Chapter 2. **Climate change**

Strategic Policy CC2.1 Promoting Sustainable Design to Mitigate and Adapt to Climate Change

1. To make Merton a more environmentally sustainable place and net-zero carbon by 2050 [1], Merton Council aims to reduce greenhouse gas emissions and increase local resilience to the impacts of a changing climate through sustainable design.

2. This will be achieved by requiring all development to:

a. Minimise greenhouse gas emissions and support the transition to a low carbon society by maximising energy efficiency, low carbon heat and local renewable energy generation;

b. Support the principles of the circular economy and promote more effective resource use, to ensure that resources are kept in use for as long as possible and to minimise waste;

c. Recognise and adapt to Merton's changing climate and ensure that development mitigates the risk of overheating and flooding, and maximises comfort and wellbeing in a changing climate;

d. Maximise opportunities to enhance green infrastructure and tree planting to deliver multi-functional benefits such as minimising the urban heat effect, enhancing natural carbon sinks and improving air quality; and

e. Promote healthy and sustainable lifestyles in line with Merton's net-zero carbon target.

Supporting text

2.1.1 In accordance with the NPPF-Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.'

A Climate Emergency and carbon reduction targets

2.1.2 In 2018, the Intergovernmental Panel on Climate Change (IPCC) published a Special Report [2] which concluded that global greenhouse gas emissions[1] need to reach net-zero by 2050 in order to keep global temperature rise below 1.5°C and minimise damaging climate impacts on human and natural systems. In May 2019, the Committee on Climate Change (CCC) recommended a new long-term emissions target for the UK: net-zero

[1] Also referred to throughout the Local Plan as carbon emissions.

greenhouse gases by 2050 [3]. Following the adoption of the Climate Change Act 2008 (2050 Target Amendment) Order in 2019, the UK has a statutory requirement to reduce its greenhouse gas emissions by 100% by 2050 (based on 1990 levels) [4].

2.1.3 Furthermore, in his 1.5C Compatible Climate Action Plan 2018 [5] and Environment Strategy 2018 [6], the Mayor of London committed to London becoming a net-zero carbon city by 2050, with energy efficient buildings, clean transport and clean energy.

2.1.4 In July 2019, Merton Council declared a Climate Emergency and committed to working towards becoming a carbon neutral borough by 2050 and a carbon neutral council by 2030 [7], in line with the national and regional targets mentioned above. Merton's Climate Strategy & Action Plan [1], which was approved by Council on 18 November 2020, sets out the key actions required to achieve these carbon reduction targets across a range of sectors: economy, transport, buildings and energy, and green spaces.

2.1.5 By 2050, Merton will need to decarbonise activities across all sectors. This will require: a transition to a low carbon and circular economy which promotes the effective use of resources and minimises waste; all journeys using petrol and diesel vehicles will need to be replaced by low carbon alternatives such as cycling and walking, and low carbon vehicles; and emissions from all existing and new buildings will need to be net-zero carbon by minimising energy demand, and meeting all our energy needs using renewable and low carbon energy [1] [8].

2.1.6 With some 81% of greenhouse gas emissions in Merton being generated from the energy used to heat and power our buildings, decarbonising our building stock will be a fundamental step in becoming a net-zero carbon borough [1]. The following policies aim to drive net-zero carbon development in Merton through sustainable design. These policies should be read alongside Merton's Design and Housing policies in this Local Plan.

2.1.7 However, development should also encourage sustainable lifestyles more broadly. For example, development should reduce the need to travel, particularly by private car, and ensure that the largest possible share of journeys are made by active travel and public transport, as set out in Merton's Sustainable Travel policies. Merton Council also encourages development to support community-led initiatives such as local food growing as set out in Merton's Green Infrastructure and Health & Wellbeing policies.

The role of sustainable design in getting to net-zero carbon

2.1.8 All buildings in Merton will need to operate at net-zero carbon by 2050 in order to achieve our carbon reduction target. A building which operates at net-zero carbon does not burn fossil fuels, has ultra-high energy efficiency and is 100% powered by renewable energy [9].

2.1.9 Extensive retrofit will be required to decarbonise Merton's existing building stock given that low carbon heat solutions require reasonable levels of energy efficiency (at least an Energy Performance Certificate (EPC) rating of C) [5], and more than three quarters of Merton's 88,000 homes have an EPC rating of D or below [1]. The costs of achieving higher standards via retrofit are three to five times higher than for new buildings and the carbon impact of delayed action is significant [10]. Merton's decarbonisation pathways modelling estimated that retrofitting Merton's existing building stock would cost in excess of £2.7 billion [8].

2.1.10 In order to achieve our carbon reduction target as cost effectively as possible, all new development must therefore be fit for the future (i.e. be ultra-energy efficient and climate resilient, and maximise low carbon and renewable energy) [11]. Any new buildings which are not built to operate at net-zero carbon will require expensive retrofit in the next 30 years.

2.1.11 Current housing projections for Merton indicate that a minimum of 12,084 additional homes will be built during the plan period. Policy must therefore ensure that new development in Merton does not create a legacy of poor performance that will require remedial action in the future and add to Merton's retrofit burden. In their Climate Emergency Design Guide (2020), the London Energy Transformation Initiative (LETI) concluded that all new buildings will need to operate at net-zero carbon by 2030 in order to achieve a zero-carbon built environment in the UK by 2050. This means that all new buildings must be designed to operate at net-zero carbon by 2025.

2.1.12 Developers must consider sustainability early in the design process in order to maximise energy and carbon savings, and minimise construction and operational costs.

The policy gap and the need for higher local standards

NATIONAL STANDARDS – PART L OF BUILDING REGULATIONS

2.1.13 The UK Green Building Council defines a net-zero carbon operational building as follows: "When the amount of carbon emissions associated with the building's operational energy on an annual basis is zero or negative. A net zero carbon building is highly energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset."

2.1.14 There is a significant gap between current building standards (Part L 2021) and the standards required to become net-zero carbon by 2050 [51]. In order to achieve a net-zero carbon balance across the UK housing stock, LETI found that all new development will need to be designed to achieve an Energy Use Intensity (EUI), i.e. energy use measured at the meter, of 35kWh/m^2/yr [9]. However, the Part L average EUI in 2020 was 140 kWh/m^2/yr.

2.1.15 It is widely accepted that there is a significant performance gap between predicted and actual performance using the Part L methodology [9] [11]. Reasons for this include, but are not limited to, the following:

a. Part L does not address emissions associated with unregulated equipment such as fridges, washing machines, cooking equipment, computers, etc. which can represent up to 50% of a building's operational emissions [9]. This means that a building achieving a 100% improvement against Part L doesn't necessarily achieve net-zero carbon operational emissions.

b. The relative improvement approach against a notional building used in Part L does not reward more efficient building forms which ultimately provide more energy and carbon savings [12].

c. Delays in incorporating up to date carbon factors in Part L can lead to perverse modelling outcomes by overestimating the carbon savings from gas [10]. Part L also overestimates the emissions associated with electricity use over a building's lifetime as it does not consider impacts of further projected reductions in carbon intensity of electricity in coming decades.

2.1.16 In addition, in recent years, policies supporting low-carbon homes, such as Zero Carbon Homes and Code for Sustainable Homes, have been weakened or withdrawn at a national level [11]. Policy proposals encouraging high energy efficiency such as the 'Interim' and 'full' Fabric Energy Efficiency Standards defined by the Zero Carbon Hub in 2009 [13] have not been enforced through Building Regulations which has led to the development of buildings which are not future-proofed for 2050 [14].

2.1.17 Building Regulations are expected to be updated in 2025 but current proposals for the Future Homes Standard 2025 do not address the shortcomings set out above and are not ambitious enough to deliver the savings required to achieve our carbon reduction targets [15] [16] [17] [18].

REGIONAL STANDARDS – THE LONDON PLAN

2.1.18 In order to drive greenhouse gas and energy savings in London, the Mayor has implemented a zero carbon policy for all residential Major Developments since 2016, and this policy was extended to non-residential Major Developments in the London Plan 2021. This policy aims to achieve net-zero carbon development in London; however, in practice, there are a number of shortcomings to the policy which must be addressed in order to genuinely achieve our net-zero carbon target:

a. A development which achieves a 100% improvement against Part L on site in line with the Mayor's zero carbon policy, does not necessarily achieve net-zero carbon operational

emissions given that the current Part L methodology does not account for unregulated emissions [12].

b. The London Plan allows for up to 65% of a development's regulated emissions to be offset through cash-in-lieu contributions which shifts the responsibility for offsetting any residual emissions to the local authority [12]. However, in order to achieve our net-zero carbon target, emissions will need to reduce close to zero without offsetting, so carbon offsetting must not be heavily relied upon and should only be considered where further savings cannot be achieved on-site [9] [3].

c. The cost of carbon used to offset a development's carbon shortfall included in the London Plan does not incentivise developers to achieve further carbon savings on site as it does not reflect the actual cost of implementing carbon saving measures [12]. This in turn also limits the carbon savings which can be achieved through carbon offset funds and prevents a zero carbon balance from being achieved.

d. The Mayor's zero carbon policy only applies to Major Developments which represent less than 10% of schemes in Merton. However, all buildings, regardless of the scale of development, will need to be net-zero carbon by 2050 in order to achieve our carbon reduction target.

2.1.19 We are committed to driving sustainable design and minimising greenhouse gas emissions through local policies in Merton. Policies CC2.2 minimising greenhouse gas emissions; CC2.3 minimising energy use and CC2.4 low carbon energy are intended to go beyond the London Plan requirements to drive building energy performance which is compatible with our 2050 net-zero carbon target, by maximising on-site savings through energy efficiency and low carbon and renewable energy generation. These policies set out Merton's requirements based on the current Building Regulations (2021) Part L methodology, but also embed recommendations from the Zero Carbon Hub, the CCC 's report on making UK housing fit for the future, LETI's Climate Emergency Design Guide and the Delivering Net Zero study where possible.

2.1.20 In addition, as operational emissions decrease with the roll out of low carbon heat and higher energy efficiency standards, embodied emissions will make up an increasing proportion of a development's whole-life cycle emissions. Policy CC2.5 Minimising Waste and Promoting a Circular Economy sets out Merton's requirements to minimise embodied carbon and Policy CC2.6 sustainable design standards sets out the sustainability standards required of development in Merton.

Climate adaptation in Merton

2.1.21 There is extensive evidence that human-induced global warming has already caused significant changes to the climate system including an increased frequency and intensity of

extreme weather events such as heatwaves and heavy precipitation events [2] [3]. This trend is expected to continue as the magnitude of warming increases.

2.1.22 Impacts in London will likely include increased heat, flooding and drought, with a greater frequency of severe weather events [19]. In order to ensure climate resilience in our communities and minimise future climate-related human and financial costs, these risks will need to be embedded in how we design the buildings in which we live and work by minimising the risk of overheating, flooding, subsidence and water shortages.

2.1.23 We will require all development proposals to demonstrate that they are well designed, fully adaptable and resilient to the impacts of a changing climate, and will not exacerbate any climate change impacts elsewhere.

2.1.24 Climate adaptation has been embedded within the relevant sections of the Local Plan. Overheating of buildings and subsidence are addressed in the Design policies; flooding, water shortages and the urban heat island effect are covered in the Green & Blue Infrastructure policies; and water use from development is addressed in Policy CC2.6 Sustainable Design Standards below.

2.1.25 Merton's climate change policies should be read alongside Chapter 9 Sustainable Infrastructure of the London Plan 2021.

Policy CC2.2 Minimising Greenhouse Gas Emissions

1. All development within the borough should seek to minimise greenhouse gas emissions on site.

2. We will require:

All development resulting in the creation of 1 or more dwellings or 500sqm or more non-residential GIA:

a. To reduce greenhouse gas emissions on-site and minimise both annual and peak energy demand in accordance with the Mayor of London's Energy Hierarchy below:

i. Be lean: use less energy and manage demand during operation

ii. Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly

iii. Be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site

iv. Be seen: monitor, verify and report on energy performance

b. To provide an energy statement demonstrating how emissions savings have been maximised at each stage of the energy hierarchy towards achieving net-zero carbon emissions on site.

c. To achieve the relevant minimum carbon reduction targets as set out in the table below:

Development Type	Minimum on-site total reduction in CO_2[2]	Benchmark total reduction in CO_2[3]
Residential Major Development of 10 or more dwellings (including new build, change of use, conversions and major refurbishments)	35%	50%+
Minor new build residential development of 1 or more dwellings[3]	35%	50%+
Minor residential change of use and conversions resulting in the creation of 1 or more dwellings	35%	
Office buildings of 500sqm GIA or more (including new build, change of use and major refurbishments)	25%	
School buildings of 500sqm GIA or more (including new build, change of use and major refurbishments)	35%	
Industrial buildings of 500sqm GIA or more (including new build, change of use and major refurbishments)	35%	
Hotel of 500sqm GIA or more (including new build, change of use and major refurbishments)	10%	
All other non-residential development of 500sqm GIA or more (including new build, change of use and major refurbishments)	35%	

All new build development resulting in the creation of 1 or more dwellings or 500sqm or more non-residential GIA:

d. To demonstrate compliance with the Mayor's net-zero carbon target.

e. Where it is clearly demonstrated that the net-zero carbon target cannot be fully achieved on site beyond the minimum requirements, any carbon shortfall to be provided, either:

i. through a cash-in-lieu contribution to Merton's carbon offset fund, or

ii. off-site provided that an alternative proposal which offers Additionality4 is identified, delivery is certain and subject to agreement with the council.

[2] This represents a minimum improvement beyond Part L of Building Regulations 2021. When Building Regulations are updated (e.g. The Future Homes Standard expected in 2025), we will clarify how the policy's requirements relate to the new Building Regulations in an Explanatory Note on Approaches to Sustainable Design & Construction.
[3] Throughout, this refers to gross residential development.
[4] See Glossary for definition of Additionality

SUPPORTING TEXT

The Mayor's Energy Hierarchy and Zero Carbon Policy

2.2.1 In line with the London Plan, all developments in Merton should maximise on-site carbon savings in accordance with the Mayor of London's energy hierarchy through energy efficiency, the use of clean energy, and on-site renewable energy generation.

2.2.2 Since 2016, the Mayor has implemented a zero carbon policy for all residential Major Developments (i.e. of 10 or more dwellings) to drive greenhouse gas and energy savings in London. This policy was extended to include non-residential Major Developments (i.e. of 1,000sqm GIA or more) in the London Plan in 2021.

2.2.3 To date, the Mayor's zero carbon policy has only been applied to Major Developments in Merton. However, over 90% of developments in Merton are built as minor schemes (i.e. 10 homes or less, or 1,000sqm non-residential GIA or less), of which a large proportion involves conversions and change of use to create new dwellings[5]. While individually these developments do not represent a large source of carbon emissions, their cumulative impact will significantly affect Merton's ability to achieve our national, regional and local carbon reduction targets. In order to become a net-zero carbon borough by 2050, all development, regardless of its size, will need to reduce its greenhouse gas emissions to near zero on site, and become net-zero carbon or net-positive buildings[6] [1].

2.2.4 In order to drive carbon reductions in Merton's existing and new building stock, all development will therefore be expected to seek new, innovative and robust approaches to reducing energy demand and carbon emissions on site. All applications resulting in the creation of 1 or more new dwellings or 500sqm[7] or more non-residential GIA (in both new and existing buildings) will need to provide an energy statement to demonstrate how carbon savings have been maximised at all stages of the energy hierarchy and that all reasonable endeavours have been made towards achieving net-zero carbon emissions on site.

2.2.5 In addition, all new build development resulting in the creation of 1 or more dwellings or 500sqm or more non-residential GIA will need to demonstrate compliance with the Mayor's net-zero carbon target. This means that any carbon shortfall[8] will need to be offset via off-site projects which offer Additionality or via cash-in-lieu contributions.

[5] Around 90% of applications received for non-residential developments are smaller than 1000sqm GIA. The vast majority of residential applications (around 7,000 in the last 5 years) are householder applications (i.e. proposals to alter or enlarge a single house, e.g. extensions). A large proportion of residential applications (over 1,000 in the last 5 years) are minor applications for the creation of new dwellings (including new build, conversions and change of use). A relatively small proportion of residential applications (around 100 in the last 5 years) are Major Development applications.
[6] A building which generates more energy on-site than it uses on an annual basis.
[7] Since 2011, Merton has applied the London Plan policies to all non-residential schemes of 500sqm GIA or more given that a significant proportion of non-residential schemes in Merton are less than 1000sqm GIA.
[8] Using the Part L methodology.

2.2.6 Any development involving the change of use or conversion of an existing building will not be required to offset the carbon shortfall. This is to encourage the refurbishment of existing buildings and disincentivize the demolition of retrofittable buildings, in order to minimise embodied carbon emissions from development. However, all development will be expected to maximise carbon savings on site towards the net-zero carbon target.

2.2.7 As set out in Strategic Policy CC2.1 the Mayor's zero carbon target is not a reflection of true net-zero carbon development because it enables a significant proportion of regulated emissions to be offset via cash-in-lieu contributions and does not take into account unregulated energy uses. To address this gap, we have introduced higher on-site carbon reduction targets to maximise on-site savings as set out below, specified additional requirements to minimise energy demand and unregulated emissions in Policy CC2.3 Minimising Energy Use, and set out further requirements to maximise renewable and low carbon energy generation in Policy CC2.4.

2.2.8 This net-zero carbon target may need to be reviewed if national and regional policy changes (e.g. if the Mayor were to adopt a change in approach to include both regulated and unregulated emissions within their net-zero carbon target, to address the shortfalls highlighted above). If this were to result in a substantial change, this would be considered as part of the Local Plan review process.

Minimum on-site carbon savings

2.2.9 The aim of the Mayor's zero carbon policy is to drive carbon savings on site and ensure that any carbon shortfall which cannot be addressed on site is offset elsewhere in the borough to achieve a net-zero carbon balance. However, in practice, the current London Plan 2021 approach (35% minimum target) allows up to 65% of carbon emissions from development to be offset via cash-in-lieu contributions, which shifts the responsibility to the local authority to make the scheme compliant. In order to achieve our carbon reduction commitments, on-site emissions will need to reduce close to zero, so carbon offsetting must not be heavily relied upon and should only be considered where further savings cannot be achieved on site [9] [3].

2.2.10 In 2019/20, a study commissioned by several London boroughs (Towards Net Zero Carbon), to investigate the cost of carbon and its role in achieving greater carbon reductions on site, found that the London Plan on-site carbon reduction targets and cost of carbon were inadequate for delivering the savings required to achieve net-zero carbon [12]. The *Towards Net Zero Carbon* study demonstrated that due to the decarbonisation of the electricity grid, for the same specifications, a greater improvement over Part L was achieved with no extra effort/cost. The study also concluded that a carbon offset price of £60-£95/tCO2 was not sufficient for local authorities to deliver the required carbon savings off site.

2.2.11 In 2022, following the adoption of Part L 2021 of Building Regulations, Merton and 17 other London boroughs commissioned a review of the Towards Net Zero Carbon study against Part L 2021. This review (Delivering Net Zero, May 2023) tested several building typologies against Part L 2021 and recommended the following percentage improvement targets [51]:

a. Domestic buildings: 65% better than Part L 2021

b. Office buildings: 25% better than Part L 2021

c. School buildings: 35% better than Part L 2021

d. Industrial buildings: 45% better than Part L 2021

e. Hotel: 10% better than Part L 2021

f. Other non-domestic buildings: 35% better than Part L 2021

2.2.12 The Delivering Net Zero study was developed in response to changes to Part L of Building Regulations which came into effect in 2022. As such, this local evidence was completed and published at a late stage of the Examination process of this Local Plan. As a result of this, Policy CC2.2 part-2c contains the minimum targets and benchmarks set out in the Mayor's Energy Assessment Guidance 2022 apart from where the Delivering Net Zero study identified targets which are lower than the minimum target set out in the Mayor's Energy Assessment Guidance (i.e. 35% improvement against Part L 2021). Nonetheless, as set out in Policy CC2.2 part-2b, all development resulting in the creation of one or more dwellings or 500sqm or more non-residential GIA will be required to demonstrate how emissions savings have been maximised at each stage of the energy hierarchy towards achieving net zero carbon emissions on site.

2.2.13 These minimum on-site targets will be reviewed over time unless there is a local or national change in methodology for assessing building energy performance. We will seek to apply an equivalent standard when Building Regulations are updated.

2.2.14 However, all development is expected to get as close to zero carbon emissions on-site as possible, and will need to demonstrate that on-site savings have been maximised at all stages of the energy hierarchy whether the minimum on-site target has already been met or not. For new build development, offsetting any carbon shortfall via cash-in-lieu contributions or via off-site projects will only be considered where the council is satisfied that on-site savings have been maximised. Proposals for off-site projects should have carbon equivalence to the carbon shortfall on-site. Off-site projects should offer Additionality, and monitoring and verification measures would be expected.

Carbon offsetting for new build development and the cost of carbon

2.2.15 In order to genuinely deliver net-zero carbon development, carbon pricing must:

a. Drive on-site savings by making it more cost effective for developers to deliver the savings on site than to opt to buy out of their obligation by paying carbon offset contributions; and

b. Where offsetting is required, ensure that carbon offset contributions are sufficient for the local authority to pay for measures which achieve carbon savings equivalent to the carbon shortfall of the development. Otherwise, developers are not achieving net-zero carbon development and the local authority cannot deliver a net-zero carbon policy [12].

2.2.16 The London Plan 2021 carbon offset price (£95/tCO2) is too low to actually deliver equivalent carbon savings and therefore does not incentivise sufficient on-site savings [12][51]. Using the cost of carbon recommended in the London Plan 2021, it is cheaper and easier for developers to offset carbon emissions via cash-in-lieu contributions than it is to achieve the actual savings on site, resulting in developments with higher operational emissions and local authorities with insufficient funds to deliver equivalent carbon savings off site.

2.2.17 In 2019, Etude et al. found that it would cost a local authority at least £300/t to save carbon in a sustainable way, taking into account administration and management costs [12]. Local authorities therefore have insufficient funds to deliver equivalent carbon savings off site through cash-in-lieu contributions using a cost of carbon of £95/t.

2.2.18 In order to incentivise developers to implement lower carbon strategies on site where possible, and to ensure that any remaining carbon shortfall can adequately be addressed off site, the carbon shortfall for the assumed life of a development (e.g. 30 years) will therefore be offset at a rate of £300/tCO2 as at 2021. The price for offsetting carbon is regularly reviewed; if prices were to change significantly this may trigger review of the policy to determine whether updates would be needed.

2.2.19 Where a developer is proposing to directly offset any shortfall in carbon dioxide emissions from the proposed development by installing carbon dioxide saving measures off site (e.g. photovoltaic panels on a local school), this will need to comply with the GLA's Carbon Offset Fund Guidance, and any relevant local guidance. Any off-site proposals will need to be agreed with the council and confirmed in the energy statement.

2.2.20 Etude et al. [12][51] modelled a number of technical scenarios and demonstrated that several low carbon solutions (involving good practice or ultra-low energy fabric, and a range of low carbon heating systems) achieved the proposed minimum on-site targets across several typologies.

2.2.21 These scenarios were modelled using different approaches to carbon offsetting to determine their associated construction and carbon offset costs, which were tested as part of Merton's Local Plan Housing Viability Study [20].

2.2.22 Developers will be expected to adopt the highest possible standards of fabric and ventilation and heating plant to maximise carbon savings on site. Any development that fails to achieve the necessary on-site performance targets or to demonstrate that carbon savings have been maximised, must provide full evidence and justification as to why the scheme is unable to comply. Where the developer contends the policy requirements in relation to viability of a particular proposal, the onus would lie with the developer to demonstrate what can viably be achieved through the submission of a viability assessment. We may seek payments from applications for the cost of independent viability assessment(s). Where it has been demonstrated that planning considerations cannot viably be supported, Policy IN14.1 sets out the infrastructure prioritisation that applicants and decisions-makers should apply in accordance with Policy DF1 of the London Plan.

Policy CC2.3 Minimising Energy Use

1. Merton Council will require all proposed development within the borough to demonstrate that they have made the fullest contribution to minimising energy use through energy efficiency on site.

2. This will be achieved by requiring:

All development resulting in the creation of 1 or more dwellings or 500sqm or more non-residential GIA

a. To demonstrate how energy demand, including regulated and unregulated uses, has been minimised on site through passive measures and by maximising the efficiency of building form, fabric and systems.

b. To disclose the anticipated Energy Use Intensity[9] at design and pre-occupation stage.

All new build development resulting in the creation of 1 or more residential unit or 500sqm or more non-residential GIA

c. To demonstrate compliance with the following relevant fabric efficiency targets*:

Type of Development	Zero Carbon Hub Interim FEES until 31 December 2022[10]	Zero Carbon Hub Full FEES from 01 January 2023 to 31 December 2024	Space Heating Demand Target from 01 January 2025[11]
Blocks of flats and mid-terrace houses	<43 kWh/m^2/yr	<39 kWh/m^2/yr	<15 kWh/m^2/yr
Semi-detached, end of terrace and detached houses	<52 kWh/m^2/yr	<46 kWh/m^2/yr	<20 kWh/m^2/yr
Non-residential development	-	-	<15 kWh/m^2/yr

[9] An annual measure of total energy consumed in a building which can be estimated at design stage and easily monitored in-use as energy bills are based on kWh of energy used by the building. It includes regulated (heating, hot water, cooling, ventilation and lighting) and unregulated (plug loads and equipment) energy.

*Both the Fabric Energy Efficiency Standard and Space Heating Demand Target are based on regulated energy use.

[10] Based on the Fabric Energy Efficiency Standard for Zero Carbon Homes as defined by the Zero Carbon Hub (2009) [40].

[11] Based on recommendations from the Committee on Climate Change (2019) [11] and the London Energy Transformation Initiative (2020) [9].

All Major Development
d. To monitor and report on energy use for 5 years post-occupancy[12].

Supporting text

2.3.1 A building's operational carbon emissions are a direct result of its energy use. In order to reduce greenhouse gas emissions and ultimately achieve our carbon reduction targets, a development will therefore first and foremost need to minimise energy use through energy efficiency, as reflected in the first tier of the Mayor's Energy Hierarchy: 'Be Lean'.

2.3.2 In addition, the transition to low carbon heat, which is required to deliver long term carbon savings, is contingent on having high levels of energy efficiency [21].

2.3.3 Energy efficiency will depend on both building and equipment design. This policy focusses primarily on fabric efficiency, and Policy CC2.4 Low Carbon Energy below addresses the importance of efficiency of plant in decarbonising heat.

The role of energy efficiency in delivering low carbon heat

2.3.4 In order to manage running costs and avoid external costs to the grid infrastructure, a transition to low carbon heat can only be achieved through significant improvements to energy efficiency [10]. Indeed, low carbon heating solutions (such as heat pumps and solar thermal) tend to operate most effectively at low temperatures, and are therefore much more sensitive to energy efficiency than conventional gas boiler systems [9]. Indeed, if a building's heat losses are much higher than anticipated, a low temperature heating system has to run at higher operating temperatures to compensate for this, which can result in significant increases in energy use and energy bills [10]. In addition, as we move from gas to electricity to heat our buildings, energy use needs to be minimised to reduce the demand for energy generation and peak loads on the national grid [9] [22].

2.3.5 However, there are limitations to using Building Regulations as a tool for driving energy efficiency. Indeed, the Part L methodology enables low carbon energy to compensate for poor building fabric and doesn't reflect efforts to improve energy efficiency through form [14]. Part L assessments also underestimate carbon savings achieved through improvements to fabric and ventilation, given that they underestimate a development's space heating requirements [12].

[12] In line with the GLA's 'Be Seen' Energy Monitoring Guidance, or equivalent.

The need for fabric energy efficiency standards

2.3.6 Improved fabric energy efficiency will ensure that buildings use low and zero carbon energy in the most efficient way [11]. As well as reducing greenhouse gas emissions, using ultra-high levels of fabric efficiency alongside heat pumps and Mechanical Ventilation and Heat Recovery (MVHR) systems can help reduce annual and peak electricity demand, provide comfort and health benefits to occupants, and deliver average bill savings of around £85 per year for a typical three bedroom semi-detached house [11], which will help tackle fuel poverty in Merton. This will also help 'future proof' developments and reduce the likelihood of buildings needing difficult and expensive refurbishment at a later date.

2.3.7 In 2019, the Committee on Climate Change recommended to the UK government that new homes should deliver ultra-high levels of energy efficiency achieving a space heating demand of 15kWh/m^2/yr or less as soon as possible and by 2025 at the latest [11]. In 2020, the London Energy Transformation Initiative published their Climate Emergency Design Guide which concluded that in order to achieve our national carbon reduction targets, all new residential and non-residential buildings should be designed to achieve a space heating demand of 15kWh/m^2/yr or less by 2025 [9].

2.3.8 In order to give industry the opportunity to adjust, Policy CC2.3 Minimising Energy Use, part-2c sets out a gradual increase in fabric energy efficiency standards for residential developments. To do this, Merton Council will require all new build residential developments to comply with the minimum Fabric Energy Efficiency Standard (FEES) for Zero Carbon Homes defined by the Zero Carbon Hub in 2009.

2.3.9 The FEES, measured in kWh/m^2/yr and available through the Government's Standard Assessment Procedure (SAP), covers space heating and space cooling energy demand. The FEES allows design flexibility, takes into account building form, promotes innovation and delivers a specific level of dwelling performance. The FEES is much better at recognising efforts made to improve energy efficiency through building form and fabric specifications than a percentage improvement against Building Regulations, as demonstrated by Etude in 2017 [14].

2.3.10 The Zero Carbon Hub recommended two different performance levels for (a) blocks of flats and mid terrace houses, and (b) semi-detached, end of terrace and detached houses. This is because certain dwelling types with less exposed fabric relative to floor areas, such as mid-floor apartments, can achieve a lower energy space heating and cooling demand with a less challenging construction specification than other dwelling types.

2.3.11 To encourage a gradual shift in fabric efficiency, the Zero Carbon Hub defined an 'Interim FEES' for implementation from 2013 and a 'Full FEES' for implementation from 2016. These standards were never introduced through Building Regulations as a result of the national Zero Carbon Homes policy being scrapped. However, in 2017, Etude demonstrated that both the interim and full FEES were technically feasible and viable with a

range of combinations of form and fabric specification [14] and these standards are already being achieved by a number of schemes in Merton.

2.3.12 Merton Council will therefore require all new residential development to achieve at least the 'interim' FEES until the end of 2022 and at least the 'full' FEES from the start of 2023. In line with the recommendations from LETI and the CCC, Merton Council will also require all new build residential and non-residential development to achieve a space heating demand of 15kWh/m^2/yr or less by 2025.

2.3.13 In the past 5 years, non-residential development in Merton has included everything from a football stadium, to a hotel development, to a mixed-use development comprising a community gym/ retail space, hostel and residential development. Given the range of non-residential developments that could come forward in Merton over the lifetime of this Local Plan, the council will work with applicants towards achieving this target on a case-by-case basis for any bespoke non-residential development.

Closing the gap between predicted and actual energy demand

2.3.14 It is widely accepted that there is a significant performance gap between the energy use and carbon emissions estimated at design stage and the actual in-use performance of buildings using the current Building Regulations Part L methodology, and that this needs to be addressed in order to genuinely make our buildings net-zero carbon [9] [11] [23]. The Part L methodology uses carbon emissions as the main performance metric which is dependent on the carbon factor of the electricity grid and does not necessarily reflect good operational performance. The UK Passivhaus Trust found that new build houses have an average performance gap of 40% between the actual overall energy use compared to the EPC modelling carried out at design stage [22] which means that buildings are emitting significantly more carbon than predicted using the SAP methodology.

2.3.15 Managing the performance gap and ensuring good design is particularly important with the roll-out of low carbon heating systems which are much more sensitive to building heat losses and system inefficiencies than traditional gas heating systems [10].

2.3.16 In addition, current Building Regulations (2021) do not address unregulated emissions associated with cooking, white goods and other equipment which can represent up to 50% of a building's operational emissions [9]. Operational performance of buildings therefore cannot be verified using the Part L methodology. The CCC has highlighted the importance of improving building performance monitoring and focussing on 'as built' performance in order to close this performance gap which could deliver £70-260 in annual bill savings per household [11].

A new metric for measuring performance: Energy Use Intensity

2.3.17 LETI's Climate Emergency Design Guide and the UK Green Building Council's Net Zero Whole Life Carbon Roadmap, which set out a roadmap to net-zero carbon, both recommend the use of Energy Use Intensity (EUI) targets in regulations, policy and design decisions to drive energy efficiency [9] [24]. EUI is an annual measure of total energy consumed in a building which can be estimated at design stage and easily monitored in-use as energy bills are based on kWh of energy used by the building. It includes regulated (heating, hot water, cooling, ventilation and lighting) and unregulated (plug loads and equipment) energy [9].

2.3.18 In order to improve our understanding of energy demand and drive more energy efficient design of buildings, Merton Council requires applicants for all developments resulting in the creation of 1 or more dwellings or 500sqm or more non-residential GIA, to determine their anticipated EUI, at planning and pre-occupation stage. Applicants for Major Developments will need to calculate the anticipated regulated and unregulated energy demand, and combined EUI, using the Chartered Institute of Building Service Engineers (CIBSE) TM54 methodology, Passive House Planning Package (PHPP) methodology or equivalent, or successor methodologies[13]. Minor residential schemes resulting in the creation of one or more dwellings will need to estimate the expected regulated and unregulated energy demand, and combined EUI, using the Part L methodology or equivalent, or successor methodologies.

2.3.19 In addition, all Major Developments are required to monitor and report actual operational energy performance for at least five years post-occupancy in line with policy SI 2 in the London Plan 2021 and the GLA's 'Be Seen' Energy Monitoring Guidance 2020, or equivalent.

2.3.20 In 2019, Currie and Brown also recommended that absolute performance targets are used to reduce energy demand (peak demand in particular) in order to reward energy efficient designs and minimise running costs and pressures on the national grid [10].

2.3.21 In their Climate Emergency Design Guide, LETI identified energy consumption targets for four building typologies consistent with achieving national net-zero carbon targets; LETI concluded that all new build development should be designed to achieve these standards by 2025 [9]:

a. **Small scale residential** – reducing EUI to 35 kWh/m^2/yr in GIA excluding renewable energy contribution, and reducing space heating demand to 15 kWh/m^2/yr.

[13] These methodologies enable more accurate determination of the anticipated energy demand and carbon emissions by considering factors which impact on a building's energy performance including expected occupancy and use, and calculate unregulated loads [41]. These methodologies can also be used to verify the performance of the constructed building in operation, which is not possible with Building Regulation Part L percentage reductions.

b. Medium and large scale residential – reducing EUI to 35 kWh/m^2/yr in GIA excluding renewable energy contribution, and reducing space heating demand to 15 kWh/m^2/yr.

c. Commercial offices – reducing EUI to 55 kWh/m^2/yr in GIA excluding renewable energy contribution, and reducing space heating demand to 15 kWh/m^2/yr.

d. Schools - reducing EUI to 65 kWh/m^2/yr in GIA excluding renewable energy contribution, and reducing space heating demand to 15 kWh/m^2/yr.

2.3.22 In 2022/2023 Etude et al. modelled several building typologies to identify the following Energy Use Intensity benchmarks for a range of development types for a consortium of 18 London boroughs including Merton [51]:

a. Residential – 35 kWh/m^2/yr

b. Student or key worker accommodation, care homes, extra care homes - 35 kWh/m^2/yr

c. Warehouses and light industrial units – 35 kWh/m^2/yr

d. Schools - 65 kWh/m^2/yr

e. Offices, Retail, HE teaching facilities, GP surgeries – 70 kWh/m^2/yr

f. Hotels - 160 kWh/m^2/yr

2.3.23 Merton Council expects all new development to make all reasonable but commercially prudent endeavours to achieve these EUI and space heating demand benchmarks in demonstrating that it has made the fullest contribution to minimising energy use in accordance with Policy CC2.3. In doing so, developments would help to tackle fuel poverty and lead the way in decarbonising Merton in a manner that future-proofs its new building stock.

2.3.24 Developments are also encouraged to adopt recognised and successful fabric first approaches such as Passivhaus which is seen as the most stringent low ‘energy in use’ standard and is consistent with LETI’s Climate Emergency Design Guide. This standard also relies on a more accurate energy demand assessment methodology using the Passive House Planning Package (PHPP).

Policy CC2.4 Low Carbon Energy

1. All proposed developments within the borough must demonstrate that they have made the fullest contribution to supplying energy efficiently and cleanly, and maximising renewable and low carbon energy generation, storage and use, through the deployment of appropriately selected, sized and sited technologies.

2. This will be achieved by requiring:

a. All new development to use low carbon heat.

b. All development proposals to demonstrate in the energy statement:

i. How the proposal has made the best potential use of roof space to maximise local renewable and low carbon electricity and/or heat generation – 100% of energy demand should be met by renewable energy generation on site wherever possible;

ii. How appropriate roof spaces have been utilised to maximise the delivery of multi-functional benefits (e.g. co-location of renewable energy and green, brown or blue infrastructure);

iii. How demand-side response has been incorporated, specifically through the installation of smart meters, minimising peak energy demand and promoting short term energy storage;

iv. How the proposal has ensured efficient generation of low carbon energy on site; any developments proposing to use heat pumps to demonstrate that these are good quality and achieve a minimum standard of efficiency; and

v. How all Major Development proposals located within identified heat network opportunity areas have utilised decentralised energy, or are enabled for connection to current or future district heat networks, unless it is demonstrated that it is not technically feasible to do so.

Supporting text

2.4.1 In order to have net-zero carbon emissions, once energy demand has been minimised, the remaining energy we use to power and heat our buildings will need to be generated from clean, low carbon and renewable sources [9].

The decarbonisation of heat

2.4.2 Low carbon heat is an essential component of our roadmap to net-zero carbon given that heat accounts for a third of the UK's greenhouse gas emissions [11] [21]. BEIS' Clean Growth Strategy emphasized that a fundamental shift away from fossil fuels for heating is required, alongside reductions in energy demand through energy efficiency [27]. In 2015,

the Energy Technologies Institute estimated that 20,000 households per week would need to be switched from gas to low carbon heating between 2020 and 2050 in order to bring emissions from the UK's existing housing stock to near zero carbon [28].

2.4.3 98% of homes in Merton use gas as their primary source of heating. All buildings in Merton must be gas free by 2050 in order to achieve our carbon reduction target, unless the Government plan to supply a low carbon gas through the gas grid [1]. There is increasing interest in the use of hydrogen and biomethane as low carbon alternatives to gas [27], but insufficient evidence is currently available to demonstrate that either of these are credible options for wide-scale decarbonisation of heat in the short term [29] [30] [12] [31][14].

2.4.4 Low carbon heating generally requires different space heating design standards to gas heating as the former tends to operate most effectively using a low temperature system whereas the latter operates at high temperatures [10]. A building typically has a lifespan longer than 30 years, so any new building which is designed and built to use a high temperature heating system will require retrofitting to move to a low carbon system before 2050.

2.4.5 In their 2019 study [10] on the costs and benefits of tighter energy efficiency standards, Currie & Brown demonstrated that delayed action in decarbonising heat would have a significant carbon impact: each year of delay in adopting lower-carbon heat technologies could result in several million tonnes of avoidable carbon emissions. They found that a home built to use gas heating in 2020 which is retrofitted to use a heat pump in 2030 can be expected to emit over three times more carbon over 60 years than if the heat pump was installed from the start, as the house would have originally been built to different space heating design standards.

2.4.6 The costs of installing low carbon heat as a retrofit are also between three and ten times higher than delivering them in a new building [10]. The Clean Growth Strategy highlighted the importance of ensuring that all new homes can accommodate low carbon heating in order to avoid the need for expensive retrofit further down the line. In their 'UK Housing: Fit for the Future?' report (2019), the CCC concluded that no new homes should be connected to the gas grid from 2025 at the latest, with ultra-low energy homes using low carbon heat instead [11].

2.4.7 In order to drive the decarbonisation of heat in Merton and minimise the retrofit burden, Merton Council requires all new development to use low carbon heat efficiently. Any development that proposes to use gas-powered systems will need to provide robust justification to satisfy Merton Council that low or zero carbon systems cannot be used, to

[14] There currently remains significant uncertainty around the cost and practicality of repurposing the gas grid to deliver hydrogen from low carbon sources, particularly in terms of consumer acceptability and the cost of safely distributing hydrogen to end-users [46] [45]. Biomethane could be used to reduce carbon emissions from the gas grid, but no studies have suggested that this could fully replace the role of natural gas at its current levels of use due to the relatively small available resource and its potential value elsewhere in the energy system [21, 28].

set out how the development has been future-proofed to achieve net-zero carbon by 2050, and to demonstrate that the gas-powered system is credibly being used as a stepping stone towards this objective.

The electrification of heat

2.4.8 The electrification of heat will likely play a major role in decarbonising heat. As well as becoming a lower carbon energy source with the decarbonisation of the national grid, electricity also provides air quality benefits which are particularly important in a London borough [12]. There are a range of technologies that can convert electricity into heat including heat pumps and direct electric heating systems.

2.4.9 Proposals using direct electric heat will only be deemed acceptable if the developer can demonstrate, through Passivhaus certification or equivalent, that energy use has been significantly reduced by achieving ultra-high fabric efficiency [12]. This is to ensure that direct electric heating systems do not result in high energy bills for future residents, and to mitigate the risk of fuel poverty.

2.4.10 Heat pumps[15] are likely to play a growing role in the delivery of low carbon heat in London, as part of both low carbon heat networks and individual building heating systems [29]. Well-designed, installed and maintained heat pumps can be very energy efficient and a way of harnessing waste heat. Heat pumps typically achieve efficiencies between 260 and 320% [29], whereas direct electric systems and gas boilers typically operate between 80 and 100% efficiency [21]. In addition, heat pumps use low flow temperature and large emitters to spread heating throughout the day, resulting in reduced peak heating demand compared to gas boilers and direct electric systems which operate when heat is desired [21]. Heat pumps also have the benefit of being smart grid ready which could enable demand-side response.

2.4.11 Heat pumps are already a lower carbon system than gas boilers, and the carbon factor for grid electricity is expected to decrease further as more renewable energy is produced, while the carbon content of gas is likely to remain the same unless low carbon gases are introduced to the gas grid [12]. Heat pumps also provide air quality benefits given that they do not produce any direct emissions on site.

2.4.12 Low-carbon heat using a heat pump is cost effective when built into new homes from 2021 and should not increase running costs if the system is well designed, installed and operated, particularly in well-insulated buildings [10]. Heat pump deployment in new build properties will also play an important role in helping develop the heat pump markets and supply chains required to electrify heat in our existing building stock [30].

[15] A heat pump uses electricity to increase the temperature of a low temperature heat source (e.g. air, water or ground).

2.4.13 However, inappropriate design, installation or operation of heat pumps can result in high energy costs and increased peak electricity demand. In order to mitigate impacts on the electricity grid and operating costs, electrical heating systems must be highly efficient and paired with high fabric efficiency [9] [29]; high performance building fabric is critical to enable the electrification of heat while keeping costs low for future residents. All new development should also be designed to harness heat at low temperatures given that heat pumps tend to operate significantly more efficiently at lower temperatures and waste heat sources are also typically at lower temperatures [9].

2.4.14 Where heat pumps are proposed, developments will need to demonstrate that efficiencies have been maximised through the proposed technology and heating system. A high specification of energy efficiency (coefficient of performance) will be expected to ensure the system works efficiently and reduces running costs and peak electricity demand. UKPN has indicated that they will actively plan for additional demand due to heat pumps, provided they have early visibility of any deployment plans, and are notified of installations on their networks [29].

2.4.15 Where heat pumps are proposed developers will also need to ensure that living conditions of existing and future occupiers of the proposed development and neighbouring properties are not materially harmed in terms of outlook, noise or vibrations in line with Design Policies D12.3 part-3g and D12.4 part-2e, and Pollution Policy P15.10.

Decentralised energy

2.4.16 The use of decentralised energy and local secondary heat sources is expected to play a significant part in reducing emissions from buildings in London [32]. All Major Development proposals will be expected to comply with London Plan policies on decentralised energy networks and decentralised energy.

2.4.17 The council will require all proposed Major Development and regeneration schemes within any identified heat network opportunity areas to fully explore and utilise decentralised energy, subject to technical and financial viability. Heat-mapping and feasibility studies undertaken by AECOM in 2017 [33]/2018 [34] identified two district heat network opportunity areas in Merton linked to two major regeneration schemes: Morden town centre and South Wimbledon (High Path estate).

2.4.18 Any proposals to develop or connect to a site-wide or district heat network will need to demonstrate compliance with all Merton's climate change policies, be future-proofed and demonstrate that heat losses have been minimised. Given that the carbon savings from gas engine combined heat and power (CHP) systems are declining due to the decarbonisation of the national electricity grid, and increasing evidence of adverse air quality impacts, developers will be required to use low and zero carbon heat sources and existing heat networks will need to be decarbonised [32].

Renewable energy generation

2.4.19 The use of renewable and low-carbon micro-generation technologies (e.g. solar photovoltaic panels, solar thermal and air source heat pumps) is now a viable, cost-effective and practical approach to ensuring developments can achieve their on-site carbon emissions requirements alongside low carbon heat and high energy efficiency, and will play a crucial role in achieving our net-zero carbon target [27] [12] [9].

2.4.20 In order to genuinely operate at net-zero operational carbon, all buildings must be 100% powered by renewables [9]. As renewable energy generation increases in the UK, grid electricity will continue to decarbonise [8]. However, electricity demand is expected to increase across London as a result of population growth, the electrification of heat and increased uptake of electric vehicles [32]. In order to limit pressure on the national electricity grid, contribute to the decarbonisation of grid electricity (if a development feeds back to the grid), and ultimately build a more resilient local energy supply, the council requires all development to demonstrate that on-site renewable energy generation has been maximised and that 100% of energy demand is met through on-site renewable energy generation wherever possible. Developers will need to compare their anticipated Energy Use Intensity (EUI)[16] to the amount of renewable energy expected to be generated on site annually, and these will be expected to match where feasible.

2.4.21 Developments in conservation areas or involving heritage assets need to provide careful consideration of how sustainable energy measures may be incorporated without adversely impacting on the character, function and preservation of a specific area or asset, in accordance with the policies on design in this Local Plan. In such circumstances, development proposals should not presume that a viable sustainable solution cannot be provided. Where necessary, Merton will determine whether the provision of sustainability measures causes any adverse impact with the asset or area, and will prioritise safeguarding of the asset, as appropriate.

Demand-side response and energy storage

2.4.22 Demand-side response involves changing how and when electricity is used to minimise peak energy demand. Demand-side response will play an important role in embedding flexibility in our energy systems, improving the utilisation of intermittent low carbon energy generation, and ensuring that energy supply always meets demand whilst reducing pressure on the national grid [35].

2.4.23 Energy storage (heat and battery storage) and flexibility will need to be maximised to reduce energy use and pressure on the national grid at peak times, and ensure that variable renewable energy supply can match electricity demand at all times [11] [36] [9].

[16] See Policy CC2.3 *minimising energy use* for more details.

Advancements in energy storage technology have meant that energy storage is now feasible at individual domestic level, and costs are predicted to continue to fall [10].

2.4.24 The council therefore requires all development to demonstrate that demand-side response has been considered and maximised alongside renewable energy generation.

Policy CC2.5 Minimising Waste and Promoting a Circular Economy

1. All development proposals should adopt a circular economy approach to building design and construction, and be designed for durability, flexibility and easy disassembly, to reduce waste, to keep materials and products in use for as long as possible, and to minimise embodied carbon.

2. This will be achieved by requiring:

All development:

a. Where existing buildings are on site, to prioritise their reuse and retrofit wherever possible before considering the design of new buildings.

b. To ensure resource efficiency and reduce embodied carbon emissions by sourcing and prioritising materials, and designing building shapes and forms, that can easily be maintained, repaired and renewed across the development lifetime.

c. To minimise the environmental impact of materials by specifying sustainably-sourced, low impact and re-used or recycled materials; this should include identifying opportunities for the retention and reuse of existing materials on site (e.g. re-using demolition material on site). Materials should be locally-sourced wherever possible to minimise transport emissions.

All development resulting in the creation of 30 or more dwellings or 1000sqm or more non-residential GIA, and all development proposing to demolish and rebuild a single dwelling:

d. To undertake a Whole Life-Cycle Carbon assessment proportionate to the scale of development and demonstrate actions taken to reduce life-cycle carbon emissions.

Supporting text

Embodied carbon and a circular economy

2.5.1 The construction of a development uses energy and resources which represent its embodied carbon emissions. Of the annual carbon emissions associated with the UK building stock (existing and new build) 20% is related to the embodied emissions associated with new construction [9]. Climate change policies relating to sustainable design have traditionally focused on reducing operational carbon emissions. However, as buildings become more energy efficient and energy generation is decarbonised, the proportion of operational emissions will significantly reduce and embodied carbon will represent a higher proportion of whole life-cycle carbon emissions. Embodied carbon can represent 40-70% of whole life-cycle carbon emissions in a new low carbon building [9].

2.5.2 A circular economy is one that seeks to promote waste minimisation by moving from a more traditional linear model of resource use, consumption and disposal, to one that promotes long-term sustained use, reuse and recycling. Merton is supportive of the move towards a more circular economy. As such, circular economy principles should be embedded across all facets of the development lifecycle - from concept and design to build-out and occupation/ use, in order to increase resource efficiency, minimise operational and embodied carbon emissions, and minimise residual waste, in line with Section R2 of the National Design Codes 'Careful selection of materials and construction techniques' [37].

2.5.3 Circular economy opportunities might include using materials with a lower embodied carbon (e.g. timber rather than concrete frame – using timber also provides an opportunity to sequester carbon), using more recycled content in the materials and finding other ways to enhance recovery and recyclability (e.g. reinforcement free concrete). Mechanical and electrical services will typically need to be replaced every 20 years and should therefore be designed to allow easy recovery, reconditioning and reuse whilst also optimising for performance and carbon emissions. Encouraging a 'fabric first' approach to building design can also minimise mechanical plant and services in favour of natural ventilation.

2.5.4 In 2020, LETI identified the following best practice upfront embodied carbon targets for buildings designed in 2020 and 2030 [9]:

a. Residential

- Best practice 2020 <500kgCO_2/m^2
- Best practice 2030 <300kgCO_2/m^2

b. Non-residential

- Best practice 2020 <600kgCO_2/m^2
- Best practice 2030 <350kgCO_2/m^2

2.5.5 The GLA's Whole Life-Cycle Carbon Assessments guidance also provides benchmarks and aspirational benchmarks for different development types.

2.5.6 Embodied carbon benchmarks and targets are a developing knowledge area and are expected to be refined over the coming years. LETI has been consulting with industry groups including RIBA, CIBSE, IStructE, the GLA and the Whole Life Carbon Network to align definitions, scopes, measurement methodologies and targets [38].

2.5.7 All new build development will be expected to endeavour to minimise embodied carbon in line with best practice targets contained within the latest industry guidance.

2.5.8 All applications that are referable to the Mayor of London will need to submit Circular Economy Statements that have been prepared in accordance with the GLA's Circular Economy Statement Guidance.

Whole life-cycle carbon emissions

2.5.9 A whole life-cycle carbon approach which captures a building's operational (regulated and unregulated) and embodied emissions, as well as emissions associated with the maintenance and disassembly and disposal of the development, is required to fully understand the carbon impact of a development. Minimising whole life-cycle carbon emissions through careful and considered use of natural and renewable resources, promoting sustainable construction and minimising energy use are key considerations in securing a sustainable, low carbon future for Merton.

2.5.10 The Mayor requires all referable schemes to undertake a Whole Life-Cycle Carbon Assessment in line with the GLA's Whole Life-Cycle Carbon Assessment Guidance 2020, or equivalent. All Major Developments are also encouraged to undertake whole-life cycle carbon assessments under the London Plan. In order to drive a reduction in whole life-cycle carbon emissions in Merton's building stock and to develop a better understanding of whole life-cycle carbon emissions associated with development in the borough, Merton Council will require all schemes resulting in the creation of 30 or more dwellings or 1000sqm or more non-residential GIA to undertake a Whole Life-Cycle Carbon Assessment.

2.5.11 Historically, Merton has received a large number of applications for the substantial or total demolition of a single dwelling house and rebuild as a single dwelling. Such proposals are typically driven by design, intensification or lifestyle rather than on the grounds of structural instability.

2.5.12 All such proposals outside of structural instability are considered a highly inefficient use of resources and materials and contrary to the principles of sustainable development and the circular economy. Even where proposals are deemed to result in an improvement of 'in use' energy consumption, the embodied carbon footprint of whole scale demolition and rebuild means that any environmental benefits are unlikely to be realised in the long term.

2.5.13 The council therefore requires all proposals to demolish and rebuild a single dwelling to submit a Whole Life-cycle Carbon Assessment proportionate to the scale of development. Developers will be required to demonstrate that the development has been designed and delivered in accordance with the principles of a circular economy to minimise embodied carbon.

2.5.14 This policy will also apply in cases where a substantial amount, but not all, of the original building is demolished and rebuilt (for example, where the original façade is required to be retained).

Policy CC2.6 Sustainable Design Standards

1. Merton Council will seek high standards of sustainable design and construction from new development, change of use, conversions and refurbishments to ensure that all development makes effective use of resources and materials, minimises water use, and assists in meeting local and national carbon reduction targets.

2. This will be achieved by:

a. Requiring all development to demonstrate that the use of mains water has been minimised by incorporating measures such as smart metering, water saving and recycling measures, including retrofitting where appropriate.

b. Requiring all Major Developments and high water use developments to include water saving measures such as rainwater harvesting and greywater recycling to reduce mains water consumption.

Residential development:

c. Requiring all residential development to meet a minimum internal water efficiency standard of 105 litres per person per day, as set out in Building Regulations Part G or equivalent.

d. Requiring all conversions and changes to the use of existing buildings resulting in the creation of 10 or more new dwellings to achieve a minimum BREEAM Domestic Refurbishment rating of 'Excellent' or equivalent.

Non-residential development:

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

f. Requiring all conversions and changes of use to non-residential uses of 1,000sqm GIA and above to achieve a minimum of BREEAM Non-domestic Refurbishment and Fit-out 'Excellent' standard or equivalent.

Supporting text

BREEAM

2.6.1 The principles of sustainable design and construction are designed to be holistic and are more wide-ranging than energy performance alone. National sustainable design and construction standards such as BREEAM ensure that a development's full impact on the environment, including water use, transport and land use and ecology, as well as energy use and waste are considered and addressed. Using these standards or any subsequently adopted set of national sustainable construction standards equivalent to those set out in the

policy, will assist in the delivery of a number of the policies covered in the Local Plan including the Transport, Green Infrastructure and Climate Change policies.

2.6.2 The highest standards of sustainable design and construction should be applied to improve the environmental performance of new development. Development proposals must demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.

2.6.3 The BREEAM Domestic Refurbishment standard provides a recognised scheme and methodology by which conversions and change of use can demonstrate their adherence to sustainable design and construction methodologies. Merton Council therefore requires all Major Development resulting in the creation of 10 or more new dwellings through the conversion or change of use of existing buildings to achieve a minimum BREEAM Domestic Refurbishment rating of 'Excellent' or equivalent. In particular, this scheme will help drive energy efficiency improvements across Merton's existing building stock through its post-refurbishment Energy Efficiency Rating requirements.

2.6.4 Merton Council also requires all Major Development of 1,000sqm or more non-residential GIA (both new and existing buildings) to achieve BREEAM 'Excellent' standard or equivalent.

2.6.5 Proportionally, Merton receives a large number of minor development applications which involve the conversion and change of use of existing buildings to create new dwellings. In order to make our housing fit for the future, existing homes must be made low-carbon, low-energy and resilient to a changing climate [11] through the uptake of measures including:

a. Improved insulation in lofts, walls and floors;
b. Double or triple glazing windows;
c. Low-carbon heating;
d. Draught proofing;
e. Highly energy efficient appliances;
f. Highly water efficient devices;
g. Passive cooling measures such as shading and ventilation;
h. Green space to reduce the risks of flooding and overheating;
i. Improved flood resilience and resistance.

Minimising water use

2.6.6 According to Waterwise, the UK has less available water per person than most other European countries [39]. London is drier than Istanbul, and the south-east of England has less water available per person than the Sudan and Syria. London has lower rainfall than the national average while having an extremely high population density [40].

2.6.7 This combination of limited water resources and high demand has resulted in the Environment Agency designating the Thames Water region to be “seriously water stressed” [41]. This trend is very likely to be exacerbated by future changes in climate and population growth [42].

2.6.8 All development must therefore be designed to be water efficient and reduce water consumption. Merton Council requires all development to demonstrate that the use of mains water has been minimised by incorporating measures such as smart metering, water saving and recycling measures, and retrofitting water efficiency measures where appropriate, to help achieve lower water consumption rates and to maximise future-proofing.

2.6.9 All residential schemes will be required to demonstrate that internal water usage rates of less than 105 litres per person per day have been achieved. All non-residential development of 1,000sqm GIA and above will be expected to achieve at least the BREEAM Excellent water-efficiency credits.

2.6.10 All Major Developments and high water use developments, such as hotels, hostels and student housing, will be expected to include water saving measures such as rainwater harvesting and greywater recycling to achieve lower water consumption rates.

2.6.11 New development, conversions and change of use of all sizes should seek new, innovative and more robust approaches to achieving a high standard of sustainable design and construction.

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