Background paper 008

Carbon reduction and climate resilient design

This paper addresses carbon reduction in new development and how the Local Plan will support the city's transition to net zero carbon. The paper also addresses climate resilient design and adapting the built environment to the changing climate of the future.
Relevant Local Plan Objective(s): • Ensure Oxford is ready for a net zero carbon future. • Be resilient and adaptable to climate change and resistant to flood risk and its impacts on people and property.
Relevant SA Objective(s): 1. To achieve the city's ambition to reach net zero carbon emissions by 2040. 2. To build resilience to climate change, including reducing risks from overheating, flooding and the resulting detriment to well-being, the economy and the environment.
SEA theme(s): Climatic Factors, Air

1. Introduction 1

2. Policy Framework/Plans, Policies, Programmes (supporting Task A1 of Sustainability Appraisal) 2

National and international context 2

Regional and local context 4

Other relevant plans/programmes/strategies 5

3. Current situation (supporting Task A2 and A3 of Sustainability Appraisal) 6

Primary sources of greenhouse gas emissions in the city 6

Carbon emissions associated with buildings in operation 8

Embodied carbon emissions during construction 8

Energy supply and grid capacity 10

Fuel poverty 11

Climate change risk and the need for adaptation 12

4. Likely trends without a new Local Plan (supporting Task A2 and A3 of Sustainability Appraisal) 13

5. Key issues addressed through the Local Plan 14

Introduction 15

Ensuring new development is net zero carbon in operation 15
Addressing energy efficiency and setting energy use targets 16
Requirements for renewable energy generation on new development 17
Additional considerations which have informed the approach to net zero carbon 17
Energy offsetting mechanism 18
Addressing embodied carbon in the construction process 19
Supporting the retrofit of existing buildings 20
Ensuring new development is resilient to climate change 21
Appendix A – Policy options and preferred approaches 22
Policy options set 008a (draft policy R1): Net zero carbon buildings in operation 23
Policy options set 008b (draft policy R2): Embodied Carbon 29
Policy options set 008c (draft policy R3): Retrofitting existing buildings including heritage assets 33
Policy options set 008d (draft policy G9): Resilient design and construction 38

1. Introduction

1.1 The Council has a legal duty, as set out in Section 19(1A) of the Planning and Compulsory Purchase Act 2004, to ensure that the new Local Plan includes policies that, taken as a whole, have been designed to secure action on climate change. This is reflected in national policy, which sets out that the planning system should help to: 'shape places in ways that contribute to radical reductions in greenhouse gas emissions', and that Local Plans should take a proactive approach to mitigating climate change. In recognition of the need to take action on climate change, the Council declared a climate emergency in 2019 and has committed to achieving net zero carbon emissions as a city by 2040.

1.2 Alongside the transport network, the built environment is a primary contributor to Oxford's carbon dioxide emissions, a potent greenhouse gas which is causing global climate change. The power used to heat and operate buildings, as well as the resources used within the construction process, all have a role in these emissions. In order to meet national and local commitments on mitigating climate change, it is essential that new development being built in the city is designed for a net zero carbon future, and that existing development is retrofitted to reduce its carbon footprint. It is also important that new development is designed to be resilient to the impacts of the changing climate – e.g. flood risk and overheating – which could be more common in future.

1.3 This background paper firstly sets out key context in the form of existing policy analysis, current situation in the city and the likely situation without a new Local Plan. It then goes on to discuss the key topics and options for policies that will need to be considered in the preparation of the Local Plan 2042.

2. Policy Framework/Plans, Policies, Programmes (supporting Task A1 of Sustainability Appraisal)

National and international context

Climate Change Act 2008

2.1 This legislation sets statutory targets for reducing national carbon dioxide emissions below 1990 levels at intervals up to 2050. The targets set out in the Act have been amended since to reflect updated goals for climate mitigation, such as in response to the Paris Agreement, most recently setting out a target of net zero emissions by the year 2050 (100% reduction in emissions over 1990 levels).

2.2 Under the Act, the government is required to set five-year caps on emissions (known as carbon budgets) twelve years in advance and publish its proposals and policies for meeting these budgets. Most recently, the sixth carbon budget enshrined a target of 78% reduction in carbon emissions for the period from 2033 to 2037, whilst the seventh carbon budget is expected to be set in 2025.

Planning and Compulsory Purchase Act 2004

2.3 Sets out the current structure for the English Local Planning framework and includes, within section 19 (as amended by the Planning Act 2008), the legal duty to ensure that, taken as a whole, planning policies contribute to climate change mitigation and adaptation.

Planning and Energy Act 2008

2.4 The Planning and Energy Act (2008) makes provision within Section 1 for a local planning authority to include policies within its development plan that require development in their area to comply with energy efficiency standards that exceed the energy requirements of building regulations, provided these policies are reasonable, not inconsistent with national policies, and compliant with usual provisions around plan making as set out in section 19 of the Planning and Compulsory Purchase Act 2004.

National Planning Policy Framework (NPPF)

2.5 Chapter 14 of the NPPF sets out the government's requirements for how the planning system should address the challenge of climate change, particularly paragraphs 161 to 169. For the first time, the updated wording in para 161 that opens the chapter now explicitly references the transition to net zero by 2050, stating that: The planning system should support the transition to net zero by 2050 and take full account of all climate impacts including overheating, water scarcity, storm and flood risks and coastal change. It goes on to flag the need for shaping places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, and conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

2.6 Para 162 sets out that plans should take a proactive approach to mitigating and adapting to climate change, footnote 53 clarifies that this should be in line with the objectives and provisions of the Climate Change Act 2008, which legislates for net zero carbon emissions by 2050. Para 164 (b) discusses the need for planning development in ways that help reduce greenhouse gas emissions, such as through its location, orientation and design.

2.7 Paras 165 flags the importance of securing energy from renewable sources and the role of plans in helping to enable this. In particular, it sets out the need for providing a positive strategy for energy from these sources; considering identifying suitable areas for renewable and low carbon energy and supporting infrastructure; and identifying opportunities for development to draw energy from such sources. Para 167 also highlights that significant weight should be given to the need to support energy efficiency and low carbon heating improvements to existing buildings.

National Planning Practice Guidance (PPG) including National Design Guide/Model Design Code

2.8 National guidance supporting planning policy is set out on the Planning Practice Guidance climate change webpage, although much of this now dates back to 2019 or earlier (with some sections dating to 2015). Whilst some of the guidance, including key legislation planners should take into account and general advice on climate change mitigation measures that could be applied through planning process are still of relevance, other sections appear to have been overtaken by recent policy developments (such as guidance around the 2015 Ministerial Statement as discussed below).

2.9 The National Design Guide (2019) which now forms part of the PPG includes guidance on what government considers to be 'good design' and breaks design down into 10 key topics. There is a section on "Resources" which sets out that "well-designed places and buildings follow the energy hierarchy" as well as containing some other general design guidance which can help local authorities with preparing more locally specific design guidelines.

Written Ministerial Statements on Plan Making (2015 and 2023)

2.10 There are two WMSs that have been published since the above legislation which have some relevance to the topic of energy and carbon, but also serve to confuse policy and local authorities' powers.

- The first, published in 2015, set out the expectation that local authorities should not set energy efficiency standards with requirements above the equivalent to level 4 within the withdrawn Code for Sustainable Homes. It should be noted that an update to Building Regulations during that same year meant that they had already superseded the old Code for Sustainable Homes standard.
- The more recent WMS, published in December 2023, indicates that Local Authorities cannot set their own targets based on actual energy use in buildings and dissuades them from going beyond national standards. It sets out that "*Any planning policies that propose local energy efficiency standards for buildings that go beyond current or planned building regulations should be rejected at examination if they do not have a well-reasoned and robustly costed rational...*" Where policies are proposed that do go beyond national standards, the WMS sets out that these should be supported by viability evidence that shows development would remain viable, with a focus on housing affordability and supply. It also states that such policies should be expressed as a percentage uplift of a dwelling's Target Emission Rate (TER) calculated using the Standard Assessment Procedure (SAP) of Building Regulations.

Regional and local context

Oxford's climate emergency declaration and the Zero Carbon Oxfordshire Partnership (ZCOP)

2.11 In January 2019, Oxford City Council members unanimously declared a climate emergency and agreed to create a citizens assembly in Oxford to help consider new carbon targets and additional measures to reduce emissions. This was followed in February 2021, by signing the Zero Carbon Oxford Charter, and the creation of a new Zero Carbon Oxford Partnership (ZCOP) for the city along with the setting of a local target of achieving net zero carbon emissions as a city by 2040 (ten years ahead of the UK net zero carbon target). The partnership is currently in the process of expanding to incorporate the rest of the county and will be known as the Zero Carbon Oxfordshire Partnership.

2.12 The ZCOP has previously developed a Roadmap and Action Plan (published 2021) for the city which identifies the primary sources of carbon emissions in city at present and the key milestones that are needed in relation to decarbonising different aspects of life in Oxford in order to meet the net zero target of 2040. The roadmap highlights the large-scale changes and the challenging nature of the transition to full decarbonisation which is needed across various sectors, such as expansive retro-fit of existing buildings to decarbonise heating and increase fabric efficiencies, large amount of micro-renewable installation on rooftops to increase clean energy generation as well as ongoing increases in EV charging infrastructure to support decarbonisation of transport.

Oxford Local Plan 2036

2.13 Policy RE1: Sustainable design and construction sets out the Council's expectations regarding carbon emissions in new development. The policy requires new development to achieve reductions in carbon emitted beyond those set out in national Building Regulations. The targets are increased at intervals throughout the plan period, beginning at 40% reduction, before moving to 50% by 31 March 2026, and then zero carbon after 2030 (for residential development).

2.14 Other policies in the adopted Local Plan that have a role in contributing to reductions in carbon emissions in the city, include:

- Policies that encourage and enable sustainable/active travel and the transition to electric vehicles (policies M1 to M5),
- Policies relating to protecting and enhancing Oxford's green and blue infrastructure network (policies G1 to G8).

Other relevant plans/programmes/strategies

Future Homes/Buildings Standard – Building Regulations reforms

2.15 Outside of the planning system, a review of national Building Regulations has also been ongoing with staged plans to implement the Future Homes Standard (dealing with residential development) and Future Buildings Standards (non-residential development). These reforms to the technical requirements within Building Regulations are intended to deliver higher standards of energy efficiency and carbon reduction across all new buildings through Building Control process. The first stage of these reforms came into

effect in 2022 and was presented as an interim uplift to Building Regulations that would result in homes producing 31% less CO2 emissions compared to current standards. It also included updates to other technical standards such as on ventilation, the performance gap, overheating and EV charging.

2.16 Further changes, expected in 2025, will result in new homes producing at least 75% lower CO2 emissions than those built to previous Building Regulations standards, as well as being 'zero carbon ready'. This means that, even if the new buildings are still emitting some emissions, these should reduce to zero over time (e.g. with the continued decarbonising of the energy supply sourced from the national grid as fossil fuels are phased out of the system). The reforms only affect the performance standards of buildings that are addressed by Building Control (e.g. regulated energy systems), meaning the current proposals would not deliver full net zero development, nor address embodied carbon/energy.

Oxfordshire Climate Vulnerability Assessment (2024)

2.17 The County Council have produced a climate risk vulnerability assessment for the county which identifies how climate change could impact various sectors within Oxfordshire. The assessment identifies the city as being an area with increased climate risk to hazards such as overheating and flooding, both now and in the future.

3. Current situation (supporting Task A2 and A3 of Sustainability Appraisal)

Primary sources of greenhouse gas emissions in the city

3.1 Analysis of the greenhouse gas emissions that are generated across the city is challenging with varying estimates depending upon the methodology and data sources used. The Department for Energy Security and Net Zero (formerly BEIS) publish statistics on per capita emissions yearly and these show an overall trend of reducing per capita emissions for Oxford since 2005, as can be seen in Figure 3.1.

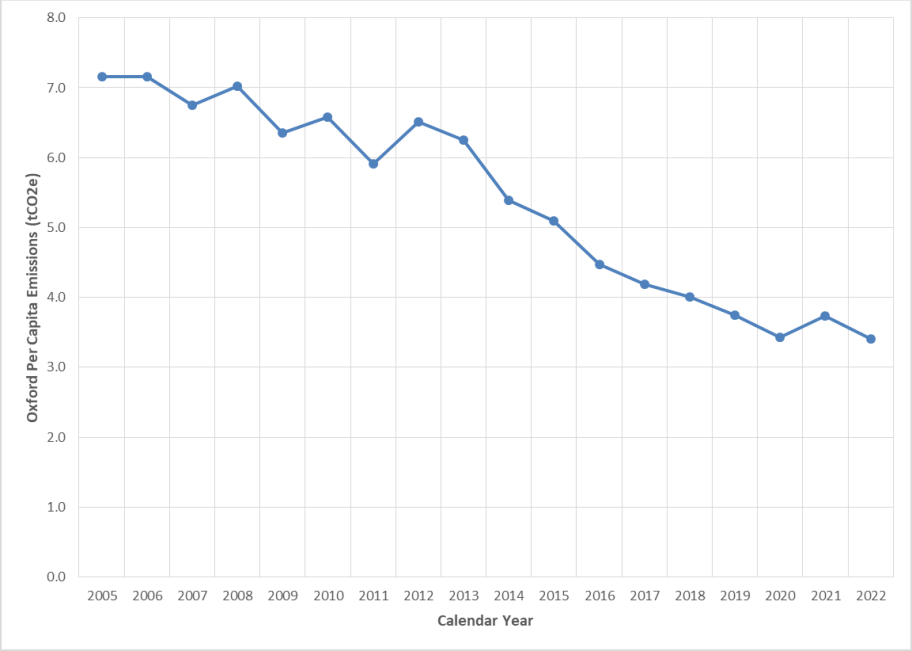


Figure 3.1 - Per capita emissions of carbon dioxide (tCO2 equivalent) for Oxford according to Local Authority Greenhouse Gas Emissions statistics (2005-2022) Sourced from the Department for Energy Security and Net Zero statistical release (June, 2024)

3.2 The underlying summary accompanying the statistics above highlights that the national pattern in declining emissions, which the city's own performance tracks with, has largely been due to reductions in emissions from power stations and industrial combustion. The reduction from power stations is driven by change in the fuel mix used for electricity generation with a large reduction in the amount of coal, which is a carbon intensive fuel, and increasing use of renewables. A small increase in emissions was noted in 2021 for the majority of Local Authorities, including Oxford, due to COVID-19 restrictions easing and colder temperatures in that year increasing the use of heating in buildings. For the most recent statistical release (2022), per capita emissions for the city had decreased in line with much of the rest of the country. The national decrease in emissions associated with 2022 was attributed largely to milder weather reducing heating demands and potentially the impact of higher energy prices.

3.3 The Zero Carbon Oxford Partnership's Roadmap and Action Plan (2021) identified the key sources of emissions in Oxford as part of its work in defining a roadmap to net zero by 2040. This was an assessment of all greenhouse gas emissions across the city (not just carbon, as is highlighted in the government data above) and drew upon data from both BEIS and from the SCATTER cities tool as well as local sources, to produce a sector-by-sector breakdown of emissions in the city. Whilst the baseline data informing the analysis is now a few years old (2018 was the baseline year), the sector-by-sector profile as shown in Figure 3.2 clearly highlights the major impact of the built environment on emissions, with buildings being the primary source of emissions resulting from the city, and this is not

considered likely to have changed in the intervening period. Transport was the second largest contributor though this is a much smaller proportion of emissions as a whole.

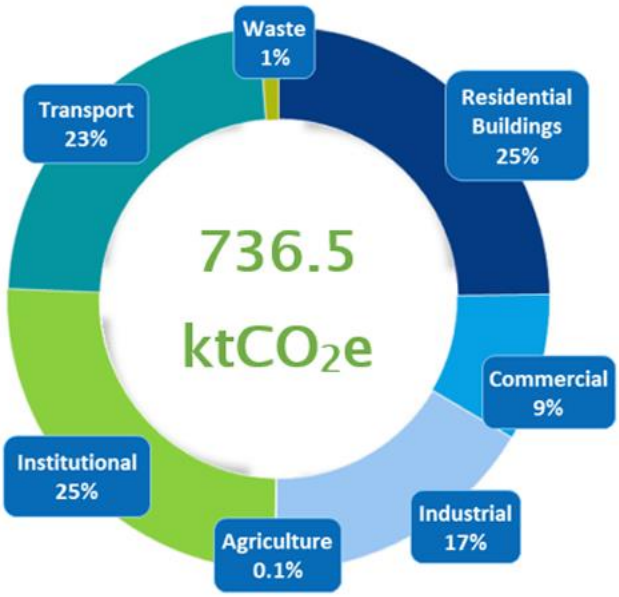


Figure 3.2 - Sector-by-sector greenhouse gas emissions in Oxford (2018 baseline year as used in the Zero Carbon Oxford Partnership Action Plan)

Carbon emissions associated with buildings in operation

3.4 As the ZCOP work notes, the primary reason for the major contribution buildings are making to Oxford's carbon footprint is the use of fossil fuels for heating. However, other sources within buildings include gas used for cooking, as well as emissions associated with electricity use (where this is not sourced from renewables). The majority of the emissions associated with buildings are from buildings that are already in existence. This flags a significant need for retro-fitting to happen alongside ensuring that new development does not exacerbate the problem.

3.5 The Building Regulations reforms embodied through the Future Homes and Future Buildings Standards (as discussed in section 2) should help to ensure new buildings make a much smaller contribution to this existing carbon footprint. Until grid energy is decarbonised, however, where these buildings rely on power from the national grid for their operation then there will still be some associated emissions from them without applying further standards via local policy.

Embodied carbon emissions during construction

3.6 The carbon associated with buildings in operation is not the only source of emissions that need to be addressed as the city moves towards net zero carbon by 2040. There is an embodied carbon cost of the materials used in the built environment in the construction,

maintenance, redevelopment and demolition processes. Carbon dioxide can be emitted in various ways as part of the processes but equally, carbon can be sequestered through careful design choices (e.g. use of natural materials like wood). As operational energy becomes zero carbon, the embodied carbon cost of new development will become the primary source of emissions that needs to be addressed and this will be a growing area of focus in future years.

3.7 Addressing the issue of embodied carbon is closely tied with the concept of a circular economy (Figure 3.3). The Low Energy Transformation Initiative (LETI), in its Embodied Carbon Primer, define the circular economy as a system that is 'restorative or regenerative by intention and design'. In this regard, products, buildings and systems are designed in a way that considers not only how these can be repaired and reused easily, but also how the energy and materials used to construct them can be remanufactured and recycled at the end of their life. This approach enables reductions in the raw materials we extract from the environment over time, our energy demands and the impacts we have upon the wider environment, and by extension, carbon emissions associated with the construction process.

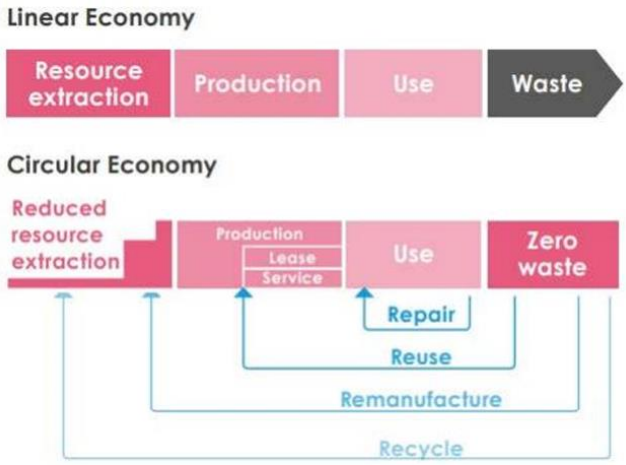


Figure 3.3 - The stages of a linear economy versus a circular economy (source: LETI Embodied Carbon Primer)

3.8 But embodied carbon is an even more challenging and complex aspect of net zero carbon design to address than operational carbon. There is much ongoing research and emerging guidance with varying levels of understanding at present in relation to the different stages of a building's life cycle. As UKGBC note, most of these embodied emissions occur early during the construction stage and this is typically the focus at present. Perhaps reflecting the emerging nature of this topic, it is not currently addressed through a consistent set of national standards, though this is something that has been repeatedly called for through an amendment to Building Regulations as highlighted in this recent House of Commons Committee report.

3.9 The emerging nature of our understanding of the topic and how to effectively address it makes formulating policy challenging, particularly because there are many difficult

questions that the development management process must grapple with when considering embodied carbon and how it is balanced with other place-making objectives, and there are not always definitive answers. For example:

- Is it more sustainable to retain an energy inefficient building or demolish to provide a highly energy efficient replacement?
- How should we balance out the benefits of long-life materials that may have a high carbon cost to produce, as opposed to shorter lived materials which will need replacement more quickly but have a low carbon cost to produce?
- How do we balance out issues of carbon reduction alongside other important choices in delivering high-quality design that contributes to making the places we wish to see in Oxford?

Energy supply and grid capacity

3.10 Across the UK, there are national trends in new sustainable technologies which are of increasing popularity and that also form important context to the new Local Plan policies. The uptake in electric vehicles has been growing, leading to increased demand for EV charging infrastructure. Equally, we are seeing increasing uptake in electric solutions for heating our properties instead of fossil fuel burning boilers, such as Air Source Heat Pumps. The uptake in these technologies is likely to continue and most likely speed up and will result in increasing demands for electricity and increased pressure on the national and local energy grid infrastructure.

3.11 The Oxfordshire Energy Strategy (2018) and associated delivery plan (2019), supported by the Stage 1 work of the Oxfordshire Infrastructure Strategy (OXIS) commissioned by the Oxfordshire local authorities, previously identified that the electricity grid across the county is already constrained. The OXIS work concluded that annual electricity consumption across the county to 2040 is expected to increase due to three reasons: continued increase in the number of domestic and non-domestic buildings; the transition to electric vehicles; and the decarbonisation of heat. These factors will not only increase annual consumption but will also increase peak demand and will necessitate ongoing work by the Distribution Network Operators to meet future demands through upgrades and reinforcing of the grid so that constraints can be reduced and additional generation capacity (e.g. solar PV) incorporated. Whilst this work is some years old now, the high-level messages about future needs are unlikely to have changed, though there is emerging work such as Local Area Energy Planning across the County and an updated OXIS emerging which may update this picture in due course.

3.12 Looking beyond Oxford, the current Government has recently published an action plan for meeting a target of securing a clean power grid by 2030 (in advance of the previous 2035 commitment) as it seeks to ensure that the majority of the country's energy demand is generated by clean, renewable sources, backed up with gas only during generation shortfalls. National decarbonisation actions to date have already supported reducing per capita emissions in the city, which is likely to continue, however, it seems reasonable to hold a 2030 or 2035 net zero target with some caution. Recent assessments have

highlighted that the pace and lack of investment to date has put targets for decarbonisation of grid in doubt, for example, the Climate Change Committee flagged multiple uncertainties based on lack of strategy and direction for rollout of renewable energy generation. In their most recent 2024 report to parliament, they continue to note that pace of delivery in rollout of renewable energy capacity needs to increase radically if net zero targets are to be achieved. A new 2030 clean power target suggests this required increase in pace is even more pressing.

Fuel poverty

3.13 The Oxfordshire Joint Strategic Needs Assessment (JSNA) defines a household as being in fuel poverty if:

- they have a fuel poverty energy efficiency rating (FPEER) of band D or below; and
- if they are to spend their modelled energy costs, they would be left with a residual income below the official poverty line.

3.14 Three factors therefore affect fuel poverty: household income, fuel prices and household energy consumption. Buildings that demand a lot of energy to heat and run, combined with high energy prices (e.g. as has been seen subsequent to global instability in face of crisis like war in Ukraine and covid recovery), and pressures on household incomes can serve individually and cumulatively to exacerbate fuel poverty.

3.15 The Oxfordshire JSNA identifies that Oxford City is significantly worse than the Oxfordshire or regional averages on fuel poverty, whilst the other Oxfordshire districts are each significantly better than average (Figure 4). The 2024 update, which reports on 2021 and 2022, indicates that fuel poverty worsened across the county including in Oxford with its score increasing from 10% to 11.2% (+1.2%). The picture of fuel poverty within the city is unequal; there are twelve areas in the city with more than 10% of their households in fuel poverty, with the highest proportion (East Central Oxford) and lowest in (North Central Oxford) (Figure 3.4).

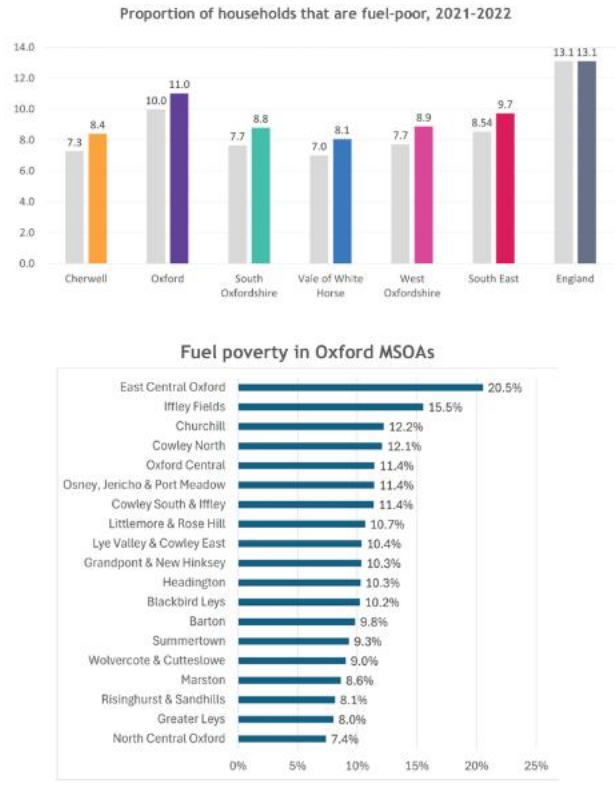


Figure 3.4 - Percentage of households in fuel poverty across Oxfordshire in 2021 and 2022 (top) alongside a breakdown of fuel poverty across different parts of Oxford in 2022 (bottom) (source: Joint Strategic Needs Assessment 2024)

Climate change risk and the need for adaptation

3.16 The impacts of greenhouse gas emissions such as carbon dioxide are in exacerbating the global problem of climate change, however, even if emissions were to be cut to zero today, the climate would continue to change because emissions in the atmosphere will persist for some time. The risks from climate change such as milder, wetter winters; coupled with increasing periods of intense and prolonged rainfall; as well as hotter, drier summers, will impact everyone in Oxford, but could be especially pronounced for more deprived communities and those living in poor health (as is discussed further in the health and wellbeing background paper).

3.17 Oxford has various characteristics that lead to climate change risks. A significant amount of land is exposed to flood risk from the two rivers, and other water courses running through the city. Despite areas of abundant green space, other areas are intensely urbanised and lacking in any green features, reflecting the constrained nature of parts of the city which brings additional challenges. For example, water runs off these artificial surfaces easier and there is less storage available in the form of green features and soils which can exacerbate flood risk (e.g. surface water flooding or overwhelming drainage systems). Also, the lack of green features exposes the city to additional overheating risk and the urban heat island effect as artificial surfaces absorb and reradiate heat, shading is reduced and the natural cooling effects of vegetation are reduced.

3.18 Recent research by the Oxfordshire County Council as part of their County-wide Climate Vulnerability Assessment 2024 identifies Oxford as having some of the most at risk areas in the county for future climate change in respect of flooding and heat waves. The assessment highlights that confirmed that current heat wave risk is concentrated in the most urban parts of the county and is only exacerbated in future according to different projections for 2050. Eight of the ten wards in Oxfordshire with the highest current heatwave risk are located in the Oxford City (Barton and Sandhills, Blackbird Leys, Cutteslowe and Sunnymeade, Carfax and Jericho, Holywell, Littlemore, Northfield Brook and Walton Manor), including some in higher deprivation areas.

3.19 The picture is similar for flooding, with the county work identifying a number of wards in the city as being in the top ten with highest flooding risk at present (Blackbird Leys, Holywell, Hinksey Park, Littlemore, Marston and Northfield Brook). The subject of current and future flood risk is explored further in the Flood risk background paper and will be an important factor in the updated Strategic Flood Risk Assessment.

4. Likely trends without a new Local Plan (supporting Task A2 and A3 of Sustainability Appraisal)

4.1 In the absence of a new local plan, the existing Oxford Local Plan 2036 policies would continue to apply. Policy RE1: Sustainable design and construction, sets out the carbon reduction requirements that proposals for new-build residential developments and new-build non-residential developments of 1000m2 or more need to demonstrate through submission of an energy statement. At time of writing, this requirement is a 40% reduction over the current Building Regulations baseline.

4.2 However, Policy RE1's requirements are not fixed over time, instead, they step up and require an increase in carbon reductions against the current Building Regulations baseline in 2026 and 2030 for residential developments, and 2026 for non-residential developments. The policy ultimately requires Zero Carbon homes from 2030, although this requirement does not apply to new build non-residential developments and as such the requirement for those types of development the expectation would remain at a 50% reduction from 2026 onwards.

4.3 Policy RE1 applies only to regulated carbon emissions, excluding those unregulated emissions from any policy requirements. Meanwhile, the policy is also very limited in setting requirements in relation to actions that can reduce embodied carbon emissions within the construction process. Additionally, the Local Plan has minimal control over existing buildings and cannot force through owners to undertake retro-fit works, which will leave the existing retro-fit challenge to be addressed in other ways.

4.4 Beyond the plan period (past 2036), in the absence of a new local plan, the policies for planning in national planning policy as set out in the NPPF would take on increasing prominence. Whilst recent updates to the NPPF highlight the role of planning in supporting transition to net zero carbon, there is no specific requirement for net zero carbon development despite the national legislated target of being a net zero carbon country by 2050.

4.5 Of course, if the proposals are progressed as previously consulted on, then national standards set through Buildings Regulations are expected to become tighter in future with the introduction of the full Future Homes and Future Buildings Standards. This will support further reductions in some emissions associated with new development. As touched upon earlier in this paper, these proposed updates however do not currently address the full operational energy demands of buildings, ignoring unregulated energy loads not controlled through Building Regulations and associated with up to 50% of energy demand in a new building. They also do not address embodied carbon/energy. As these elements are also not touched by Local Plan 2036, the emissions associated with them would remain unaddressed without a new Local Plan.

4.6 Nationally, we are likely to see continued drop in emissions related to grid electricity used in development in line with the government's clean power target of 2030, which is ahead of previous 2035 net zero grid commitments. However, the national scale rollout of renewable energy generating technology needed to support a net zero grid has, to date, suffered from lack of strategy and investment at the required pace to achieve such targets.

4.7 In the short term at least, without additional mitigation measures in place to address emissions from new development via a new Local Plan, then any additional growth can be expected to result in an increase in emissions.

4.8 In relation to climate change risk. The impacts of climate change are likely to continue to be felt, even with radical reductions in greenhouse gas emissions, but could become more severe if trends in emissions do not reduce. The Oxfordshire Climate Vulnerability Assessment 2024 indicates that six of the city's wards which were discussed in the last section remain in the top ten at risk from overheating for 2050 projections (Littlemore and Walton Manor are replaced by other wards in the county) and five remain in the top ten for flooding (Holywell and Hinksey Park are replaced by other wards in the county).

5. Key issues addressed through the Local Plan

Introduction

5.1 The Regulation 18 consultation identified that there were a number of topics that the Local Plan could implement policy to address which relate to carbon reduction and achieving net zero carbon objectives. Under each of these topics, there were various options for policy

approaches which could be taken, with differing impacts and these were presented in tables to better facilitate comparison between them. The options considered have been reviewed in light of the Regulation 18 feedback (as summarised in the consultation report) and the updates to the Local Plan period, these are reproduced in Appendix A along with the preferred approach taken forward for the Local Plan.

5.2 This section will now discuss the key issues that are being addressed through the Local Plan and how the Local Plan's policies respond to them.

Ensuring new development is net zero carbon in operation

5.3 The Local Plan's influence over carbon reduction is primarily about making sure new development does not add to the challenge of decarbonisation in the city, either by emitting additional emissions or by introducing costly retrofitting burdens for future occupiers. In the absence of net zero carbon standards in national policy, including current or future Building Regulations, this means that the new Local Plan needs to ensure that new development is net zero carbon.

5.4 At its simplest, net zero carbon design essentially means ensuring that new buildings do not contribute net additional emissions into the atmosphere whilst in use. Most directly, emissions from buildings comes from the burning of fossil fuels for heating (e.g. within boilers), as well as for cooking. Indirectly, emissions are also associated with fossil fuels used to power the energy grid. A growing consensus has developed around several metrics which relate to energy use in net zero carbon buildings in operation which have guided the formulation of policy R1:

- **A maximum energy allowance for total Energy Use Intensity (EUI)** – Encouraging energy efficient design by limiting the overall annual energy use needed to operate the building. Also important for addressing challenge of rising energy costs and fuel poverty by reducing energy costs for occupants. Targets for total EUI vary depending on type of development.
- **A maximum energy allowance for space heating** – having a specific limit on energy used for heating - driving a focus on thermal efficiency (in line with a fabric first approach). Choice of heating technology will influence overall energy demands (some systems are more efficient than others) - and can also address cooling needs.
- **Requiring enough on-site energy generating capacity to match total EUI** – to be net zero carbon in operation energy demands need to be met renewably and ideally through on-site energy generation which matches the development's total EUI. Encouraging greater decentralised energy production through more onsite renewables (especially if coupled with energy storage) also reduces strain on the wider energy grid and increases energy security.

5.5 Additionally, whilst recent (and further planned) tightening of Building Regulations will make direct burning of fossil fuels for energy in new buildings more challenging in future, Policy R1 specifically sets out that these systems will not be permitted. This will have benefits not only for avoiding direct carbon dioxide emissions, but also avoiding costly future retrofits for occupants, as well as for local air quality.

Addressing energy efficiency and setting energy use targets

5.6 With direct fossil fuel burning omitted from new buildings, the focus of design then needs to be on energy efficiency. Policy R1 requires that design of development is led by the principles of the energy hierarchy which helps to ensure buildings are as efficient as possible. These principles can be applied to various scales of development, from a simple extension up to a multi-building development and seek to guide energy efficient design through several different levels of action, which the National Design Guide summarises in the following way:

1. Reduce energy need (be lean) – through passive design measures
2. Be efficient in energy use (be clean) – use energy efficient systems such as heat networks for lighting, heating/cooling, operation etc.
3. Source energy from renewables (be green) – source remaining energy needs from renewable technologies, including decentralised sources.

5.7 The policy sets targets for total operational energy used in the building via an Energy Use Intensity (EUI) target, which is the total energy used by the development in a year as measured at the meter divided by the gross internal area (m2). The use of EUI as the key performance metric accommodates for both regulated and unregulated energy sources to that comprise all operational energy uses in the building. The EUI calculation also allows for easier verification of real world performance of the building as built and can better represent how the building will perform in terms of energy use.

5.8 Additionally, alongside the total energy use/EUI target, the policy also sets a target for the energy associated with space heating. This is because the primary source of energy use in our buildings is the energy used for heating (and cooling) and it is important to ensure that the overall energy balance of the building is not overly dedicated to space heating alone. A space heating target helps to promote a ‘fabric-first’ approach to design and encourage more efficiently designed buildings that take less energy to heat (and cool).

5.9 These targets help to reinforce the first couple of steps in the energy hierarchy by promoting reductions in energy use through careful design choices. Additionally, the requirements will have other important benefits. For example, buildings with an inefficient layout or poor fabric efficiency, take more energy to keep comfortably warm (or cool), which is a particular issue when coupled with high energy prices which can increase risk of fuel poverty.

5.10 When coupled with other design features, they can also help to reduce the risks of overheating by maintaining a comfortable temperature indoors all year round (reducing heat infiltration during summer). Equally, in the context of the known constraints on existing electricity infrastructure, more efficient design helps to reduce additional energy demand being imposed by new development and the carbon emissions associated with grid electricity whilst power plants still rely on some level of fossil fuels.

5.11 The policy includes specific energy targets for EUI and space heating. In setting the specific targets for the total energy demand/EUI and space heating requirements, the Council has considered a range of sources. This includes recommendations from national industry best

practice such as produced for the UK Net Zero Carbon Standard, the Low Energy Transformation Initiative (LETI), the Committee on Climate Change, and others. It also includes a review of technical feasibility studies produced to inform similar adopted or emerging Local Plan from other local authorities (as summarised in the separate Net Zero Carbon Technical Feasibility literature review), as well as previous engagement responses on the development of the Local Plan (and the withdrawn Local Plan 2040).

5.12 In particular, the various sources above identify that whilst residential developments tend to be more standardised in energy performance, non-residential development typically have more variety and generally higher energy demands which can only be reduced so far. There are also particular challenges for high energy demand uses, such as those associated with some types of healthcare, as well as research (e.g. labs). This has led to Policy R1 including varying EUI targets for residential and non-residential uses, as well as an additional allowance for high energy demand uses to justify exceeding targets where necessary through their application (having made every effort to ensure other elements of the policy are met).

Requirements for renewable energy generation on new development

5.13 The other factor intrinsic to net zero carbon design is ensuring that the energy needs which cannot be designed out through efficient design are being met through clean, renewable sources wherever possible (step 3 in the energy hierarchy). Policy R1 therefore sets out that the overall EUI figure for the development needs to be met with sufficient renewable energy generation which should ideally be installed onsite. Keeping operational energy demands as lean as possible by meeting the minimum targets referenced earlier helps to reduce the amount of onsite renewables needed.

5.14 It is acknowledged that some types of development will struggle to match total energy demand through installation of sufficient onsite renewables. This is particularly the case for high energy demand uses, as well as constrained sites with limited roof space (e.g. for rooftop solar PV). The policy allows for different ways to overcome this challenge, including installing renewables offsite on land elsewhere that is within control of the applicant. Equally, there is an allowance for making a contribution into the Council's energy offsetting fund (discussed further below), which would utilise financial contributions from the applicant to pay for installation of an appropriate amount of renewables, or potentially other energy saving retrofit measures, elsewhere in the city.

Additional considerations which have informed the approach to net zero carbon

5.15 Whilst policy R1 has a number of prescriptive targets which relate to the performance of the building as outlined above, it is also important to highlight that the approach continues the existing LP2036 one of being technology agnostic. In practice, this means that flexibility is retained for applicants to justify the most appropriate technologies for their site in order to attain the targets and the policy is future-proofed where new technologies arise in future.

5.16 In relation to heating/cooling, often air source heat pumps are likely to be most effective, particularly as these systems are much more efficient than other systems like direct electric heating. However, the policy also encourages applicants to consider connection into heat

networks where this could offer a more sustainable option. The policy also supports the development of new energy centres and heat networks in recognition of the role these can play in supporting decarbonising of the city's energy systems.

5.17 The policy includes minimum energy performance targets which should be feasible for most development and that are comparable to best practice for net zero carbon development today. However, the Council acknowledges that there are likely to be challenges for some types of development, and where difficulties arise, the policy seeks to set out a clear and consistent approach to how these challenges should be dealt with through the planning process. In summary, this includes:

1. An allowance for non-residential uses with exceptionally high energy demands to align with a higher Energy Use Intensity target where it can be robustly justified, including the measures taken to limit this.
2. An allowance for offsetting as a last resort where the particular challenge of providing enough onsite renewables to meet total EUI cannot be fully met.
3. Where any other individual performance target cannot be met due to specific constraints of an application, the policy requires the proposal to demonstrate net zero carbon overall (in no circumstances will direct fossil fuel burning be a permitted solution to meeting needs). It also sets out a clear set of steps that an applicant should follow to meet the overall spirit of the policy.

Energy offsetting mechanism

5.18 Whilst the full process for the energy offsetting mechanism, including full offsetting costs, will be outlined in the Energy and Carbon Technical Advice Note, an indicative process and approach to pricing offset contributions is outlined below:

1. Applicants work through the policy criteria and clearly set out in their Energy and Carbon Statement how they have met this criteria.
2. Where any criteria cannot be met, applicants should set out robust justification for why the proposal is unable to meet the requirements. Justification should only relate to technical feasibility (e.g. site/design constraints).
3. The Energy and Carbon Statement should set out the total energy demand that needs to be offset because it is unable to be met through onsite renewable energy generating installations provided by the applicant. This would be devised by working out the total operational energy demand of the development per year, compared with the average annual renewable energy generation that can be achieved through installed renewables. The deficit in demand that cannot be met by renewables will be what is to be met through offsetting.
4. An S106/developer contribution will be agreed with the applicant as part of the planning application. The cost will cover the provision of an equivalent amount of renewable energy generation (or energy saving) elsewhere to match deficit onsite.

5.19 Policy R1 is focused on ensuring energy efficient development, meaning buildings designed to specified total energy use and space heating targets, as well as ensuring that all

energy needs are then met through sufficient renewable energy generation. Offsetting is only to be relied upon where a development is unable to meet its full energy needs through onsite generation, as such, the offsetting funds are envisaged to be utilised to support alternative energy generation schemes (or potentially to reduce energy demands in existing buildings) elsewhere in the city. The most practical way of delivering the offsetting requirement is likely to be the installation of rooftop solar elsewhere in the city, as such it is envisaged that the standard offset pricing is linked to the cost of providing comparable solar pv.

5.20 The energy offset fee is envisaged to be based upon the average cost for installing equivalent solar pv (per kwh) according to the regularly published national costs figures from the government. This would provide for a standard and transparent costing, which could be kept updated as the average cost changes over the lifetime of the plan. Administrative costs (e.g. 10% the offsetting fee) would be incorporated on top of the average solar pv installation cost as part of the overall offsetting payment. This would account for the Council's time and resource in establishing the offset fund as well as identifying, developing and managing appropriate offset projects.

5.21 It is envisaged that the pricing of these contributions would be published clearly on the Council website as part of the TAN, or separately, and updated regularly in line with the changing national cost of installing comparable renewables.

Addressing embodied carbon in the construction process

5.22 Despite the challenges identified earlier in this paper with addressing embodied carbon in the construction process, the Local Plan's Policy R2 is aimed at reducing embodied carbon through careful design choices. The policy sets out that all new development should demonstrate how the design process has considered embodied carbon emitted during the construction stage via their Energy and Carbon statement and includes a set of principles which are intended to be used as a framework guiding applicants in how to do this. The principles have been formulated to tackle the key drivers of carbon emissions (mainly at the construction phase) though not all will be relevant for every application and will depend on the context of the site and the type of proposal.

5.23 On larger scale development, the policy also requires completion and submission of Whole Life Cycle Carbon Assessment (WLCCA) demonstrating how embodied carbon has been quantified and reduced through the design process. Whole life/lifecycle carbon assessment is a process which details the predicted carbon emissions associated with each stage of a building's lifecycle, although the policy is focussed on upfront emissions related to construction specifically as these are most within the control of the applicant and design process.

5.24 Whilst the requirement for WLCCA is focussed on the largest developments, as these are likely to have the most significant carbon impacts, smaller scale development may still find WLCCA to be a useful way of evidencing how they have followed the other elements of the policy – but it is not a requirement.

5.25 Unlike Policy R1, Policy R2 does not set specific targets for reduction in emissions. The framing of the individual requirements set out above are, however, considered to be a pragmatic

step forward driving development in Oxford to start seriously thinking about issues of embodied carbon alongside designing to net zero carbon in operation from adoption of the Local Plan. In this way, the policy is intended as a stepping stone which lays a foundation for more rigorous requirements in future iterations of the Local Plan that can be further developed as industry knowledge on the subject and best practice matures (and if national policy continues to fail to take action). The approach also allows for a degree of flexibility on an application-by application basis where the balance between embodied carbon savings and other important placemaking issues which could ultimately result in a more sustainable development cannot be resolved easily.

5.26 The intention is to expand on the guidance for addressing principles as part of a supporting Technical Advice Note to accompany the policy, this will also allow the Council to signpost various independent guidance and best practice and keep this list updated as new references become available.

Supporting the retrofit of existing buildings

5.27 Beyond new development, there is a significant need for retrofitting existing buildings to meet net zero carbon goals, as well as to deliver climate adaptation. Many retrofitting measures, including installation of renewable energy generation technologies like solar panels, are classed as permitted development under the General Permitted Development Order (GDPO). This means that planning permission would not usually be required for such works – unless the buildings are listed or within a conservation area or if the works are more extensive than what is covered by the GPDO.

5.28 As these buildings have already gone through the planning process, the Local Plan has limited influence over them, except for where they come forward for planning permission associated with redevelopment in future. The Local Plan seeks to set out a clear signpost of support through Policy R3 for applications which involve retrofitting that would require permission.

5.29 Oxford has a high preponderance of older and historic buildings and many of these buildings will also require retrofitting in future, however, their particular qualities require additional consideration which policy R3 also makes clear. For example:

- Some types of retrofit that would be commonplace for most buildings, such as fabric efficiencies and improved air tightness, can be inappropriate for older buildings which rely on passive ventilation to control issues like moisture build up. Applying such measures to historic buildings can lead to problems of damp build up that can impact health of occupants and the building.
- Additionally, the Council also has a statutory duty towards protecting the historic environment which the Local Plan must also balance. In the case of designated assets, some solutions may not always be suitable, or will need to be carefully designed, especially where they might cause conflict or cause harm to the special features for which a building is protected.

5.30 The difficulty is that every historic building is different, and solutions that may be acceptable in some cases will be much more harmful in others. This variation in harm occurs even at the building scale, with certain facades being more sensitive than others. Policy R3 reinforces the position that the Council will recognise the public benefit of retrofit measures, however, in every case this will need to be balanced out against potential for harm. This is an important caveat which reflects our responsibility towards preserving Oxford's unique heritage and ensuring change is managed in the right way for these features. To aid applicants, the policy includes some general principles which proposals should demonstrate have been addressed in the design rationale for any intervention to aid in securing the most successful application.

5.31 A key aspect of the policy is the explicit reference to the need for taking a **Whole Building Approach** to retrofitting traditional buildings (including designated buildings). This is a way of ensuring that alterations to buildings are informed by a careful and methodical understanding of the context of the asset, its surroundings, and how it performs so that the correct interventions are selected for the sustainability of the structure and the health of occupants. This is particularly important for avoiding harm to valuable heritage features, but also for ensuring that improper retrofit measures that might cause harm to the functioning of the building and/or occupants' health are avoided. By showing that a proposal has been informed in this way, the applicant will be better positioned for a successful application.

5.32 The Local Plan policy is but one tool to help encourage retrofit of existing buildings. An update to the Council's existing Technical Advice Note on retrofitting historic buildings, available on the website here, will also help elaborate on the policy requirements with additional guidance and useful resources.

Ensuring new development is resilient to climate change

5.33 The Local Plan includes a range of policies which seek to drive more climate resilient design in new development. Most directly, policy G9, seeks to ensure applicants consider current and future climate projections and use this to inform their design. It also sets out a range of resilience measures that should be included where applicable, including measures to address overheating, water use, flooding.

5.34 Naturally, policy G9 crosses over with various other policies, particularly in chapter 4, including requirements for greening (which can bring multiple adaptation benefits in terms of managing water run off, flood risk and cooling); as well as for dealing with flood risk. Equally, there is some overlap with requirements for Health Impact Assessment, which would increasingly need to consider health risks posed by climate change.

5.35 More broadly, the Local Plan's policy G1 seeks to protect a network of green space in the city, and climate resilience was one consideration in defining the GI network, with spaces providing for significant amounts of flood storage (areas with more than 50% flood zone 3b) being assigned to the core GI network. Protecting open spaces will not only help

to ensure resilience against climate change in terms of people's health, but also help wildlife to adapt to climate change by being able to move through the city as easily as possible.

Appendix A – Policy options and preferred approaches

Policy options set 008a (draft policy R1): Net zero carbon buildings in operation

It is clear that the built environment contributes overwhelmingly to Oxford's existing carbon footprint as existing buildings contribute to emissions arising from the energy used to heat and power them. New buildings coming forward in the city will only add to these emissions unless they are designed to operate as net zero carbon buildings (which do not emit net additional carbon dioxide emissions in order to function).

Whilst the current Local Plan already requires improvements in carbon dioxide emissions over national building regulations standards, the current requirements do not ask for net zero carbon design. National buildings regulations are expected to be updated in future, and require net zero carbon ready development, but these will not deliver true net zero carbon buildings in operation (because Building Regulations does not address all energy sources in a building – only 'regulated' energy sources).

The options for policy that have been considered for the Local Plan therefore relate to how much further local standards should go beyond what is asked for in national building regulations now or in future. They also include whether or not to allow for offsetting on trickier sites.

Table 1 - Policy options set 008a Net zero carbon buildings in operation

Option for policy approach	Potential positive consequences of the approach	Potential negative/neutral consequences of the approach
Option a Specify design in accordance with energy hierarchy principles (including fabric-first) for all new development **and** permit no fossil fuel use in new buildings.	Designing in accordance with the energy hierarchy will help to ensure buildings are as efficient as possible from the ground up. Energy use is the primary source of carbon emissions from buildings in operation, tackling this will support carbon reduction but also potentially help address issues of fuel poverty and reduce demand on the wider energy grid.	Different types of application will have varying opportunity to apply the energy hierarchy – for example, it may be easier to take a fabric first across a new self-contained dwelling, compared with an extension to an existing dwelling. This could add complexity or confusion in the design process. There may be circumstances where there is a need for relying on fossil fuel systems – potentially where grid

	Preventing any additional fossil fuel combustion heating systems will help to reduce the need for retrofit later. This could also ensure that new development does not contribute further to air pollution, including NO2 levels, but also Particulate matter levels (PM) in the city. Direction of travel, including previous updates to Building Regs already (and will further) disincentivizes fossil fuel systems like gas boilers. Policy would lock in local commitment and ensure all new development accords with it from adoption of the plan.	constraints are unable to support fully electric systems for example. Equally, there may be opportunities for future technology advances to enable the transition of fossil fuel systems to cleaner sources (e.g. infrastructure and gas boilers being upgraded to function using hydrogen), although this is highly uncertain.
Option b **Mandate net zero carbon in operation (applying to <u>regulated</u> energy only)** from adoption of the Plan. Measure performance using Energy Use Intensity (EUI) as the primary calculation. Set targets for: • regulated energy use in the building, and • energy use associated with space heating, and • this energy use to be met through equal amount of new renewable energy generation (ideally onsite). Encourage net zero unregulated energy to be addressed as part of overall	Regulated energy use is a well understood area of operational energy consumption and there is good understanding about how to decarbonise it. It is currently addressed as part of Local Plan 2036 so would keep in line with current practices. Assessing net zero carbon performance using an Energy Use Intensity (EUI) calculation would measure energy use as recorded at the meter and is more reflective of performance. Measuring via EUI instead of traditional carbon % reduction targets allows for better comparisons of performance between buildings also.	The option is not in line with the government's current policy guidance for Local Authorities. A more prescriptive policy, with specific targets could limit innovation and become outdated more quickly, whilst also making for an overly technical policy. It may be difficult to set targets that are realistic for the range of building types that could come forward under non-residential development (e.g. schools, offices, warehouses etc). Encouraging net zero unregulated energy through the policy would not be as strong

approach where possible (e.g. seek opportunities to reduce, and to meet through additional renewable generation capacity).	Policy would still encourage developers to address unregulated energy where possible, which may secure some additional benefit for energy use/emissions associated with thus type of energy use, but would not make it compulsory.	of a requirement as requiring it.This could have implications for power grid capacity considering expected increasing demands on electricity nationally with the shift to net zero. Ultimately, this option could risk the city not meeting its targets in addressing climate change, or achieving local (2040) or national (2050) net zero goals, particularly where national grid takes longer to decarbonise.
Option c **Mandate net zero carbon in operation (applying to <u>regulated and unregulated</u> energy)** from adoption of the Plan. Measure performance using Energy Use Intensity (EUI) as primary calculation. Set targets for • total energy use (regulated and unregulated) in the building, and • energy use associated with space heating, and • this energy use to be met through equal amount of new renewable energy generation (ideally onsite).	Similar positives to option b, however, option c would resemble a more reaching policy encapsulating decarbonising of unregulated energy sources also. Unregulated energy can be a significant component of the total operational energy use of a building and it will need to be decarbonised in the same way as regulated energy in order to meet future net zero targets. This option would seek to ensure unregulated energy needs are met through sufficient on-site generation wherever possible, potentially reducing demands for power from the main power grid. This policy option is considered to be the most well-aligned with the measures	Similar negatives to option b, however, option c is likely to be much more challenging. Again, the option is not in line with the government's current policy guidance for Local Authorities and strays further in scope (than option a). Unregulated energy use is predominantly determined by occupant behaviour within the building once in operation, something that planning policy and the design/ construction process has limited influence on. There could be particular challenges for high energy demand, non-residential uses, such as healthcare and research (such as labs) with bespoke equipment needs central to their operation. Some flexibility may need to be built into targets used in such a policy.

	needed to accord with the city's 2040 Net Zero Carbon target (and roadmap/action plan) as well as the national net zero 2050 target. It should help boost micro-generation of renewable energy across the city and mitigate need for future retro-fitting. It also accords with the majority of industry guidance for designing to net zero carbon in operation e.g. (LETI, BRE GROUP etc).	More constrained sites and/or certain buildings (e.g. with limited roof space) may struggle to meet unregulated energy demands through on site renewables and may be pushed towards other forms of offsetting.
Option d **Mandate 'net zero ready' buildings, in line with the principles in the proposed Future Homes/Buildings Standard (which apply to regulated energy only)**. Measure compliance via national Building Regs calculations (e.g. SAP/ SBEM) demonstrating carbon reduction over notional building. Encourage net zero unregulated energy to be addressed as part of overall approach where possible. (e.g. seek opportunities to reduce, and to meet through additional renewable generation capacity)	This approach represents a less advanced one to options b and c but would be closer to the direction of travel outlined by central government in its consultations on the Future Homes/Buildings Standard. It would mandate the requirement for net zero ready homes from the Local Plan's adoption, even if the national standards are delayed or watered down and would seek to ensure that no further retrofit is needed to new developments in the future to bring them to net zero as the national grid decarbonises. Recognising that the proposals set out in FH/BS do not currently address unregulated emissions, this policy would still encourage developers to address unregulated energy through ensuring sufficient on-site renewable energy	Net zero ready development as currently set out in the Future Homes/Buildings Standard does not address total operational energy of buildings and would omit emissions associated with unregulated energy. Development built to this standard would not be net zero in terms of regulated energy until the national grid has fully decarbonised either, thus would be responsible for continued emissions. Encouraging net zero unregulated energy through the policy would not be as strong of a requirement as requiring it.This could have implications for power grid capacity considering expected increasing demands on electricity nationally with the shift to net zero. Ultimately, this option could risk the city not meeting its targets in addressing

	generation and to demonstrate this via submission of EUI calculations.	climate change, or achieving local (2040) or national (2050) net zero goals, particularly where national grid takes longer to decarbonise.
Option e For challenging typologies of development that have exhausted all onsite options to meet operational energy demand in line with other policy requirements, accept offsetting as a way to mitigate impacts through paying to provide offsite retrofitting to existing buildings elsewhere. Set out strict principles for how/when this would be accepted including that this option is **a last resort**. This would be framed as 'energy offsetting' (rather than carbon offsetting) and tied to the energy calculations of demand versus generation for the development.	Due to the constrained nature of many sites in the city, it may be difficult to incorporate technologies such as renewables onsite (or find spaces offsite) to balance out energy use, thus offsetting may be necessary. It could be an option where all other approaches are exhausted. Collection of an offset fund could potentially create a pot of money which could be utilised to deliver carbon reduction measures elsewhere in the city (e.g. existing buildings in need of retrofit).	There is the risk, as evidenced elsewhere with similar schemes, that offsetting could be more attractive than delivering onsite measures leading to poorer performing buildings. Offsetting shifts the problem of carbon emissions elsewhere and does not address the real need to deliver truly net zero buildings from the beginning. Offsetting projects would need to be identified, resources would need to be found to monitor their delivery, manage the fund, and ultimately ensure a 1-to-1 offset in carbon emissions between the project and the contributing development.
Option f Set no local standards on net zero carbon design of new buildings. Conform with the approach advocated by the Written Ministerial Statement 2023 and rely on national standards set out in Building Regulations, including the upcoming uplifts associated with Future Homes/Building Standard which is envisaged to deliver 'net zero ready' development from 2025 onwards.	Similar to option d but not setting any expectation/local direction on net zero carbon design standards. This option would mean greater consistency for developers building in Oxford compared to elsewhere and less complexity in the planning application process. At the design stage, regulated emissions are the primary area that can be influenced thus Building Regs process could achieve this.	This approach ignores the local context of Oxford, such as its 2040 local net zero carbon target. Previous updates to Building Regs have been slow historically, and Future Homes/Buildings Standard is not yet guaranteed (at time of writing the results of the last consultation on the options it proposed have not even been released).

		Even when in place, the updated building regs will not deliver net zero carbon until the grid is decarbonised, it will also not address unregulated/embodied carbon (in its current proposed form). Ultimately, this option would be even more likely (than other options) to risk the city not meeting its targets in addressing climate change or achieving local (2040) or national (2050) net zero goals, particularly where national grid takes longer to decarbonise.

Initial sustainability appraisal screening of options sets
Is there only one option or are there various options we could take? - various options/combinations e.g. A+B, A+C, A+D, E, F **High-level screening conclusion? -** the options are similar to each other from a sustainability perspective **Screened in for detailed appraisal? -** No **Rationale:** In terms of options, it would be appropriate to consider having a policy or not as there is no specific NPPF demand either way, though local context supports the inclusion of some sort of policy, the considerations then are how far such a policy goes in requirements. The options that the Council has considered represent various approaches to setting policy for new development to deliver upon net zero carbon in operation through use of various combinations of requirements relating to: types of energy addressed (e.g. regulated or unregulated); use of specific targets for energy use (space heating and total); requirements for renewable energy generation; as well as the methodologies for calculating performance (e.g. SAP or EUI). Whilst options b, c, d and f, represent four alternative approaches, some of the options (options a and e) are not strictly alternatives, but rather additional options for a policy to cover and, whilst option a could stand alone, it could also be incorporated alongside one of the other options, as with option e (offsetting) which is less likely to stand alone. In terms of sustainability impacts, the different options all relate primarily to levels of mitigation that the Local Plan could ask for in relation to new developments' energy use and carbon emissions and would be assessed against similar criteria within the SA assessment framework – particularly criteria **1. Carbon emissions**, **2. Resilience to climate change**, but also potentially **5.**

Inequalities (because of potential influence on fuel poverty) and **11. Urban design** (because higher standards may push towards more standardised design styles/shapes in buildings and limit design innovation). As the differences between the options are essentially in how they propose to technically implement net zero carbon design, as well as in how far they push in terms of standards applicants must meet, there would be some variety in the extent of any impact each option would incur against the SA criteria – particularly the extent of positive impact under criteria 1. 2. and 5. and variation between neutral or minor negative impact under criteria 11. (because as standards get stronger and potentially limit design). Option f would mean no local policy requirements, however, this is likely to still be accompanied by some positive impact for criteria 1. 2. and 5. because of the expected tightening of national building regs to move new development towards being net zero ready, although the positive impact is going to be reduced and would take longer to begin to take effect (it is likely to be negative/neutral in the immediate term). Overall, it is considered that the sustainability impacts from the options do not differ enough to warrant them being scoped in for detailed appraisal.

Net Zero Carbon buildings in operation – Policy R1

The preferred approach is to take forward a combination of **options A, C and E**. Whilst the approach would risk not aligning with central government expectations (because it sets energy standards for development that exceed national standards), this approach is considered necessary to ensure new development does not compromise the city's ability to meet net zero carbon targets in future.

The combination of **options A and C** will help reduce need to retro-fit buildings in future and also help to address risks of fuel poverty for occupants of new buildings by reducing energy demands to operate buildings and drive renewable energy onsite, which can help with bills. Equally, driving more energy efficient buildings are important for reducing burdens on the wider energy grid.

The addition of **option E**, which makes an allowance for offsetting is considered to be a necessary and pragmatic approach, recognising that delivering net zero buildings in operation will be challenging for some typologies. It should only be allowed for as a last resort, once all onsite options for meeting the rest of the policy have been explored. Where utilised, the offsetting mechanism could help to deliver retro-fitting of existing buildings, which is also a potential positive (though the preference is for the mechanism to be used sparingly, if at all).

Policy options set 008b (draft policy R2): Embodied Carbon

In addition to the carbon dioxide emissions related to a building whilst it is in operation, there is also an upfront embodied carbon cost associated with constructing them as was touched upon earlier. Embodied carbon in construction can be influenced by a wide range

of factors, from the types of materials used in construction, to where these are sourced from and how they are processed, making this topic a highly complex one, subject to various considerations. As set out in Section 3 of this paper, the balance between addressing embodied carbon and achieving other place-making concerns in the planning process is not always clear either.

The stronger and more explicit a policy is, the more challenging it could be to implement, particularly as national guidance and industry understanding is still emerging. Nevertheless, whilst the current Local Plan is not explicit in requirements to reduce embodied carbon, it is important that development at least begins to consider and take action to address this topic in order to mitigate impacts on the wider environment and climate change. The options for policy relate to how far the Local Plan should go in requiring applicants to address embodied carbon.

Table 2 - Policy options set 008b: Embodied Carbon

Option for policy approach	**Potential positive consequences of the approach**	**Potential negative/neutral consequences of the approach**
Option a Include high level principles for limiting embodied carbon, including the importance of retaining existing buildings where possible. Guidance would be expanded upon in accompanying technical advice note (TAN).	A strong set of principles for addressing embodied carbon (an area where industry guidance/learning is more limited at present) would ensure the issue is not ignored, whilst leaving flexibility for applicants to respond in the most suitable way per application. Providing more detailed guidance in an accompanying TAN would allow for expectations to be expanded upon and guidance to be regularly updated considering evolving knowledge/guidance which is less developed than for addressing operational energy.	This is an area of evolving guidance and understanding and broad principles could be difficult to formalise in policy. Equally, principles need to retain a level of flexibility to enable innovation and adaptation to specific context of individual sites and schemes.
Option b *Unless superseded by future updates to Building Regulations (or other national policy).*	Requiring larger development to measure embodied carbon at the construction stage will allow for improved understanding of the embodied carbon	Assessment methods for measuring embodied carbon in construction can be resource intensive and could be challenging for some smaller scale major

Set more specific requirements for major development requiring a measurement of embodied carbon during construction through a recognised methodology and require applicants to demonstrate specific actions taken to reduce this as much as possible. Applicants would complete and submit a Whole Life Cycle Carbon Assessment demonstrating how embodied carbon has been quantified and reduced.	problem. It will enable a more informed approach to addressing the issue and requiring applicants to demonstrate how they have taken action to reduce it will be an important step forward in delivering net zero construction. This could be expanded upon in future iterations of the local plan as national guidance and understanding on this issue grows.	development – setting an alternative/appropriate threshold for where these would be required may require further consideration. Demonstrating actions to reduce embodied carbon in major schemes is less prescriptive than setting a fixed maximum target for embodied carbon. It also risks a lack of clarity for applicants about how far the Council expects them to go in justifying their approach in an application and in the level of detail they will be asked to provide.
Option c *Unless superseded by future updates to Building Regulations (or other national policy).* Set more specific requirements for major development requiring a measurement of embodied carbon during construction through a recognised methodology. Require applicants to demonstrate that they have kept embodied carbon levels to within a specific maximum target for embodied carbon on new developments. Applicants would complete and submit a Whole Life Cycle Carbon Assessment demonstrating how embodied carbon has been quantified and how they have aligned with policy target.	Same benefits as option C but going further requiring that embodied carbon levels are kept to within a certain limit. This is likely to have more effect at reducing overall embodied carbon footprint of new development. Clear targets could also provide greater clarity to applicants about the level of action the Council expects them to take/demonstrate in order to address embodied carbon in the design process.	Setting specific targets to comply with will reduce the level of flexibility for applicants to respond to various drivers influencing design of proposals on particular sites. Rigid targets may not be achievable on some sites in the city and this more prescriptive approach to policy would make their redevelopment more challenging. Setting specific targets could be challenging at policy level considering the complexities of accounting for it in construction processes and the evolving nature of guidance/industry knowledge on this issue. Equally, it may be challenging for applicants to deliver upon

		or satisfactorily respond to in a planning application. Alongside net zero carbon in operation, targets for embodied carbon are likely to have additional viability impacts.
Option d Do not include any policy requirement setting principles or targets/requirements for measuring embodied carbon.	There is potential for future updates to national policy/ Building Regs that would address embodied carbon, which may render reference in the plan unnecessary.	Previous updates to Building Regs have been slow historically, and Future Homes/Buildings Standard is not yet guaranteed. Even when in place, the updated building regs will not deliver net zero carbon until the grid is decarbonised, it will also not address unregulated/ embodied carbon.

Initial sustainability appraisal screening of options sets
Is there only one option or are there various options we could take? - Yes, various options (e.g. options A alone, A+B, A+C, D) **High-level screening conclusion? -** the options are similar to each other from a sustainability perspective **Screened in for detailed appraisal? -** No **Rationale:** Option a proposes setting general principles for applicants to follow in order to take action on reducing embodied carbon, whilst options b and c represent alternative ways of setting further standards for larger scale developments. Both options b and c require these types of applications to submit evidence showing they've quantified their embodied carbon and quantifying how much they have reduced this, however, option c goes further and sets a specific target that should not be exceeded. Option d is to set no local policy requirements for addressing embodied carbon. In terms of sustainability impacts, the impacts arising from the options most directly relate to SA **criterion 1. Carbon Emissions.** For this criterion, option a is likely to have a slight positive impact, though will depend upon implementation, and may not result in any significant reductions in embodied carbon emissions. Option b and c have increasingly positive impacts as they begin to set

standards for quantifying the emissions and actual reductions secured, so are likely to have more meaningful impact, though they will not negate all emissions so the positive impact would be minor overall. Option C is

Embodied carbon in the construction process – Policy R2

The preferred approach for this topic is a policy that comprises of **options A and B.** The policy approach would essentially act as a stepping stone, introducing requirements for the city where very little currently exist, but also recognising that embodied carbon is an area of complex topic and one where understanding is still emerging.

Option A would apply to all proposals, but the principles it would propose will vary in relevance depending on each specific site context and type of development proposed. The principles would act as important considerations to guide applicants when designing their proposals, whilst remaining flexible enough to respond to the varying context that each application for development is brought forward in. **Option B** would seek to push larger developments towards taking more explicit action in addressing this topic. Whilst the option does not impose specific targets to limit embodied carbon to, which some may feel limits the effectiveness of the policy, it would help to ensure the largest schemes with the most significant potential impacts are transparently calculating embodied carbon and specifically demonstrating the types of measures they propose to reduce this and by how much.

The options together will help to improve awareness and understanding around this topic which will be of increasing pertinence in future. They will form an important step forwards towards potentially more stringent requirements in future, either locally or nationally.

Policy options set 008c (draft policy R3): Retrofitting existing buildings including heritage assets

The Local Plan will have limited influence over existing buildings that have already gone through the planning process, yet the earlier analysis in this background paper highlights that these buildings collectively form a significant source of carbon emissions which will need to be retro-fitted to help achieve local and national net zero targets. Many retro-fitting measures, such as fabric efficiency and installation of renewables, can be undertaken without planning permission, but where permission is required the Local Plan can help applicants to approach these projects in the right way.

This is particularly important for traditional buildings and heritage assets which can have special qualities which need to be conserved (particularly where these benefit from national designation). It will also help avoid problems of maladaptation which could lead to negative impacts for occupants' health (e.g. impairing passive ventilation processes many of these buildings rely on and that

is essential for avoiding damp build up). The options set out for this topic therefore mostly focus on how the Local Plan policy should treat applications impacting traditional and historic buildings.

Table 3 - Policy options set 008c: Retrofitting existing buildings including heritage assets

Option for policy approach	Potential positive consequences of the approach	Potential negative/neutral consequences of the approach
Option a Include a presumption in favour of retrofit measures for all existing buildings that are not heritage assets or in the setting of, subject to certain conditions, where these measures secure demonstrable carbon reduction/energy efficiency/climate adaptation.	This policy recognises the high priority afforded to the retrofit need in the city and seeks to ensure that retrofit measures that require planning permission will be supported wherever possible – particularly where demonstrable benefits for climate (mitigation or adaptation) can be evidenced. It highlights that as a starting point, such measures are presumed to be acceptable on planning grounds. This additional certainty is intended to support and encourage more occupants to pursue retrofit projects.	The local plan has limited direct influence on retrofitting of existing properties unless they need planning permission (many small-scale improvements are considered permitted development and would not). Any such policy can only be supportive, as and when such measures do require planning permission. Whilst this policy would highlight the importance which we assign to supporting retrofitting measures in existing buildings, there will be other material considerations which have to be weighed up against this policy and could still ultimately be determined to outweigh this presumption in favour.
Option b In relation to designated heritage assets and historic buildings, or proposals within conservation areas, set out that carbon reduction/ energy efficiency/climate adaptation measures will be considered as public benefits that may outweigh harm.	This option addresses the retrofit need in the context of historic buildings and heritage assets and responds to the particular challenges present in the need to balance heritage considerations. It guides applicants to follow Whole Building Approach in order to ensure retro-fit maximises opportunities for	Same negatives as for option a as well as the following: Listed buildings and other heritage assets are afforded statutory protection which is over and above that given through planning controls. Great weight is given to preserving or not harming the

Be explicit in setting out some key principles to follow, including the need for taking a Whole Building Approach to retro-fit. Expand on guidance through a Technical Advice Note (updated from the current version of TAN 15 supporting Local Plan 2036). This additional supporting guidance could expand on this complex topic such as by flagging measures that would be more or less likely to cause harm (e.g. permanent versus temporary), and how levels of harm would be assessed against public benefit.	carbon reduction/climate adaptation and minimises potential for harm to the asset or its occupants (e.g. through maladaption). Same benefits as option a, however, this option would seek to provide further certainty for how retrofit of heritage assets will be considered through the planning application process. It would provide clarity on how to approach design of retrofit projects for these assets, setting out the key issues the Council would want to see addressed in an application for it to be succesful. Yet this option would also benefit from leaving flexibility for approaching each project in a way that is tailored to the specific context of the site and the particular features for which it is protected. Would also help to address the complexity in navigating how harm to heritage assets needs to be balanced with benefits of retrofit (e.g. carbon reduction/climate adaptation) in the decision-making process.	significance of these heritage assets, and this must be borne in mind when considering measures of change to buildings or retrofitting measures to combat or mitigate the impacts of climate change. In supporting retrofitting of older buildings, a policy will have to take account of the protection afforded to heritage assets and the need to preserve their values. Setting out principles that applicants would be expected to follow, as opposed to specific measures that would be acceptable or not, would still leave a fair amount of site-specific analysis for occupants to undertake. They would still need to set out project-specific justification for why a particular design (and set of retro-fit measures) has been selected. There is a risk that this quite complex topic of retro-fitting heritage assets remains a challenging one to navigate for applicants.
Option c In relation to designated heritage assets and historic buildings, or proposals within conservation areas, set out that carbon reduction/ energy efficiency/climate	Similar benefits as options above but without the additional flexibility for approaching site specific considerations relevant to retro-fit of heritage assets as is offered in option b.	Same negatives as above aside from the point about flexibility as is offered in option b which seeks only to set out key principles to follow.

adaptation measures will be considered as public benefits that may outweigh harm. Be explicit in setting out some key principles to follow, including the need for taking a Whole Building Approach to retro-fit. Additionally, set out in the policy the retro-fit measures that would be more or less likely to cause harm (e.g. permanent versus temporary), and how levels of harm would be assessed against public benefit. Expand on this through guidance in an updated version of Technical Advice Note 15.	Listing specific retrofit measures that would be more or less suitable in a policy potentially provides greater certainty to applicants as to which measures would be more appropriate versus those that would be viewed as more harmful in a heritage context. It might reduce some of the uncertainty around what would be acceptable for such applications.	In addition, option c's approach of setting out specific measures in the policy that may cause more or less harm would have its own potential negatives. This is because it is likely that identifying a strict list of measures that cause less harm in a policy will be challenging when the character and value of heritage assets and their setting varies so much across the city. Such a policy is likely to be highly complex to present in the Local Plan and subject to many caveats because it is unable to grapple with the level of detail needed to be truly helpful to applicants (and likely better suited to an optional Technical Advice Note instead). Ultimately, decisions will still have to be made on a case-by-case basis, thus the benefits of this approach may be undermined.
Option d Do not include policy addressing retrofitting of existing buildings and/or heritage assets.	The local plan has limited direct influence on retrofitting of existing properties unless they need planning permission (many small-scale improvements are considered permitted development and would not). Any such policy can only be supportive, as and when such measures do require planning permission. It would also be limited by the need for balancing other	This would ignore the significant need for pursuing retrofit projects on existing buildings in the city to reduce our carbon footprint. Any policy in the plan is likely to have limited effect in directly driving retrofit measures, however, by highlighting that such measures would be supported and providing clarity on what is most appropriate where, this could help to

	relevant planning issues in the decision-making process (such as any potential harm to protected heritage features).	avoid the planning system being seen as a barrier to uptake where such measures are planned and require planning permission.

Initial sustainability appraisal screening of options sets
Is there only one option or are there various options we could take? - Yes (e.g. options A, A+B, A+C, D) **High-level screening conclusion? -** the options should be screened in for detailed appraisal **Screened in for detailed appraisal? -** Yes **Rationale:** Option a sets out a presumption in favour of retro-fitting for non-heritage buildings, meanwhile, options b and c are alternative approaches for how local policy could support retro-fit on heritage assets and represent alternative approaches which could be combined with option a. Option d would mean no local policy requirements in relation to retro-fitting. Options a, b and c would all likely have some positive impact for **SA criterion 1. Carbon Emissions** and **SA criterion 2. Resilience to Climate Change** through establishing a local policy environment that is as supportive and enabling of retro-fit of existing buildings in order to achieve carbon reductions/energy efficiency or climate adaptation. Option b and c would have slightly more positive impact as they would also relate to the city's various historic buildings. Local Plan policy cannot enforce retro-fit of existing buildings and, in relation to historic assets, there are also other competing considerations that may limit the positive impact, meaning the options are likely to result in minor positives at best. Whilst Options b and c might increase the scope for positive impact against criteria 1. and 2., because these options would explicitly support sensitive retro-fit on heritage assets, they do also introduce the potential for harm to the special characteristics for which many are designated – thus resulting in a potential negative impact against **SA criterion 11 Urban Design and Historic Environment,** though the extent of this impact would depend upon implementation and types of assets that are retro-fitted, but should be reduced through following the key principles such a policy would set out. Option D would result in neutral impacts against the criterion because it would neither cause additional harm (indeed emissions are likely to continue to reduce in some respects e.g. as national grid decarbonises), nor will it result in specific positive impacts (there is no national requirement to undertake retro-fitting). The balance between competing priorities of reaching net zero through retro-fit and also continuing to preserve and enhance the historic environment which is intrinsic to Oxford is a complex one. Whilst the potential sustainability impacts arising from the

options are not expected to be significant, the extent of negative impacts under options b and c could vary. Based on this initial screening, it is suggested that the option set should be scoped in for further detailed appraisal.

Retro-fitting existing buildings including heritage assets – Policy R3

The preferred approach for policy addressing retro-fitting in the new Local Plan is a combination of **options A and B.** This would make it clear that the Council supports retro-fitting existing buildings, but that for traditional buildings and heritage assets this support is contingent on applicants demonstrating they have approached the design of retro-fit projects in the right way.

Option B includes that the policy would set out the need for taking a Whole Building Approach to retro-fitting traditional buildings and heritage assets along with some other key principles to follow. It would then refer applicants to a more detailed Technical Advice Note, which can be kept updated as regularly as needed, to provide additional guidance. This would ensure that the key considerations that an applicant needs to address as part of their application are set out in the policy. However, it would allow flexibility to take into consideration varying contextual factors that might need to guide design on a case-by-case basis, as there is unlikely to be a one-size-fits-all solution that will work for every building and site in the city.

The option set was scoped in for testing through the Sustainability Appraisal (SA) to better understand the effects of each option and any potential for significant effects. The SA testing indicates that this preferred approach would have the most sustainability benefits according to the SA testing, although potential for negative impacts in terms of the historic environment would need to be mitigated through careful wording of the policy in terms of guidance for applications impacting traditional buildings/heritage assets.

Policy options set 008d (draft policy G9): Resilient design and construction

Oxford is at risk from climate change, particularly in relation to increased flood risk, water stress, overheating and more intense weather events generally. Climate resilience will be supported by various policy areas in the Local Plan, and various climate adaptations such as greening can have multiple benefits not just for making places that are healthier and more comfortable for people. A specific policy could be beneficial in ensuring that the key issues of relevance are flagged to applicants and in guiding them towards considering future climate as part of their design process. The options presented below relate to what this policy approach could look like.

Table 4 - Policy options set 008d: Resilient design and construction

Option for policy approach	Potential positive consequences of the approach	Potential negative/neutral consequences of the approach
Option a Set out a discrete adaptation/ resilience policy, whilst continuing to address risks in other policies where relevant. Ask applicants to demonstrate how they have designed in accordance with policy via the design checklist or a separate checklist. Cross referencing to other relevant policy requirements (e.g. flooding) as well as incorporating other specific requirements such as: • Need for climate resilience impact assessment; • Details of a cooling strategy (for the building and surrounding spaces in large schemes, addressing alignment and shading) intrinsic to the design (not having implications for carbon use), including measures for addressing overheating risk for lifetime of development; • Measures to conserve/recycle water; • Flood resistance/resilience measures; • Supporting infrastructure such as electricity supply and broadband	Would set out a strong position/stance on the issue of climate adaptation and building resilience to climate impacts which could negatively impact on health and wellbeing. Bringing the range of policy areas into one checklist, ensuring applicants are looking at them through the lens of climate resilience, could be helpful. Would specifically pick up on issue of overheating, a key risk in the city moving into the future, and require applicants to detail what measures they have included in design/construction to address this and maintain thermal comfort for occupants during hot summer periods. Likely to go further than what is asked for in Building Regs alone.	Many aspects of climate adaptation will be dealt with through other policies, there is a danger of repetition e.g. with health, flood risk, design, and GI. Will need to find a consistent and concise way for applicants to demonstrate they have met these policy requirements without forcing them to repeat work in multiple places in their application. The design checklist would be one means of doing this. Could allow for cross-referencing to evidence prepared to meet other policy requirements where relevant.

designed to function in extreme weather conditions (such as prolonged periods of very high temperatures or heavy rainfall).		
Option b Require major development to achieve certification against a recognised sustainability assessment e.g. BREEAM/HQM.	There are several sustainability certification schemes in existence which are well recognised by industry such as BREEAM. These schemes often take a holistic view of design and ensure that considerations like climate change are weighed up alongside other design measures. Certification would ensure a high standard of sustainable design in major developments and help to ensure consistency across for applicants.	Schemes such as BREEAM are not specifically focused on climate resilience/adaptation alone, it is usually one element that is assessed amongst a range of sustainability considerations. Points that underpin certification can usually be scored across a variety of categories – though we could require points in certain places as we do at present with requiring 4 points under the water topic of BREEAM under RE1. This option would force applicants to pursue independent certification with a particular provider, though we could specify that any equivalent is acceptable to provide more flexibility. Relying on this kind of certification alone may not fully maximise climate resilience objectives. Likely to incur additional costs and resource demands for applicants.
Option c Address climate risks as theme purely through other policies e.g. design flood	Ensures resilience/adaptation is central to thinking across local plan policy framework.	Climate resilience aspects can be lost amongst other objectives when they are not given sufficient consideration.

risk, green infrastructure. No requirement for specific policy addressing issue.	Avoids repetition of requirements/considerations set out in other complementary policy areas (e.g. flooding and green infrastructure).	There are some specific adaptive measures, and wider sustainable construction issues which may not easily fit into other policy areas without making them overly long/ unwieldy.
Option d No policy on climate adaptation/resilience – rely on national guidance.	Some elements of building resilience to climate change will necessarily be covered elsewhere e.g. flood risk requirements are strong in NPPF, overheating within building regs.	Ignores local context – e.g. heritage, dense urban environment, as well as identified climate risks facing the city in future. National policy hasn't traditionally been particularly strong on adaptation. Could miss opportunities to tie together benefits for many complementing agendas – e.g. health, air quality.

Initial sustainability appraisal screening of options sets
Is there only one option or are there various options we could take? - Either option A, B, A+B, C, C+B, or D **High-level screening conclusion? -** the options are similar to each other from a sustainability perspective **Screened in for detailed appraisal? -** No **Rationale:** The options represent different approaches to incorporating requirements for applicants to deliver climate resilient design into local policy or not. Option a would be to have a bespoke policy with a checklist of requirements for them to address where relevant and option c would instead scatter these requirements across other policies. Option B would instead require applicants to achieve certification against an independent sustainability certification scheme, which could be standalone or in combination with option A or C. Option D would be to have no local policy requirements about climate resilient design. Most directly these policy options relate to **criterion 2. Resilience to climate change**, although the wide-ranging nature of climate resilient design means that these policy options can indirectly impact a variety of other criteria such as **criterion 7. Green Infrastructure** (where resilience measures include greening), **criterion 5 inequalities** (where resilient design reduces health risks

from climate change), though this is more dependent upon implementation and challenging to appraise. In relation to criterion 2, however, the options are all likely to represent minor positive impacts, other than option d, with the differences between them being more about how a local policy approach is implemented through the local plan. Option D is assumed to be neutral (because national policy has enough requirements to at least ensure some level of risk mitigation such as through national guidance on addressing flooding and Building Regs addressing overheating to some degree). Overall, the differences between the options are not significant enough in sustainability terms to warrant being scoped in for a detailed appraisal.

Resilient design and construction – Policy G9

The preferred approach is **Option A.** This acknowledges climate risk as a key issue for health and wellbeing of people and the sustainability of the wider city and will allow the Local Plan to guide applications in considering future climate change as part of the design process. The key issues of concern relevant to Oxford and its particular climate change risks can be set out in the policy and applicants can be encouraged to incorporate resilience measures to address them through the design process.

There is likely to be overlap with other policy areas, e.g. requirements for addressing flood risk, or providing green infrastructure, and information provided to meet other policy requirements can be used to support meeting this policy's requirements. The policy will help to ensure that these aspects of design are approached through the lens of adapting to climate change in particular, which may not always be the focus, and will help reduce the chances of opportunities for resilience building being missed.