1	Building Regulations Specific to Each Part
A: Structure	
B: Fire safety	Regulations 7 and 38
C: Site preparation and resistance to contaminants and moisture	
D: Toxic substances	
E: Resistance to the passage of sound	Regulation 41
F: Ventilation	Regulations 39, 42 and 44
G: Sanitation, hot water safety and water efficiency	Regulations 36 and 37
H: Drainage and waste disposal	
J: Combustion appliances and fuel storage systems	
K: Protection from falling, collision and impact	

Lettered Parts from Schedule 1	Building Regulations Specific to Each Part
L: Conservation of fuel and power	Regulations 23, 24, 25, 25a, 26, 26a, 27, 27a, 28, 35, 40, 43 and 44
M: Access to and use of buildings	
O: Overheating	
P: Electrical safety (dwellings)	
Q: Security (dwellings)	
R: Physical infrastructure for high speed electronic communications networks (dwellings)	
S: Infrastructure for the charging of electric vehicles	

NOTE: The Building Regulations, including Regulation 7, also apply.

A.2 Each technical requirement has a corresponding Approved Document that provides guidance on ways in which the Building Regulations can be met. They generally include:

- General guidance on the performance expected of materials and building work in order to comply with the Building Regulations; and
- Practical examples and solutions on how to achieve compliance for some of the more common building situations.

A.3 The four technical requirements that relate the most to carbon reduction are the following:

- F: Ventilation
- L: Conservation of fuel and power
- O: Overheating
- S: Infrastructure for the charging of electric vehicles

Part L: Conservation of fuel and power

A.4 Part L documents the conservation of fuel and power in new developments in England, and outlines how energy efficient these developments should be. The section below summarises each criteria of Approved Document L.

A.5 The Approved Document sets out that the designed Dwelling Emission Rate (for domestic buildings) and Building Emission Rate (for commercial buildings) must not exceed the Target Emission Rate for a comparative benchmark building of a similar type, shape and size. The key metrics used to calculate these figures are outlined below:

- The target primary energy rate, in kWhPE/m^2 per year: this is influenced by the fabric and fuel;
- The target emission rate, in kgCO2/m^2 per year: this is influenced by the fabric and fuel; and
- The target fabric energy efficiency rate, in kWh/m^2 per year: this is influenced by the fabric only.

A.6 The target primary energy rate, target emission rate, and target fabric energy efficiency rate for individual dwellings must be calculated using the Government's Standard Assessment Procedure (SAP10).

A.7 The designer can achieve the target primary energy rate and the target emission rate by using any combination of the following:

- Fabric energy efficiency;
- Efficient building services; and
- Low and zero carbon technologies integrated in an appropriate mix.

A.8 The Approved Document outlines that all fabric elements and services fixed within the structure, such as lighting, should all reach a good standard of energy efficiency. This prevents trade-offs between different elements of the building, such as increased renewable generation, to offset poor insulation choices.

A.9 Overheating should be prevented in the summer months. This includes avoiding excessive solar gain and providing adequate ventilation.

A.10 Consideration and provision should be made for energy efficient operation of the building. Systems should be put in place to ensure that the building owner will have the knowledge and the ability to make energy efficient decisions to ensure that no more fuel and power is consumed than is reasonable.

A.11 Reasonable provision should be made to ensure that heat gains and losses through fabrics are limited. Specific U-values are given for a variety of different fabric elements and air permeability in new dwellings.

2022 uplift

A.12 New homes are to produce 30% less CO^2e than current standards along with a 27% reduction from other new buildings, including offices and shops.

A.13 A new metric for measuring energy efficiency has been introduced – 'primary energy'. This will be used to measure the efficiency of a building's heating as well as the energy required to deliver fuel to a building.

A.14 New and replacement heating systems must have a maximum flow temperature of 55C compared to the previous maximum of 75C.

A.15 Existing non-domestic buildings must improve the efficiency of heating and hot water boiler systems through the installation of new controls.

A.16 In new buildings (non-domestic), the minimum lighting efficacy has been raised.

Part F: Ventilation

A.17 As part of the 2021 changes, all new residential buildings must be designed to reduce overheating. All new dwellings will be air tested.

Part O: Overheating

A.18 Approved Document O came into effect on the 15th of June 2022 and applies to new dwellings, institutions or any other building containing one or more rooms for residential purposes. Part O attempts to reduce overheating by:

- Limiting unwanted solar gains in summer; and
- Providing an adequate means of removing excess heat from an indoor environment.

Part S: Infrastructure for the charging of electric vehicles

A.19 Approved Document S came into effect on the 15th of June 2022 and applies to new residential and non-residential buildings; buildings undergoing a material change of use to dwellings; residential and non-residential buildings undergoing major renovation; and mixed-use buildings that are either new or undergoing major renovation.

A.20 For new developments, with some exceptions, an electric vehicle charge point is required for each parking space. If no parking spaces are provided, no charge points need to be installed. For non-residential developments with more than 10 parking space, at least one of these will need to have access to a charge point and cable routes must be provided for 20% of the other spaces. There is an average cost cap of £3,600 for each charge point and where this exceeded only the cable routes need to be installed. Cables do not need to be installed if the cost of the cable routes exceeds more than 7% of the total cost of renovation.