

Report 2

Essex Net Zero Policy – Summary of Policy, evidence and validation requirements

July 2023

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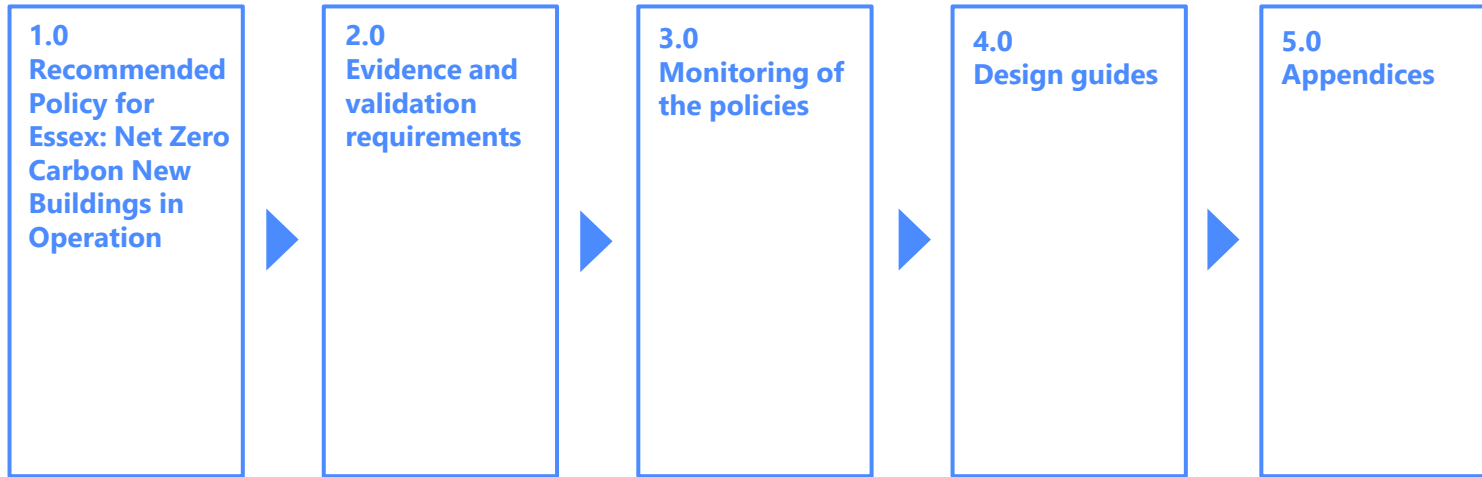
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**1.0 Recommended Policy for Essex:
Net Zero Carbon New Buildings in
Operation**

Executive Summary

The Essex Climate Action Commission have commissioned Introba to develop an evidence base to inform a new Net Zero policy for incorporation into emerging local plans. This "Report 2: Essex Net Zero Policy – Summary of Policy, evidence and validation requirements" gives a high-level summary of the proposed Net Zero policy requirements, evidence and validation requirements for different planning applications, monitoring guidance and high-level design guidance for two different domestic typologies.

"Report 1: Essex Net Zero Policy – Technical Evidence Base" sets out the technical and financial evidence to support the recommended Net Zero policy requirements for all new residential non-residential buildings. The report outlines the analysis undertaken for 6 residential typologies: terrace block, bungalow, semi-detached house, block of flats (low rise, mid rise and high rise) and 3 non-domestic typologies: office, school and industrial. Predictive energy modelling using Passive House Planning Package (PHPP) for domestic, and CIBSE TM54 for non-domestic typologies, was carried out to support the technical evidence base and inform local planning policies. The evidence base builds on the work of existing evidence bases, including Cornwall Council and Delivering Net Zero, and uses the results of existing stock models developed by Etude, Inklings, Levitt Bernstein and Introba.

Capital cost analysis of the building typologies and specifications modelled that comply with the recommended net zero policy has been undertaken by Currie & Brown and the findings are presented in Report 1.

An overarching net zero policy, with five requirements, is recommended to reduce operational energy and carbon from new buildings in order to enable Essex to meet its climate change commitments.

Recommended Policy: Net Zero Carbon New Buildings in Operation is the overarching policy.

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

All new buildings are required to comply with the following requirements:

- **Requirement 1:** Space heating demand
- **Requirement 2 :** Fossil fuel free
- **Requirement 3 :** Energy Use Intensity (EUI)
- **Requirement 4 :** On-site renewable energy generation
- **Requirement 5 :** As-built performance confirmation and in-use monitoring
- Offsetting (as last resort)

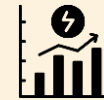
Recommended Overarching Policy: Net Zero Carbon New Buildings in Operation



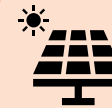
Requirement 1
Space heating demand



Requirement 2
Fossil fuel free



Requirement 3
Energy use intensity (EUI)



Requirement 4
On-site renewable energy generation



Requirement 5
As-built performance confirmation and in-use monitoring



Offsetting
(as a last resort)

Policy recommendation | Net Zero Carbon New Buildings in Operation

This section gives a high-level summary of the proposed Net Zero Operational Carbon policy for Essex. Further details of the policy requirements can be found in “Report 1: Essex Net Zero Policy – Technical Evidence Base”.

Policy: Net Zero Carbon New Building in Operation is the proposed net zero overarching policy, which states that all new buildings must be designed and built to be Net Zero Carbon in operation. They must be ultra-low energy buildings, be fossil fuel free, and generate renewable energy on-site to at least match annual energy use. All new buildings are required to comply with the following requirements, which are summarised below:



Requirement 1

Space heating demand limits (kWh/m²/year) for residential and non-residential developments

Residential developments:

- All domestic buildings, apart from bungalows, must achieve a space heating demand of less than 15 kWh/m²_{GIA}/yr.
- All bungalows, must achieve a space heating demand of less than 20 kWh/m²_{GIA}/yr.

Non-residential developments:

- All non-domestic buildings must achieve a space heating demand of less than 15 kWh/m²_{GIA}/yr.

Space heating demand in all buildings should be demonstrated using predictive energy modelling.



Requirement 2

Fossil fuel free

- No new developments to be connected to the gas grid
- Fossil fuels must not be used on-site to provide space heating, domestic hot water or cooking.
- Space heating and domestic hot water must be provided through low carbon fuels.



Requirement 3

Energy use intensity (EUI) limits (kWh/m²/year) for residential and non-residential developments

Residential developments:

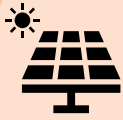
- Must achieve an Energy Use Intensity (EUI) of no more than 35 kWh/m²_{GIA}/yr.

Non-residential developments:

- Must achieve an Energy Use Intensity (EUI) of no more than the following by building type or nearest equivalent:
 - Offices – 70 kWh/m²_{GIA}/yr
 - Schools – 65 kWh/m²_{GIA}/yr
 - Light Industrial – 35 kWh/m²_{GIA}/yr

Energy use intensity (EUI) in all buildings should be demonstrated using predictive energy modelling.

Policy recommendation | Net Zero Carbon New Buildings in Operation



Requirement 4

On-site renewable energy generation (kWh/m²/year) for residential and non-residential developments

Renewable energy must be generated on-site for all new developments. The renewable energy generation provision must meet the greater of:

- i. Route 1: 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/m²/yr) = or > predicted annual energy use (kWh/m²/yr).
- ii. Route 2: As a minimum, the amount of energy generated in a year must be:
 - at least 80 kWh/m²_{building footprint} per annum for all building types
 - at least 120 kWh/m²_{building footprint} per annum for industrial buildings

The renewable energy generation output should be calculated following the [Microgeneration Certification Scheme](#) (MCS) guidance method.



Requirement 5

As-built performance confirmation and in-use monitoring

- All developments must submit as-built performance information, at completion and prior to occupation, as listed in Appendix D.
- In-use energy monitoring is recommended for the first 5 years of operation.



Offsetting (as a last resort)

Energy offsetting expressed in £/kWh should be used as a last resort for policy compliance.

If Policy Requirement 4 is not technically possible and suitably justified, the applicant must establish the shortfall in renewable energy generation to enable the annual renewable energy generation to match the energy use of the building in kWh/yr (Route 1).

Renewable energy generation (kWh/m²/yr) = predicted annual energy use (kWh/m²/yr).

The applicant must pay into the Council's offset fund a sum of money to cover the purchasing and installation of a PV renewable energy system elsewhere in the plan area, which is to meet the shortfall in renewable energy generation.

The recommended energy offsetting price is £1.35/kWh. This tariff should be reviewed at least every 3 years.

Alternative approach to policy compliance:

1. An alternative approach to policy compliance is through the certified Passivhaus Classic or higher Passivhaus standard. Where a development is proposed to be built and certified to this standard, policy requirement 1 and 3 are deemed to be met through the Passivhaus certification. Requirements 2, 4 and 5 of the policy will have to be met to achieve compliance. The energy offsetting mechanism will only be allowed as a last resort in circumstances where requirement 4 cannot be fully met.
2. For non-domestic typologies (other than office, school and light industrial), applicants are expected to comply with all the policy requirements, apart from Requirement 3: Energy Use Intensity limits. Applicants should instead report their energy use intensity, but are not expected to comply with a certain limit. Net Zero energy use intensity limits are being developed by the UK Net Zero Carbon Building Standard Initiative in 2023 and it is recommended that applicants seek to meet these limits.

2.0 Evidence and validation requirements

Validation Checklist

The following tables set out the requirements for validating different types of planning applications. The required documents depend on whether the planning application is defined as major or minor. These checklists are recommended to be added to the relevant planning authority Local Validation List as supporting documents when completing a planning application.

Table 1 lists the requirements for Major Applications. Applicants are required to submit an Energy Strategy, in which they disclose the information listed in the Net Zero Evidence Checklists as a minimum, outlining compliance with the policy requirements 1 to 5.

Appendix A has different Net Zero Evidence Checklists for major applications, depending on the stage of planning application the applicant is submitting, namely pre-application; master planning; outline; and full and reserved matters.

Table 2 lists the requirements for Minor Applications. Applicants are only required to complete the Net Zero Spreadsheet, as set out in Appendix B.

The Net Zero Spreadsheet is a standard template for minor applications, in which applicants report space heating demand, energy use intensity, renewable energy generation, to outline compliance with the policy requirements 1 to 5.

Major Applications	
Document Type	What information is required?
<i>Council to include other documents required</i>	
Energy Strategy	Required
Net Zero Evidence Checklist	Required
Net Zero Spreadsheet	Not Required

Table 1: Planning application requirements for Major applications

Minor Applications	
Document Type	What information is required?
<i>Council to include other documents required</i>	
Energy Strategy	Not required
Net Zero Evidence Checklist	Not required
Net Zero Spreadsheet	Required

Table 2: Planning application requirements for Minor applications

The following defines major and minor applications:

Major Application:

- Residential development of between 10 or more dwellings or a site area of 0.5 ha or more where the number of dwellings is unknown.
- Development of floorspace of 1,000 m² or more.

Minor Application:

- Residential development of between one and nine dwellings.
- Development where the floorspace is less than 1,000 m².

Energy Modelling Requirements

Compliance with the Net Zero policy must be demonstrated by using predictive energy modelling tools, such as PHPP or Chartered Institute of Building Services Engineers (CIBSE) TM54 . The level of energy efficiency calculations and energy modelling requirements will be different at the various stages of a planning application.

The following table lists the energy modelling requirements at different planning application stages.

- For major applications, applicants must undertake predictive energy modelling.
- For minor domestic applications, applicants have a choice, they can either carry out predictive energy modelling or they can undertake a “minimum standard approach” which lists the minimum fabric and system specifications applicants must meet. If these requirements are met it is understood that their performance is inline with meeting space heating demand and energy use intensity limits. The minimum standard approach fabric and system specifications can be found in Appendix C for different domestic typologies.

Energy Modelling Requirements				
Development Type	Pre-App	Outline & Master Planning	Full Planning	Reserved Matters
Major	No energy modelling required	Energy modelling required for sample/typical dwellings/buildings	Energy modelling required for representative sample accounting for all house types/buildings and orientations.	
Minor (domestic only)		Energy modelling required for sample/typical dwellings/buildings. OR minimum standards approach to be followed.	Energy modelling required for representative sample accounting for all house types/buildings and orientations. OR minimum standards approach to be followed.	

3.0 Monitoring of the policies

Monitoring

There are two main approaches to monitoring, which are further explained below:

1) Monitoring of the number of districts enacting the proposed Net Zero Policy performance targets, which includes:

- a) How many districts are implementing the Net Zero policy requirements
- b) How many planning applications are meeting the Net Zero policy requirements without offsets
- c) How many planning applications are meeting the Net Zero policy requirement with offsets
- d) The value of offsets received annually

2) Monitoring of the applications implementing the requirements of the Net Zero policy – this is monitored from the applicants Energy Strategy reports/Net Zero spreadsheet, and includes:

- 1) How many applications and homes/buildings are meeting the space heating demand limits (requirement 1 of the Net Zero policy) at design stage?
- 2) How many applications and homes/buildings are committing to being fossil fuel free (requirement 2 of the Net Zero policy)?
- 3) How many applications and homes/buildings are meeting the energy use intensity limits (requirement 3 of the Net Zero policy) at design stage?
- 4) How many applications and homes/buildings are meeting the renewable energy generation (requirement 4 of the Net Zero policy) at design stage?
- 5) How many applications and homes/buildings are meeting the policy requirements by resorting to offsets?

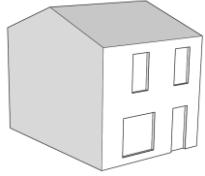
The policy requirements 1 and 3 (space heating demand and energy use intensity limits) cannot be fully verified unless in-use energy monitoring is mandated and implemented.

An alternative approach to in-use energy monitoring, to ensure and validate energy performance, is the use of assured performance standards. There are several existing performance standards that offer an assured performance methodology to deliver energy efficient buildings, which include:

- Passivhaus Standard
- Association for Environmental Conscious Building (AECB) Standard
- Building Energy Performance Improvement Toolkit (BEPIT)

4.0 Design guides

Terrace Block – The following design guide has been developed to give applicants high level guidance on design considerations and specifications to deliver Net Zero Carbon in operation homes that would meet policy requirements



Key performance indicators (KPIs)

A strong brief provides tangible targets that can be delivered. Best practice KPIs for new terrace houses are listed here and all KPIs must be met for a home to be termed 'Net Zero Carbon'.



Space Heating Demand



Energy Use Intensity



Renewable Energy Generation

Energy Efficiency

- 1 Orientation**
South-facing dwellings should be prioritized to maximize solar gains, ideally within 30 degrees of south.
- 2 Form factor**
Ensure building form is as simple and compact as possible. Less surface area (thermal envelope) means less surface area for heat to escape through
- 3 Fabric**
The following values can be used as initial target U-values. Please note that all U-values shown are indicative. They provide a starting point and should be adjusted on a project by project basis to achieve KPIs.



Pitched roof

U-value: 0.1 W/m².K



Walls

U-value: 0.1 W/m².K



Ground floor

U-value: 0.08 W/m².K



Windows

Triple glazed
U-value: 0.8 W/m².K
G-value: 0.5 W/m².K



External doors

Insulated
U-value: 1.2 W/m².K



Airtightness

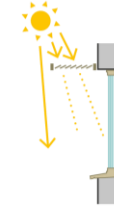
An extremely airtight building fabric of <1 ACH

- 4 Design out overheating**
Carry out an overheating assessment (as per Part O requirements) and reduce overheating through passive design measures. e.g. external shading, openable windows and cross ventilation

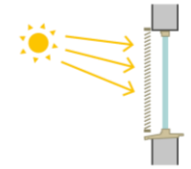
Recommended Window Ratios

North: 10-15%
East/West: 10-20%
South: 20-30%

Best practice external shading for different window orientations:



South facing
Horizontal shading



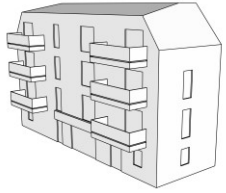
East/West facing
Vertical shading

Systems

- 1 Mechanical ventilation**
MVHR efficiency of 90%
- 2 Heat pump**
Use a heat pump to provide heating and hot water
- 3 Hot water**
Install hot water tank and use wastewater heat recovery in the shower/bath.
- 1 Renewables**
The optimal option for adding PV to the building should be explored.



Low-rise Apartment Block – The following design guide has been developed to give applicants high level guidance on design considerations and specifications to deliver Net Zero Carbon in operation homes that would meet policy requirements



Key performance indicators (KPIs)

A strong brief provides tangible targets that can be delivered. Best practice KPIs for new terrace houses are listed here and all KPIs must be met for a home to be termed 'Net Zero Carbon'.



Space Heating Demand



Energy Use Intensity



Renewable Energy Generation

Energy Efficiency

- 1 Orientation**
South-facing dwellings should be prioritized to maximize solar gains, ideally within 30 degrees of south.
- 2 Form factor**
Ensure building form is as simple and compact as possible. Less surface area (thermal envelope) means less surface area for heat to escape through.
- 3 Fabric**
The following values can be used as initial target U-values. Please note that all U-values shown are indicative. They provide a starting point and should be adjusted on a project by project basis to achieve KPIs.



Pitched roof

U-value: 0.1 W/m².K



Walls

U-value: 0.1 W/m².K



Ground floor

U-value: 0.08 W/m².K



Windows

Triple glazed
U-value: 0.8 W/m².K
G-value: 0.5 W/m².K



External doors

Insulated
U-value: 1.2 W/m².K



Airtightness

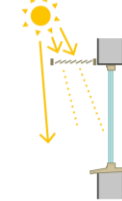
An extremely airtight building fabric of <1 ACH

- 4 Design out overheating**
Carry out an overheating assessment (as per Part O requirements) and reduce overheating through passive design measures. e.g. external shading, openable windows and cross ventilation

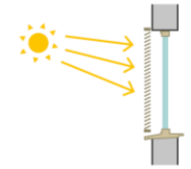
Recommended Window Ratios

North: 10-15%
East/West: 10-20%
South: 20-30%

Best practice external shading for different window orientations:



South facing
Horizontal shading



East/West facing
Vertical shading

Systems

- 1 Mechanical ventilation**
MVHR efficiency of 90%
- 2 Heat pump**
Use a heat pump to provide heating and hot water
- 3 Hot water**
Install hot water tank and use wastewater heat recovery in the shower/bath.
- 1 Renewables**
The optimal option for adding PV to the building should be explored.



5.0 Appendices

Appendix A
Net Zero Evidence Checklists for Major
Applications

Net Zero Evidence Checklist – Pre-App

The following list sets out what applicants at Pre-App stage are required to design to when forming their development proposals. Applicants are required to submit an Energy Strategy (and update it as necessary) at each planning stage – Master planning, Outline, Full and Reserve Matters – to demonstrate compliance with the net zero policy requirements as a minimum.

#	Net Zero Evidence Checklist	Policy Minimum Requirement
1	Energy Modelling	Not required at this planning stage
2	Space heating demand (kWh/m²/year)	<ul style="list-style-type: none"> All residential and non-residential buildings, apart from bungalows, must achieve a space heating demand less than 15 kWh/m²/year. This should be demonstrated using predictive energy modelling. All bungalows must achieve a space heating demand less than 20 kWh/m²/year. This should be demonstrated using predictive energy modelling.
3	Fossil Fuel Free	<ul style="list-style-type: none"> No new developments to be connected to the gas grid Fossil fuels must not be used on-site to provide space heating, domestic hot water and cooking. Space heating and domestic hot water must be provided through low carbon fuels.
4	Energy use intensity (EUI) (kWh/m²/year)	<p>All buildings must meet the following Energy Use Intensity (EUI) Limits. This should be demonstrated using predictive energy modelling.</p> <ul style="list-style-type: none"> Residential - 35 kWh/m²/year Office – 70 kWh/m²/year School – 65 kWh/m²/year Light Industrial - 35 kWh/m²/year
5	On-site renewable energy generation	<p>The renewable energy generation on-site must be the greater of:</p> <ul style="list-style-type: none"> Route 1: Renewable energy generation (kWh/m²/yr) = or > predicted annual energy use (kWh/m²/yr) Route 2: The amount of energy generated in a year must be as a minimum: <ul style="list-style-type: none"> At least 80 kWh/m²_{building footprint} per annum for all building types At least 120 kWh/m²_{building footprint} per annum for industrial buildings <p>The renewable energy generation output should be calculated following the Microgeneration Certification Scheme (MCS) guidance method including the impact of shading.</p>
6	As-built performance confirmation and in-use monitoring	<ul style="list-style-type: none"> Applicants must submit as-built performance information, at completion and prior to occupation. The required information to be submitted is listed in Appendix D. In-use energy monitoring is recommended for the first 5 years of operation.
7	Offsetting	<ul style="list-style-type: none"> The applicant should demonstrate that offsetting is used as a last resort if the building follows all other minimum policy requirements as described above. If on-site renewable energy is maximised and it cannot meet the minimum policy requirements, then an offset is required. This is calculated by establishing the shortfall in matching the building's annual energy use with renewable energy generation.

Net Zero Evidence Checklist – Master Planning Stage

The following shows the mandatory information to be included in the Energy Strategy report for applications at Master Planning Application stage.

#	Net Zero Evidence Checklist	Policy Minimum Requirement	What information is required?
1	Energy Modelling	All new residential and non-residential developments should demonstrate compliance with the proposed policy using predictive energy modelling tools, for example CIBSE TM54 modelling or Passive House Planning Package (PHPP). Energy modelling required for sample/typical dwellings/buildings, to give an indication of whether the development is likely to comply with the policy.	<input checked="" type="checkbox"/> Applicant must disclose the predictive energy modelling software used for demonstrating compliance with the policy
2	Space heating demand (kWh/m²/year)	<ul style="list-style-type: none"> All residential and non-residential buildings, apart from bungalows, must achieve a space heating demand less than 15 kWh/m²/year. This should be demonstrated using predictive energy modelling. All bungalows must achieve a space heating demand less than 20 kWh/m²/year. This should be demonstrated using predictive energy modelling. 	<input checked="" type="checkbox"/> Applicant must confirm they will comply with space heating demand limit and provide evidence at full planning application stage to show that the target has been met
3	Fossil Fuel Free	<ul style="list-style-type: none"> No new developments to be connected to the gas grid Fossil fuels must not be used on-site to provide space heating, domestic hot water and cooking. Space heating and domestic hot water must be provided through low carbon fuels. 	<input checked="" type="checkbox"/> Applicant must confirm that a fossil fuel free heating system and kitchen appliances will be used and that the development will not be connected to the gas grid.
4	Energy use intensity (EUI) (kWh/m²/year)	All buildings must meet the following Energy Use Intensity (EUI) Limits. This should be demonstrated using predictive energy modelling. <ul style="list-style-type: none"> Residential - 35 kWh/m²/year Office – 70 kWh/m²/year School – 65 kWh/m²/year Light Industrial - 35 kWh/m²/year 	<input checked="" type="checkbox"/> Applicant must confirm they will comply with the energy use intensity (EUI) limits and provide evidence at full planning application stage to show that the target has been met
5	On-site renewable energy generation	The renewable energy generation on-site must be the greater of: <ul style="list-style-type: none"> Route 1: Renewable energy generation (kWh/m²/yr) = or > predicted annual energy use (kWh/m²/yr) Route 2: The amount of energy generated in a year must be as a minimum: <ul style="list-style-type: none"> At least 80 kWh/m²_{building footprint} per annum for all building types At least 120 kWh/m²_{building footprint} per annum for industrial buildings <p>The renewable energy generation output should be calculated following the Microgeneration Certification Scheme (MCS) guidance method including the impact of shading.</p>	<input checked="" type="checkbox"/> Applicant must confirm that they will comply with the renewable energy generation policy minimum requirements
6	As-built performance confirmation and in-use monitoring	<ul style="list-style-type: none"> All developments must submit as-built performance information, at completion and prior to occupation. The required information to be submitted is listed in Appendix D. In-use energy monitoring is recommended for the first 5 years of operation. 	<input checked="" type="checkbox"/> Applicants must confirm that they will submit the required information when the development is complete, prior to occupation.
7	Offsetting	<ul style="list-style-type: none"> The applicant should demonstrate that offsetting is used as a last resort if the building follows all other minimum policy requirements as described above. If on-site renewable energy is maximised and it cannot meet the minimum policy requirements, then an offset is required. This is calculated by establishing the shortfall in matching the building's annual energy use with renewable energy generation. 	<input checked="" type="checkbox"/> If 100% of the energy required for the building is not met on site, the applicant must establish the shortfall in renewable energy generation and highlight the need of offsets for the development.

Net Zero Evidence Checklist – Outline Stage

The following shows the mandatory information to be included in the Energy Strategy report for applications at Outline Application stage.

#	Net Zero Evidence Checklist	Policy Minimum Requirement	What information is required?
1	Energy Modelling	All new residential and non-residential developments should demonstrate compliance with the proposed policy using predictive energy modelling tools, for example CIBSE TM54 modelling or Passive House Planning Package (PHPP). Energy modelling required for sample/typical dwellings/buildings, to give an indication of whether the development is likely to comply with the policy.	<input checked="" type="checkbox"/> Applicant must disclose the predictive energy modelling software used for demonstrating compliance with the policy
2	Space heating demand (kWh/m²/year)	<ul style="list-style-type: none"> All residential and non-residential buildings, apart from bungalows, must achieve a space heating demand less than 15 kWh/m²/year. This should be demonstrated using predictive energy modelling. All bungalows must achieve a space heating demand less than 20 kWh/m²/year. This should be demonstrated using predictive energy modelling. 	<input checked="" type="checkbox"/> Applicant must confirm they will comply with space heating demand limit and provide evidence at full planning application stage to show that the target has been met
3	Fossil Fuel Free	<ul style="list-style-type: none"> No new developments to be connected to the gas grid Fossil fuels must not be used on-site to provide space heating, domestic hot water and cooking. Space heating and domestic hot water must be provided through low carbon fuels. 	<input checked="" type="checkbox"/> Applicant must confirm that a fossil fuel free heating system and electricity generation. <input checked="" type="checkbox"/> Applicant must confirm that the development will not be connected to the gas grid.
4	Energy use intensity (EUI) (kWh/m²/year)	All buildings must meet the following Energy Use Intensity Limits. This should be demonstrated using predictive energy modelling. <ul style="list-style-type: none"> Residential - 35 kWh/m²/year Office – 70 kWh/m²/year School – 65 kWh/m²/year Light Industrial - 35 kWh/m²/year 	<input checked="" type="checkbox"/> Applicant must confirm they will comply with the energy use intensity limits and provide evidence at full planning application stage to show that the target has been met. <input checked="" type="checkbox"/> A high-level model must be produced at this stage on a typical housing typology to demonstrate that the Energy Use Intensity Limits (EUI) can be met.
5	On-site renewable energy generation	The renewable energy generation on-site must be the greater of: <ul style="list-style-type: none"> Route 1: Renewable energy generation (kWh/m²/yr) = or > predicted annual energy use (kWh/m²/yr) Route 2: The amount of energy generated in a year must be as a minimum: <ul style="list-style-type: none"> At least 80 kWh/m²_{building footprint} per annum for all building types At least 120 kWh/m²_{building footprint} per annum for industrial buildings The renewable energy generation output should be calculated following the Microgeneration Certification Scheme (MCS) guidance method including the impact of shading.	<input checked="" type="checkbox"/> Applicant must confirm that they will comply with the renewable energy generation policy minimum requirements. <input checked="" type="checkbox"/> The calculation of projected annual yield of the PV must be shown and this should be compared to the building's annual energy use.
6	As-built performance confirmation and in-use monitoring	<ul style="list-style-type: none"> All developments must submit as-built performance information, at completion and prior to occupation. The required information to be submitted is listed in Appendix D. In-use energy monitoring is recommended for the first 5 years of operation. 	<input checked="" type="checkbox"/> Applicants must confirm that they will submit the required information when the development is complete, prior to occupation.
7	Offsetting	<ul style="list-style-type: none"> The applicant should demonstrate that offsetting is used as a last resort if the building follows all other minimum policy requirements as described above. If on-site renewable energy is maximised and it cannot meet the minimum policy requirements, then an offset is required. This is calculated by establishing the shortfall in matching the building's annual energy use with renewable energy generation. 	<input checked="" type="checkbox"/> If 100% of the energy required for the building is not met on site, the applicant must establish the shortfall in renewable energy generation and highlight the need of offsets for the development.

Net Zero Evidence Checklist – Full Planning and Reserved Matters Stage

The following shows the mandatory information to be included in the Energy Strategy report for applications at Full Planning Application stage.

#	Net Zero Evidence Checklist	Policy Minimum Requirement	What information is required?
1	Energy Modelling	<p>All new residential and non-residential developments must demonstrate compliance with the proposed policy using predictive energy modelling tools, for example CIBSE TM54 modelling or Passive House Planning Package (PHPP).</p> <p>Energy modelling required for representative sample accounting for all house types and orientations.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Applicant must disclose the predictive energy modelling software used for demonstrating compliance with the policy <input checked="" type="checkbox"/> Applicants must fill out sections 1-6 of the LETI operational modelling reporting template. If multiple scenarios are modelled as per CIBSE TM54 only the central/baseline scenario needs to be reported.
2	Space heating demand (kWh/m²/year)	<ul style="list-style-type: none"> • All residential and non-residential buildings, apart from bungalows, must achieve a space heating demand less than 15 kWh/m²/year. This should be demonstrated using predictive energy modelling. • All bungalows must achieve a space heating demand less than 20 kWh/m²/year. This should be demonstrated using predictive energy modelling. 	<p>Applicant must disclose:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> The space heating demand in kWh/m²/year <input checked="" type="checkbox"/> Air tightness target <input checked="" type="checkbox"/> Building ventilation strategy <input checked="" type="checkbox"/> Efficiency of Mechanical Ventilation with Heat Recovery (MVHR) system (if applicable) <input checked="" type="checkbox"/> Fabric U-values for <ul style="list-style-type: none"> <input checked="" type="checkbox"/> External Walls <input checked="" type="checkbox"/> Floor <input checked="" type="checkbox"/> Roof <input checked="" type="checkbox"/> Windows <input checked="" type="checkbox"/> Doors
3	Fossil Fuel Free	<ul style="list-style-type: none"> • No new developments to be connected to the gas grid • Fossil fuels must not be used on-site to provide space heating, domestic hot water and cooking. • Space heating and domestic hot water must be provided through low carbon fuels. 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Applicant must disclose the systems providing space heating, hot water, kitchen appliances and cooling (if applicable), and confirm that the development will not be connected to the gas grid.
4	Energy use intensity (EUI) (kWh/m²/year)	<p>All buildings must meet the following Energy Use Intensity (EUI) Limits. This should be demonstrated using predictive energy modelling.</p> <ul style="list-style-type: none"> • Residential - 35 kWh/m²/year • Office – 70 kWh/m²/year • School – 65 kWh/m²/year • Light Industrial - 35 kWh/m²/year 	<p>Applicant must disclose:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> The building's total energy consumption in kWh/year <input checked="" type="checkbox"/> The building's total energy use intensity in kWh/m²/year <input checked="" type="checkbox"/> If the building will be served by individual, communal or district heating systems <input checked="" type="checkbox"/> The system efficiencies of the space heating, hot water and cooling (if applicable) systems.

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#	Net Zero Evidence Checklist	Policy Minimum Requirement	What information is required?
5	<p>On-site renewable energy generation</p>	<p>The renewable energy generation on-site must be the greater of:</p> <ul style="list-style-type: none"> Renewable energy generation (kWh/m²/yr) = or > predicted annual energy use (kWh/m²/yr) The amount of energy generated in a year must be as a minimum: <ul style="list-style-type: none"> At least 80 kWh/m²_{building footprint} per annum for all building types At least 120 kWh/m²_{building footprint} per annum for industrial buildings <p>The renewable energy generation output should be calculated following the Microgeneration Certification Scheme (MCS) guidance method including the impact of shading.</p>	<p>Applicant must disclose:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> The total installed capacity on-site in kWp <input checked="" type="checkbox"/> The annual Renewable energy generation intensity in kWh/m²_{GIA}/year <input checked="" type="checkbox"/> The annual Renewable energy generation intensity per building footprint in kWh/m²_{building footprint}/year <input checked="" type="checkbox"/> What program/calculation methodology has been used to calculate the above figures. <input checked="" type="checkbox"/> Prior to implementation details of the proposed PV system: <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Location <input checked="" type="checkbox"/> Dimensions <input checked="" type="checkbox"/> Design/technical specification <input checked="" type="checkbox"/> Prior to occupation details of the proposed PV system: <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Exact location <input checked="" type="checkbox"/> Technical specification <input checked="" type="checkbox"/> Projected annual energy yield (kWh/year). <input checked="" type="checkbox"/> The calculation of projected annual yield of the PV should be compared to the building's total annual energy consumption.
6	<p>As-built performance confirmation and in-use monitoring</p>	<ul style="list-style-type: none"> All developments must submit as-built performance information, at completion and prior to occupation. The required information to be submitted is listed in Appendix D. In-use energy monitoring is recommended for the first 5 years of operation. 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Applicants must submit the required as-built performance information. <input checked="" type="checkbox"/> Applicants must confirm if in-use metering will be implemented or not. If yes, state what the monitoring strategy in place is and how data collected will be published.
7	<p>Offsetting</p>	<ul style="list-style-type: none"> The applicant should demonstrate that offsetting is used as a last resort if the building follows all other minimum policy requirements as described above. If on-site renewable energy is maximised and it cannot meet the minimum policy requirements, then an offset is required. This is calculated by establishing the shortfall in matching the building's annual energy use with renewable energy generation. 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> The applicant must confirm if there's a shortfall in energy generation on-site. If yes, an offset payment needs to be made.

Appendix B
Net Zero Spreadsheet for Minor
Applications

Net Zero Spreadsheet for Minor Applications

Applicants submitting a minor application should complete the following spreadsheet, and should comply with the Net Zero Policy requirements.

#	Requirement	Question	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10
	Summary	Development type										
		Gross internal area (GIA) (m ²)										
		Number of units										
1	Space heating demand	Space heating demand of each building (kWh/m ² /year)										
2	Fossil fuel free	Has a fossil fuel free system been used in the building (yes/no)										
3	Energy use intensity	Energy use intensity (EUI) of each building (kWh/m ² /year)										
4	Renewable energy	Renewable energy generation intensity (kWh/m ² /year)										
		Photovoltaic system installed capacity (kWp)										
		Photovoltaic system area (m ²)										
		Does the renewable energy generation intensity match or exceed the building's energy use intensity? (yes/no)										
5	Energy measurement and verification	Will in-use energy monitoring be implemented for the building? (yes/no)										
6	Offsetting	Has the energy balance on-site been achieved? If not, what is the shortfall in renewable energy generation? (kWh/m ² /year)										
		What is the offset payment made to the council? (£)										

Appendix C

Minimum Standards Approach

Minimum Standards Approach – Fabric and System Specifications - Domestic

For minor residential applications following the minimum standards approach for policy compliance (without an energy model), the following table lists the limiting fabric and systems standards that should be met, unless an energy model is carried out and proves otherwise.

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
Systems	Ventilation system	MVHR	MVHR	MVHR
	Ventilation system heat recovery	90%	90%	90%
	Ventilation system specific fan power (W/l/s)	0.85	0.85	0.85
	Space heating system	Heat pump	Heat pump	Heat pump
	Space heating system flow temperature	< 45°C	< 45°C	< 45°C
	DHW system	Heat pump	Heat pump	Heat pump
	Lighting Efficacy (lm/W)	95	95	95

Acronyms:

ASHP – Air source heat pump

DHW – Domestic hot water

MVHR – Mechanical ventilation with heat recovery

Appendix D

As-built performance indicators

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

All developments must submit as-built performance information, at completion and prior to occupation, as listed in Table (1).

**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 need to re-confirm the specifications that the development has been built to.*

# Table 1: As-built stage performance indicators (Required information to be submitted at completion, prior to occupation)	
1	<p>Update parameters</p> <ul style="list-style-type: none"> • Use or typology • Gross Internal Area (GIA) (m²) • Energy supply (fossil fuel free?)
2	<p>Update performance modelling</p> <ul style="list-style-type: none"> • Space heat demand using predictive energy model (kWh/m²/year) • Energy Use Intensity using predictive energy model (kWh/m²/year) • As Built stage Energy Performance Certificate (EPC) (U-values and airtightness check) • Draft Display Energy Certificate (DEC) for non residential (regardless of user)
3	<p>Confirm renewable energy installation</p> <ul style="list-style-type: none"> • Installed solar PV (kW_p) and predicted annual output from PV generation meter • Any other installed renewable (i.e solar thermal)
4	<p>Update offset contribution</p> <ul style="list-style-type: none"> • Assess energy balance based on data supplied and confirm whether any offset payment is required, and how much
5	<p>Confirm process for collecting 'in use' data</p> <ul style="list-style-type: none"> • 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