November 2023

Climate and Planning Unit

Planning Policy Position for

Net Zero Carbon

Homes and Buildings in Greater Essex

Essex Climate and Planning Unit

EPOA
Essex Planning Officers Association

Essex Climate Action Commission

Contents

1. Net Zero Carbon Development

The built environment (in operation) is estimated to account for 23%[1] of the UK's greenhouse gas emissions. This proportion is substantially higher when emissions embodied in the materials and construction process of new buildings is included. The UK has a statutory target for reducing greenhouse gas emissions to net zero by 2050 (as set out in the Climate Change Act 2008, as amended). The Climate Change Act also sets, through the Sixth Carbon Budget[2], a further legal target of a 78% reduction in emissions by 2035, which builds upon the commitment to reduce emissions by 68% from 1990 levels by 2030. The Climate Change Committee[3] warns that the UK is off target and rapid and deep cuts to emissions must be made in all sectors.

It is therefore imperative that new build development is built to be net zero carbon in operation from the outset and minimises embodied carbon emissions through all stages of a building's life cycle. Embodied emissions include those related to raw material supply, manufacturing and transport, construction processes and demolition and disposal (see Figure 1). For a building to be net zero carbon in its operation then it must be an ultra-low energy building that meets high building fabric and energy efficiency standards, does not use fossil fuel and maximises renewable energy generation to achieve operational energy balance (see Figure 2).

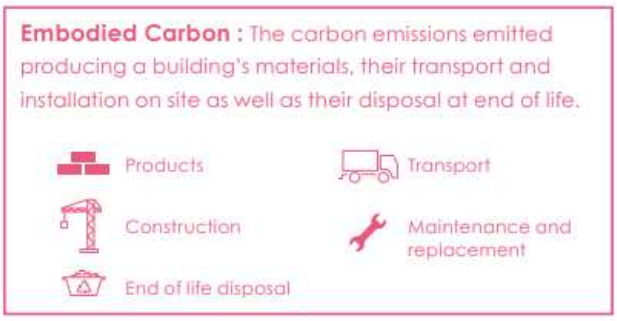

Figure 1 – Embodied Carbon

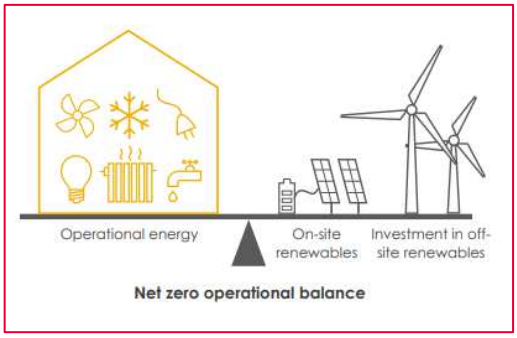

Figure 2 - Net Zero in Operation

Source: LETI Climate Emergency Design Guide

Retrofitting buildings is more disruptive, costly and time consuming than designing buildings to be net zero carbon in the first place. In Essex, a target for all planning permissions for new buildings to be net zero carbon by 2025 and carbon positive by 2030 was recommended by the Essex Climate Action Commission (ECAC) in July 2021[4] and endorsed by Essex County Council (ECC) in November 2021. The ECAC recommendations form the basis of the ECC Climate Action Plan[5] and are relevant to all Essex Local Planning Authorities (LPAs).

[1] In 2019, includes direct and indirect emissions, page 6 of https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-Buildings.pdf

[2] Carbon Budget order 2021 - https://www.gov.uk/guidance/carbon-budgets#setting-of-the-sixth-carbon-budget-2033-2037

[3] https://www.theccc.org.uk/wp-content/uploads/2022/06/Progress-in-reducing-emissions-2022-Report-to-Parliament.pdf

[4] https://www.essexclimate.org.uk/sites/default/files/DS21_7178%20ECAC_Commission_Report-Final.pdf

[5] Essex Climate Action Plan

Evidence commissioned by the ECAC, led by ECC on behalf of all the Greater Essex Local Authorities, demonstrates that building to the net zero carbon (in operation) standard set out in **Policy NZ1** is:

- **Technically feasible** *(Report 1: Essex Net Zero Policy – Technical Evidence Base by Introba, Etude, Currie & Brown, July 2023)*;

- **Financially viable** *(Net Zero Carbon Viability Study for Essex by Three Dragons, August 2022; to be supplemented by each LPA's local plan viability study using costs from Report 1: Essex Net Zero Policy – Technical Evidence Base (Introba et al, July 2023) or later updates)*; and

- **Legally justified** *(Essex Open Legal Advice – Energy policy and Building Regulations by Estelle Dehon KC, Cornerstone Barristers, April 2023).*

The Net Zero Carbon Development evidence base for Essex is available on the Net Zero Evidence page of the Essex Design Guide (EDG) and is supplemented by each Essex LPA's local plan evidence base.

To complement this evidence, practical design advice is provided (and being added to) on the EDG which focuses on how to design developments (of all scales and types) to meet the net zero carbon and energy standards, mitigate potential overheating risk and to address other inter-related sustainability issues. The aim is to ensure new development mitigates, adapts and is resilient to a changing climate.

Alongside reducing carbon emissions that arise from the use or occupation of a new development to net zero (known as operational carbon), it is important to address the carbon emissions associated with the processes and materials used in construction and eventual disposal of buildings (known as embodied carbon). Together, both operational carbon emissions and embodied carbon emissions form the Whole Life Carbon impact of a development. As a first step, the carbon emissions from a proposed development should be calculated by using a nationally recognised Whole Life-Cycle Carbon (WLC) assessment methodology (for example, the RICS Guidance) [6] and measures taken to reduce emissions with reference to best practice targets.

Evidence is being commissioned in Essex to provide further guidance on the preferred planning policy approach for reducing embodied carbon emissions, including the setting of specific targets. In the interim, **Policy NZ2** is a 'placeholder' policy for consultation purposes which sets out an approach that requires the assessment and reporting of embodied carbon in developments over a defined size threshold and identifies industry good practice benchmarks as targets to aim for. The policy will be updated as further evidence is produced.

The Building Regulations 2021 (including the proposed Future Homes Standard 2025) do not adequately address operational or embodied carbon emissions from new development. For example, operational carbon emissions come from 2 categories of energy use – Regulated and Unregulated (see Figure 3). About 50% of a building's total operational energy use comes from 'unregulated' uses, however Building Regulations does not address these uses. Furthermore, Building Regulations currently does not address embodied carbon emissions.

[6] https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/building-surveying-standards/whole-life-carbon-assessment-for-the-built-environment

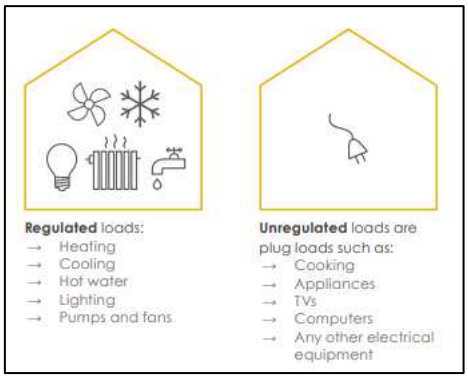

Figure 3 – Regulated and Unregulated Energy loads

Source: LETI Climate Emergency Design Guide

It therefore falls to the planning system, and local planning authorities through their local plans, to ensure new development addresses carbon emissions in operation (including those from both regulated and unregulated energy uses) and embodied carbon emissions, in a way that aligns with local and national climate targets and mitigates and adapts to climate change. This is supported through primary legislation and national policy which require local plans to include policies to secure development that mitigates and adapts to climate change. This will enable LPAs to take a proactive approach to climate change which is in line with the objectives and provisions, and hence legally binding targets, of the Climate Change Act *(NPPF, para 153, Footnote 53)*.

2. Policy NZ1: Net Zero Carbon Development (in Operation)

POLICY NZ1: NET ZERO CARBON DEVELOPMENT (IN OPERATION)

A) New build development (residential and non-residential)

All new buildings must be designed and built to be Net Zero Carbon in operation. They must be ultra-low energy buildings, fossil fuel free, and generate renewable energy on-site to at least match annual energy use.

All new buildings (1 dwelling and above for residential; 100m^2 and above for non-residential) are required to comply with requirements 1 to 5 as set out below:

1. **Requirement 1: Space heating demand limits**
   a. **Residential buildings (apart from bungalows) and non-residential buildings must achieve a space heating demand of 15 kWh/m^2 GIA (gross internal floor area)/year or less.**
   b. **Bungalows must achieve a space heating demand of 20 kWh/m^2 GIA/year or less.**

2. **Requirement 2: Fossil fuel free**
   a. **No new buildings shall be connected to the gas grid; and**
   b. **Fossil fuels must not be used on-site to provide space heating, domestic hot water or cooking.**

3. **Requirement 3: Energy Use Intensity (EUI) limits**
   a. **Residential buildings (Use Class C3 and C4) must achieve an Energy Use Intensity (EUI) of no more than 35 kWh/m^2 GIA/yr.**
   b. **The following non-residential buildings must achieve an Energy Use Intensity (EUI) of no more than the following (where technically feasible) by building type or nearest equivalent:**
      - **Offices – 70 kWh/m^2 GIA/year**
      - **Schools – 65 kWh/m^2 GIA/year**
      - **Light Industrial – 35 kWh/m^2 GIA/year**
   c. **For other residential and non-residential buildings, that are not covered by a) and b) above, applicants should report their energy use intensity but are not required to comply with a certain limit.**

4. **Requirement 4: On-site renewable energy generation**
   Renewable energy must be generated on-site for all new developments by whichever of the following results in the greater amount of solar PV energy (electricity) generation:

   a. **The amount of energy generated in a year should match or exceed the predicted annual energy use of the building, i.e. Renewable energy generation (kWh/m^2/year) = or > predicted annual energy use (kWh/m^2/year)*; or**

   b. **the amount of energy generated in a year is:**
      - **at least 80 kWh/m^2 building footprint per annum* for all building types; and**
      - **at least 120 kWh/m^2 building footprint per annum* for industrial buildings.**

   ***For development proposals where it is demonstrated to the satisfaction of the Local Planning Authority that meeting Requirement 4 is not technically feasible then renewable energy generation on-site should be maximised and the residual amount of renewable energy generation (equivalent to the shortfall in meeting the annual energy use of the building in kWh/year) must be offset by a financial contribution (to cover the administration, purchasing and installation of a solar PV**

renewable energy (electricity) system elsewhere in the plan area, which is able to generate a similar amount of energy) and be paid into the Council's offset fund.

The offset price is set at £1.35 per kWh or the most recent updated version and the contribution shall be calculated at the time of planning application determination.

5. **Requirement 5: As-built performance confirmation and in-use monitoring**
   a. **All developments must submit as-built performance information at completion and prior to occupation; and**
   b. **In-use energy monitoring is required on a minimum of 10% of dwellings for development proposals of 100 dwellings or more, for the first 5 years of operation.**

Alternative routes to meeting policy requirements.

Proposals that are built and certified to the Passivhaus Classic or higher PassivHaus standard are deemed to have met Requirements 1 and 3. Requirements 2, 4 and 5 must also be met to achieve policy compliance.

B) Extensions and Conversions

Applications for residential extensions and conversions affecting existing buildings (but excluding Listed Buildings) are encouraged to meet the minimum standards approach fabric specifications set out in Table 2 and maximise renewable energy generation where practical and feasible.

3. Supporting Text / Reasoned Justification – Policy NZ1

The policy requirements under Part A of Policy NZ1 apply to new build residential development (1 dwelling and above) and non-residential development (100m^2 floorspace and above). For the purposes of the policy 'residential buildings' means dwellinghouses and flats (C3), houses in multiple occupation (C4), and developments of self-contained residential units such as extra-care (C3). This also includes the residential element of any new mixed-use buildings. Non-residential buildings includes Use Classes C1 (Hotels), C2 /C2A (Residential Institutions) and those falling within use classes B, E, F and Sui Generis. For any other residential and non-residential buildings, the policy should be applied in a proportionate manner where relevant and appropriate through the Development Management process.

To meet the requirements 1- 5, developments will need to be designed in a way that prioritises a fabric first approach to building design and embeds the energy hierarchy (see Figure 4). This means improving building fabric standards and energy efficiency to ensure energy demand is minimised, and then installing renewable energy generation capacity to meet or exceed demand where possible, followed by offsetting residual energy (if required) as a last resort.

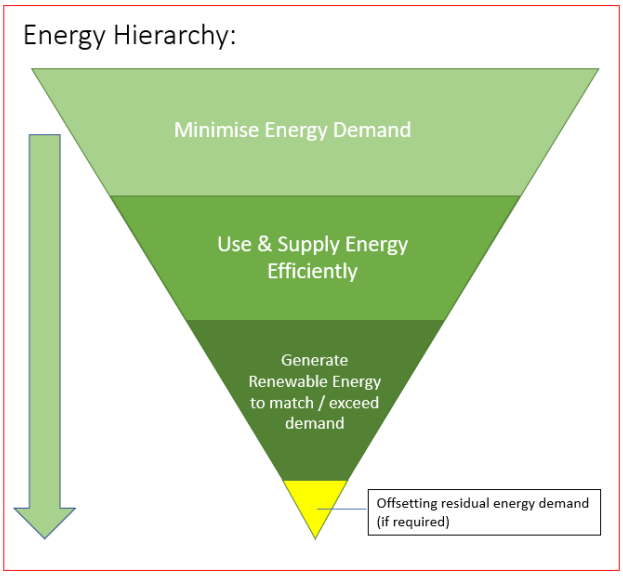

Figure 4: Energy Hierarchy

Designing new development to be net zero carbon in operation needs to be addressed at both building level and site level and at the earliest possible stage so that factors such as the orientation, built form, building fabric, site layout and landscaping measures can be taken into account to minimise energy demand. These factors also influence the renewable energy generation potential of a site and through good design, can help make a development more resilient to a changing climate, for example, through using landscaping measures and green/blue infrastructure to mitigate potential overheating risk to the comfort and well-being of occupants. It is important that designing for 'net zero' is done in a holistic manner at an early stage of the design process, and in a way that considers wider sustainability objectives and issues. *Report 2: Essex Net Zero Policy – Summary of Policy, Evidence and Validation Requirements (July 2023)* contains a 1 page high level design guide for a terrace block and low rise apartment block. Also the EDG contains practical advice on good solar design which focuses on balancing the needs of daylighting, useful solar gain and mitigating overheating risk.

3.1. Requirement 1: Space heating demand

The space heating demand is the amount of heat energy needed to heat a home or building over a year and is expressed in kWh/m^2/year. It is a measure of the thermal efficiency of the building elements. Various design and specification decisions affect space heating demand including building form and orientation, insulation, air-tightness, windows and doors and the type of ventilation system.

Reducing space heating demand to the target levels identified is necessary to achieve a net zero carbon (in operation) building and aligns with recommendations from the Climate Change Committee, Royal Institute of British Architects (RIBA), Low Energy Transformation Initiative (LETI) and the UK Green Building Council (UKGBC). It is also beneficial to residents and building users as it directly reduces energy costs.

Space heating demand in all buildings of major development proposals should be demonstrated using predictive energy modelling, for example Passivhaus Planning Package (PHPP) or the Chartered Institute of Building Services Engineers (CIBSE) TM54. The space heating demand figure is an output of the modelling software once all data has been input.

The space heating target applies to all residential and non-residential buildings designed to be used by people (i.e. not agricultural buildings).

3.2. Requirement 2: Fossil fuel free

New buildings must not burn fossil fuels for heating, hot water and cooking if Essex, and the UK, is to stay within carbon budgets. Alternatives are available. For example, heat pumps can provide both space heating (and cooling) and hot water and can serve individual homes or communal heating systems. They use renewable heat sources such as air, ground or water. The key benefit of heat pumps is their efficiency. Efficiencies vary but are typically around 250- 400% for an Air Source Heat Pump. Direct electric heating systems are less efficient, typically 100%, and are therefore more expensive to run. Solar thermal panels, which turn solar energy into heat can help with space and water heating too.

Heating provided through wood burners and biomass boilers has a negative impact on air quality and are therefore discouraged.

3.3. Requirement 3: Energy Use Intensity

Energy Use Intensity (EUI), or metered energy use, is the total energy needed to run a home or building over a year (per square metre). It is a measure of the total energy consumption of the building (kWh/m^2/year). Reducing total energy use of buildings to the target level identified is necessary to align with climate targets. It is also beneficial to residents and building users as it would directly reduce energy costs.

Energy Use Intensity in all buildings of major development proposals should be demonstrated using predictive energy modelling.

The EUI of a building covers all energy uses (regulated and unregulated): space heating, domestic hot water, ventilation, lighting, cooking and plug-in loads e.g. appliances, computers etc. However, electricity used for electric vehicle charging is excluded from the calculation. Whether the energy is sourced from the electricity grid or from onsite renewables does not affect the calculation.

The EUI target set in the policy for dwellings is based on modelling undertaken in the technical evidence base *(Report 1: Essex Net Zero Policy – Technical Evidence Base, July 2023)* and includes both regulated and unregulated energy uses. For clarity, the EUI target set out in 3a) applies to residential uses which include: dwellinghouses, flats, self-contained residential units (C3) and houses of multiple occupation (C4).

For non-residential buildings, the EUI's for the uses listed (office, school and light industrial) are based on gross internal floor areas (GIA) and include regulated and unregulated energy loads. Buildings which represent these generic typologies have been modelled in the evidence *(Report 1: Essex Net Zero Policy – Technical Evidence Base, July 2023)* and appropriate EUI limits identified.

For other residential and non-residential typologies (that are not covered under 3a or 3b), applicants are expected to comply with all other policy requirements, except Requirement 3: Energy Use Intensity limits. Instead, applicants are expected to only report their energy use intensity. However, applicants are recommended to seek to meet the limits being developed by the UK Net Zero Carbon Building Standard initiative.

3.3.1. District Heat Networks

Developments connected to a district heat network are expected to meet the proposed EUI limits. The limits set for EUI for each building should be the same irrespective of the heating system that is proposed, to allow a fair comparison between different heating options. The EUI calculations for a scheme connected to a district heat network would have to include the energy consumption of the district heating heat generation plant. This means that the EUI includes the heat losses of the district heating system.

3.4. Requirement 4: On-site renewable energy generation

New development presents opportunities for integrating renewable energy technology into a proposal, including renewable electricity generation. The evidence recommends that in Essex currently the most suitable and cost effective technology is rooftop solar photovoltaic panels.

Evidence *(Report 1: Essex Net Zero Policy – Technical Evidence Base (July 2023))* shows that it is technically feasible for a building to generate sufficient renewable energy to match or exceed its predicted annual total energy use and thereby achieve an operational energy balance on-site. For clarity, the predicted annual total energy consumption of a building includes both regulated and unregulated energy uses, but excludes energy used for electric vehicle charging.

The policy sets out two options for calculating the renewable energy provision required from a development to be policy compliant. Option a) requires renewable energy generation to match the predicted annual energy use of a building. Option b) sets a minimum amount of renewable energy generation to be achieved in a year based on the building footprint. Whichever calculation results in the greater amount of solar PV renewable electricity generation is the route that must be achieved.

The *Report 1: Essex Net Zero Policy – Technical Evidence Base July 2023* sets out some worked examples, and guidance on roof design and orientation is provided in Appendix 2 of that report, which will help applicants maximise renewable energy generation. The renewable energy generation output should be calculated following the Microgeneration Certification Scheme (MCS) guidance[7] method including the impact of shading.

Matching or exceeding predicted total annual energy use on site with renewable energy generation achieves a net zero carbon development in operation from the outset. As well as helping progress towards climate targets, there are other benefits for ensuring new build development maximises renewable energy generation. For example, it would generate 'free' electricity close to its point of use and help deliver significant energy cost savings for residents and building users. It would also aid the transition to a more

[7] https://mcscertified.com/standards-tools-library/

sustainable energy system by contributing to the significant increase in renewable energy generation required between now and 2050 in the UK and make efficient use of land and resources.

3.4.1. Renewable Energy Offsetting Mechanism

There may be circumstances where it is not technically possible to match on-site renewable energy generation with annual average energy demand. An offsetting mechanism is therefore provided to enable these developments achieve policy compliance.

For the offset mechanism to be triggered, the applicant must justify and demonstrate, to the satisfaction of the Local Planning Authority (LPA), why it is not technically possible for the development to achieve policy compliance with Requirement 4. To do this, applicants should refer to, and meet, the minimum information requirements for policy compliance set out in *Report 2: Essex Net Zero Policy – Policy Summary, Evidence and Validation Requirements (July 2023)*. The information will be critically reviewed by the LPA, particularly as evidence shows that it is technically possible to achieve all the policy requirements and at a reasonable cost in most development typologies.

If the offsetting mechanism is justifiably triggered by non-compliance with Requirement 4, then the development proposal must still meet the other Policy requirements 1, 2, 3 and 5, and maximise on-site renewable energy generation.

The offset mechanism is expressed as a renewable energy offset and the price is set in £/kWh, which will be reviewed at least every 3 years and updated for Essex. The price (as of July 2023) is set at **£1.35 per kWh** (published in the *Report 1: Essex Net Zero* Policy – *Technical Evidence Base, July 2023*) and has been calculated using a robust methodology based on the cost of providing roof top solar PV in Essex and incorporating an allowance for maintenance and administration. The calculation of the contribution required will be made at the point a planning application is determined using the most up to date offset price (£/kWh) for Essex.

The offset contribution will be used to fund additional renewable energy capacity elsewhere in the plan area or County. The aim is to make up for the shortfall in renewable energy that cannot be generated on-site. The offset mechanism is purposely limited in role and scope and is only intended for use as a last resort.

The offsetting mechanism meets the legal tests for Section 106 in that it is: (i) necessary to make the development acceptable in planning terms; (ii) directly related to the development; (iii) fairly and reasonably related in scale and kind to the development.

Further information on how the offsetting mechanism will operate will be available in the Renewable Energy Offsetting Framework document that is in preparation. Current proposals are for a countywide funding mechanism to be administered by ECC. The Offset tariff will be collected as a single payment (via a direct payment / Section 106 / Unilateral Undertaking). It is initially envisaged that the payments will be used to provide roof top solar PV on public amenity facilities (to be determined). Spending of the offset fund is preferred to be within reasonable distance of the original development, and within the same plan area as the development. However, pooling may be necessary to enable installation of sufficient scale schemes.

3.4.2. Other roof top uses

There may be certain circumstances where it is considered more appropriate for uses other than solar PV on rooftops to be delivered. Consideration should be given to the co-benefits of this on a case by case basis in accordance with wider sustainability objectives, but it is envisaged to likely be only in exceptional circumstances.

3.5. Requirement 5: As-built performance confirmation and in-use monitoring

In order for the Net Zero Carbon Development (in operation) policy to be effective, it is important that new buildings deliver their intended performance.

Using predictive energy modelling, such as Passivhaus Planning Package or the Chartered Institution of Building Services Engineers (CIBSE) TM54 (which is a requirement for major applications), will help improve accuracy of energy performance assessments and reduce the potential gap between the design and actual in-use energy. Also, excellent detailed design needs to be matched by high quality construction and commissioning in order for the 'energy performance gap' to be minimised.

The information that must be submitted at completion stage of a development (prior to occupation) to demonstrate to the satisfaction of the LPA that the building / development has been built to the approved design and energy standards, is set out in *Report 2: Essex Net Zero Policy – Policy Summary, Evidence and Validation Requirements (July 2023)* and includes the indicators listed in Table 1 below:

#	**Table 1: As-built stage performance indicators** (Required information to be submitted at completion, prior to occupation)
1	**Update parameters** • Use or typology • GIA (m^2) • Energy supply (fossil fuel free?)
2	**Update performance modelling** • Space heat demand using predictive energy model (kWh/m^2/year) • Energy Use Intensity using predictive energy model (kWh/m^2/year) • As Built stage EPCs (U-values and airtightness check) • Draft DEC for non residential (regardless of user)
3	**Confirm renewable energy installation** • Installed solar PV (kW_p) • Any other installed renewable (i.e solar thermal)
4	**Update offset contribution** • Assess energy balance based on data supplied and confirm whether any offset payment is required, and how much
5	**Confirm process for collecting 'in use' data** • Confirm if in-use monitoring and reporting will be carried out • If yes, state what monitoring strategy is in place and confirm how data collected will be published

**Note that for performance modelling (indicator 2), Minor applications following the "minimum standards approach" (without an energy model), do not have to report their space heat demand, energy use intensity and offset contribution at as-built stage. Applications instead need to re-confirm the specifications to which the development has been built to. Further guidance is provided below under 'Reporting and Modelling'.*

In-use energy monitoring (also known as post occupancy evaluation) is recommended to be carried out on new developments so that a building can be evaluated to ascertain whether the energy targets aimed for in the design have been met in practice.

For residential development proposals of 100 dwellings or more, the Council requires in-use energy monitoring to be undertaken on a representative sample of at least 10% of homes for a period of 5 years. The information must be evaluated to understand how buildings are performing, minimise the performance gap, and to aid the learning, innovation and skills development in the design and construction industry.

Qualitative feedback from building users via occupant satisfaction questionnaires should also be undertaken to assess performance post occupation. This information can be used to enhance the training and advice given to residents / occupiers of new homes and buildings.

3.6. Reporting and Modelling

Policy compliance will need to be demonstrated through the submission of an appropriate energy assessment, which for major development proposals should be in the form of an Energy Strategy and for minor development proposals the applicable 'net zero spreadsheet' (which will be available to download from EDG). Minimum information requirements and checklists for Major and Minor development proposals at each stage of the planning process are set out in *Report 2: Essex Net Zero Policy – Policy Summary, Evidence and Validation Requirements (July 2023)*, along with the template spreadsheet.

Major Development proposals are:

- For housing development - where 10 or more homes will be provided, or the site has an area of 0.5 hectares or more.
- Non-residential development - an additional floorspace of 1,000m^2 or more, or a site of 1 hectare or more.

Minor Development is less than 10 dwellings or less than 1000m^2 of additional floorspace.

With regards major development proposals, predictive energy modelling, such as Passivhaus Planning Package (PHPP) or CIBSE TM54, should be used. This will provide the necessary assurance to the LPA of the accuracy of the energy assessment information and will help reduce any potential energy performance gap issues, which is where in-use energy does not match the design standard.

With regards minor development proposals, applicants may use predictive energy modelling or follow a 'minimum standards approach' which sets out the specifications that the development must be designed and built to. These fabric and systems specifications are presented in Appendix C of *Report 2: Essex Net Zero Policy – Summary of Policy, evidence and validation requirements (July 2023).* By following this approach (i.e. without an energy model), minor applications do not have to report the space heating demand, energy use intensity and offset contribution, but they do need to re-confirm on completion the specifications that the development has been built to and the solar photovoltaic system installed.

3.7. Alternative routes to policy compliance

3.7.1. Passivhaus

Passivhaus[8] is an international energy standard for buildings. It sets stringent standards on energy consumption for heating and overall energy demand and design requirements to control the quality of the internal environment.

In recognition of the high sustainability standards required to achieve a Certified Passivhaus Classic standard (or higher) scheme and the rigorous quality assurance process that must be followed to achieve certification, Passivhaus is considered an acceptable alternative route to compliance with policy requirements 1 and 3.

[8] https://www.passivhaustrust.org.uk/what_is_passivhaus.php

Proposals seeking to follow this route will be required to provide evidence from an accredited Passivhaus Certifier that the proposed design would be capable of and is expected to achieve the full certified Passivhaus Classic standard (or higher). The proposals would still be required to meet policy requirements 2, 4 and 5.

3.7.2. BREEAM

The use of BREEAM[9] is encouraged in terms of addressing broader sustainability objectives and providing a level of independent quality assurance for development. However, the use of BREEAM as an alternative approach to policy compliance will not be accepted.

3.8. Extensions and Conversions affecting Existing Buildings (except Listed Buildings)

Development proposals involving existing buildings offer an opportunity for measures to be taken to reduce energy use and carbon emissions, and also to generate renewable energy.

Encouraging proposals for extensions and conversions to be built to the minimum fabric standards (residential) set out in Table 2 (below), will improve the energy efficiency of the existing building and contribute to meeting climate targets. Incorporating and maximising renewable energy generation technology will enhance this further. However, there may be some circumstances where this is not practical and/or feasible, such as a small extension or where the building is overshadowed.

Table 2 – Minimum Standards Approach Fabric Specifications (Domestic)

Residential Developments		Block of Flats Low Rise	Terrace / Semi-Detached House	Bungalow
Fabric	Floor U-value	0.08 – 0.10	0.08 – 0.10	0.08 – 0.10
	External Wall U-value	0.10 – 0.14	0.10 – 0.13	0.09 – 0.12
	Roof U-value	0.09 - 0.11	0.09 - 0.11	0.09 - 0.10
	Windows U-value	0.80 – 0.90	0.80 – 0.90	0.80 – 0.90
	Windows G-value	0.45 – 0.55	0.45 – 0.55	0.45 – 0.55
	External doors U-value	-	0.90 - 1.2	0.90 - 1.2
	Thermal bridging	0.04 W/m^{2}K	0.04 W/m^{2}K	0.04 W/m^{2}K
	Air permeability	<1 ach	<1 ach	<1 ach

Source: Report 2: Essex Net Zero Policy – Policy Summary, Evidence and Validation Requirements (July 2023)

3.8.1. Heritage Assets

Retaining, reusing, refurbishing and retrofitting historic buildings can contribute to meeting climate targets. There are sensitive issues that need to be addressed when it comes to improving the energy efficiency and climate resilience of heritage assets, including potential impact on their setting. Any schemes should have regard to the specific advice and guidance provided in the Essex Design Guide - Climate Change and the Historic Environment | Essex Design Guide.

[9] https://bregroup.com/products/breeam/

3.9. Monitoring and Implementation

To support the implementation of the Net Zero Carbon Development (in operation) Policy in Greater Essex, the County Council will publish guidance so that meeting the requirements of the policy can be demonstrated efficiently, effectively and consistently. Arrangements for monitoring compliance of permissions granted will also be published, to give confidence that new homes and other buildings are built to the standards granted consent.

As a minimum, the following indicators will be monitored on new development proposals:

- Space Heating Demand – has the limit been met? (Policy Requirement 1)
- Fossil fuel – is the development fossil fuel free? (Policy Requirement 2)
- Energy Use Intensity – has the limit been met? (Policy Requirement 3)
- Renewable energy generation – is it maximised? And does it at least match predicted annual energy demand? (Policy Requirement 4)
    - Renewable energy offsetting mechanism – is this being used to achieve policy compliance? And has this been justifiably triggered?
- In-use energy monitoring – is this being carried out? What percentage of homes and for how long?

The use of assured performance standards (e.g. Passivhaus) that are accredited and certified independently will also be monitored.

3.10. Mitigating Overheating Risk

When designing new buildings, national planning policy also requires the potential for overheating risk from a changing climate, and the impact this has on the comfort, health and wellbeing of occupiers to be considered.

Overheating risk in new residential buildings has partly been addressed by amendment to the Building Regulations in June 2022 (Part O: Overheating Mitigation). Since the compliance tools for Building Regulations are not intended to accurately evaluate overheating, major development proposals are encouraged to use the CIBSE (Chartered Institute of Building Service Engineers) standards TM52 for non-residential development and TM59 for residential development.

Measures to mitigate overheating risk from both current and future climate should be incorporated into the design of the development to help ensure the future comfort, well-being and health of occupiers. Further advice and guidance on good solar design is provided on the Essex Design Guide[10].

[10] Solar orientation | Essex Design Guide

4. Policy NZ2: Net Zero Carbon Development – Embodied Carbon

POLICY NZ2: NET ZERO CARBON DEVELOPMENT – EMBODIED CARBON

Proposals for Large scale new-build developments (a minimum of 100 dwellings or a minimum of 5000m^2 of commercial floor space) must submit a Whole Life-Cycle Carbon Assessment that demonstrates the following buildings targets have been met:

a) 'upfront' embodied carbon emissions;
i. Residential: <500kgCO_2/m^2
ii. Non-Residential: <600kgCO_2/m^2
and
b) Total embodied carbon
i. Residential: <800kgCO_2/m^2
ii. Non-Residential: <970kgCO_2/m^2

5. Supporting Text / Reasoned Justification: Policy NZ2

Total embodied carbon emissions are the greenhouse gas emissions resulting from the materials and construction processes through the whole life cycle of a building, including the demolition and disposal (RIBA stages A 1-5, B1-5 and C1-4). Upfront embodied emissions are the portion of total emissions associated with the Building Life Cycle stages A1 – A5 and include the following elements: substructure, superstructure, façade and roof, Mechanical Electrical & Plumbing (MEP) & internal finishes.

Embodied carbon accounts for a significant proportion of a buildings' whole life carbon and addressing embodied carbon is important to meet local and national climate targets. Currently, embodied carbon is not covered by Building Regulations and there is no Government policy requiring the assessment or control of embodied carbon emissions from buildings. The Environmental Audit Committee[11] (EAC) reported to Parliament in 2022 on this issue. The EAC highlighted that as a result, no progress has been made in reducing these emissions within the built environment. They go on to advise that the UK is slipping behind comparator countries in Europe in monitoring and controlling the embodied carbon in construction and that if this continues the UK will not meet net zero or its carbon budgets.

Local authorities are mandating Whole Life-Cycle Carbon (WLC) assessments of their own accord, and this is being done through the planning system. The EAC reported that evidence so far shows that the policy is achievable and is working, with few barriers to its introduction (EAC Report, Paragraph 73). The EAC encourages Local authorities to include embodied carbon assessments in their Local Plans ahead of the introduction of national planning requirements.

Policy NZ2 introduces a requirement to assess whole life cycle carbon emissions for all new build developments (residential and non-residential) over the threshold identified. The assessment and reporting of embodied carbon for the purposes of compliance with Policy NZ2 should follow a nationally recognised methodology. In the absence of an approved UK national methodology, the RICS Professional Statement on Whole Life Carbon Assessment (WLC) is the accepted industry methodology for WLC assessments (EAC Report, Para 70) and should be used for demonstrating policy compliance until a national methodology is in

[11] Building to net zero: costing carbon in construction: Government Response to the Committee's First Report - Environmental Audit Committee (parliament.uk)

place. Further guidance and software tools have also been developed, such as one click LCA[12]. The Government is working with industry to update the RICS methodology to develop it into a national methodology, and once approved then this will become the methodology that should be used for demonstrating policy compliance. The EAC considers that once the national methodology and requirement to undertake whole-life carbon assessments is in place, the cost of undertaking assessments is likely to be minimal (EAC Report, para 71).

In terms of targets for reducing embodied carbon, there is no nationally set standard but there are industry organisations that have worked together to align the best practice standards to ensure the scope and definition of targets are consistent. Specifically, LETI[13] have worked with RIBA, GLA, IStructE and UKGBC to align the targets set out in the RIBA 2030 Challenge for Total Embodied Carbon Emissions and those of LETI for Upfront embodied carbon emissions. They have sought to develop a simple rating system to easily enable comparisons between different buildings / developments. The result is set out in the Embodied Carbon Target Alignment document[14] – and the key table is replicated here:

Table 3: Upfront and Life Cycle Embodied Carbon LETI & RIBA Targets (Kg Co_2/m)^2

Upfront Embodied Carbon, A1-5 (exc. sequestration)

	Band	Office	Residential (6+ storeys)	Education	Retail
	A++	<100	<100	<100	<100
	A+	<225	<200	<200	<200
LETI 2030 Design Target	A	<350	<300	<300	<300
	B	<475	<400	<400	<425
LETI 2020 Design Target	C	<600	<500	<500	<550
	D	<775	<675	<625	<700
	E	<950	<850	<750	<850
	F	<1100	<1000	<875	<1000
	G	<1300	<1200	<1100	<1200

Life Cycle Embodied Carbon, A1-5, B1-5, C1-4

	Band	Office	Residential (6+ storeys)	Education	Retail
	A++	<150	<150	<125	<125
	A+	<345	<300	<260	<250
	A	<530	<450	<400	<380
RIBA 2030 Build Target	B	<750	<625	<540	<535
	C	<970	<800	<675	<690
	D	<1180	<1000	<835	<870
	E	<1400	<1200	<1000	<1050
	F	<1625	<1400	<1175	<1250
	G	<1900	<1600	<1350	<1450

Source: LETI Embodied Carbon Target Alignment document

[12] https://www.oneclicklca.com/

[13] https://www.leti.uk/carbonalignment

[14] Embodied Carbon Target Alignment - LETI

Policy NZ2 sets out specific building targets for total and upfront embodied carbon which are currently based on Band C of the aligned targets tables from the RIBA 2030 challenge and LETI. The scope, threshold and targets – including the ratchetting of targets over time - for the policy will be updated as further information across the industry is developed and Essex specific evidence is commissioned.

Policy NZ2 is therefore a 'placeholder' policy for consultation purposes. The aim of the policy is to ensure whole life cycle carbon assessments are carried out using a recognised methodology and that measures are taken in new developments to significantly reduce embodied carbon emissions and meet the latest best practice targets.

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