Central Lincolnshire

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Contents

Introduction

- This guidance
- Energy efficiency design hierarchy
- How this guidance relates to local plan policy

The Energy Efficiency Design Guide

This document has been developed to provide practical, accessible guidance on how to comply with Central Lincolnshire Local Plan policy relating to energy efficiency in new buildings.

The guidance is aimed at building professionals (such as applicants, architects, and contractors) in designing buildings to meet best practice energy efficiency standards, and for planning officers to refer to when assessing applications for relevant policy compliance.

Which policies does this guide address?

- Policy S6: Design Principles for Efficient Buildings
- Policy S7: Reducing Energy Consumption - Residential Development
- Policy S8: Reducing Energy Consumption - Non-residential Buildings

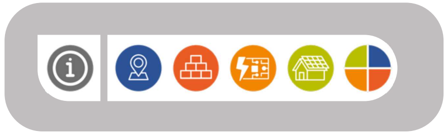
How is the guide used to comply with policy?

This guide is paired with a Compliance Checklist document, which must be submitted with a

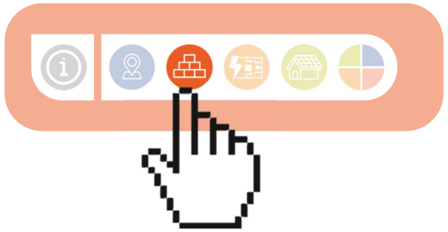
Navigating the guide

If viewing this guide as a PDF electronically, a series of hyperlinks can be used to navigate the document.

On the header of each page throughout the document, there are a series of icons. Each icon represents a different section within the guide.

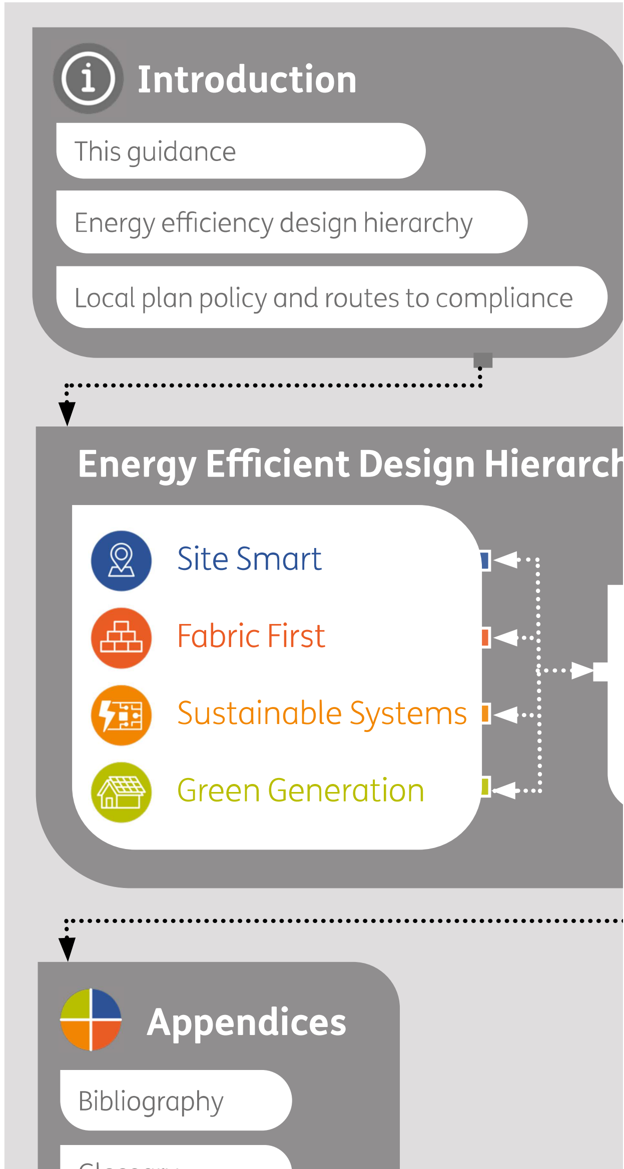


Clicking on one of these icons will take you to the opening page of that section. You will know which section is currently being viewed by the colour of the header, which will match the icon.



Each section's opening page contains hyperlinks to four sub-sections (these are the same for each section). Clicking a link will take you to the respective sub-section.

Map of the guide



Energy Efficiency Design Hierarchy

This guide divides energy efficient design into four themes that inform how to optimise energy efficiency within new buildings. Together, these themes form the 'energy efficient design hierarchy'.

The hierarchy broadly demonstrates the order in which design decisions should be made in order to effectively optimise the subsequent theme.

For example, a poor implementation of 'Site Smart', which involves optimising the orientation and form of a building for energy efficiency, will fundamentally limit how effective the material choices within 'Fabric First' can be, and so on.

Each of the themes forms a section within this guide, comprising of three sub-sections:

1. **'Relevant policy components** introduces how the section of the guide contributes to maximising energy efficiency, and which policies the section relates to
2. **'Design challenges'** builds upon the theme and explains the potential complications that may arise during the design process
3. **'Best practice'** provides examples of existing best practice relating to the section theme, and provides suggested targets to aid policy compliance. This section also sign-posts to the most relevant industry guidance

Site Smart

Optimising building orientation and form

Fabric First

Optimising building materials and airtightne

Sustainable Systems

Optimising energy systems and hot water de

Green Generation

Optimising local renewable energy generati

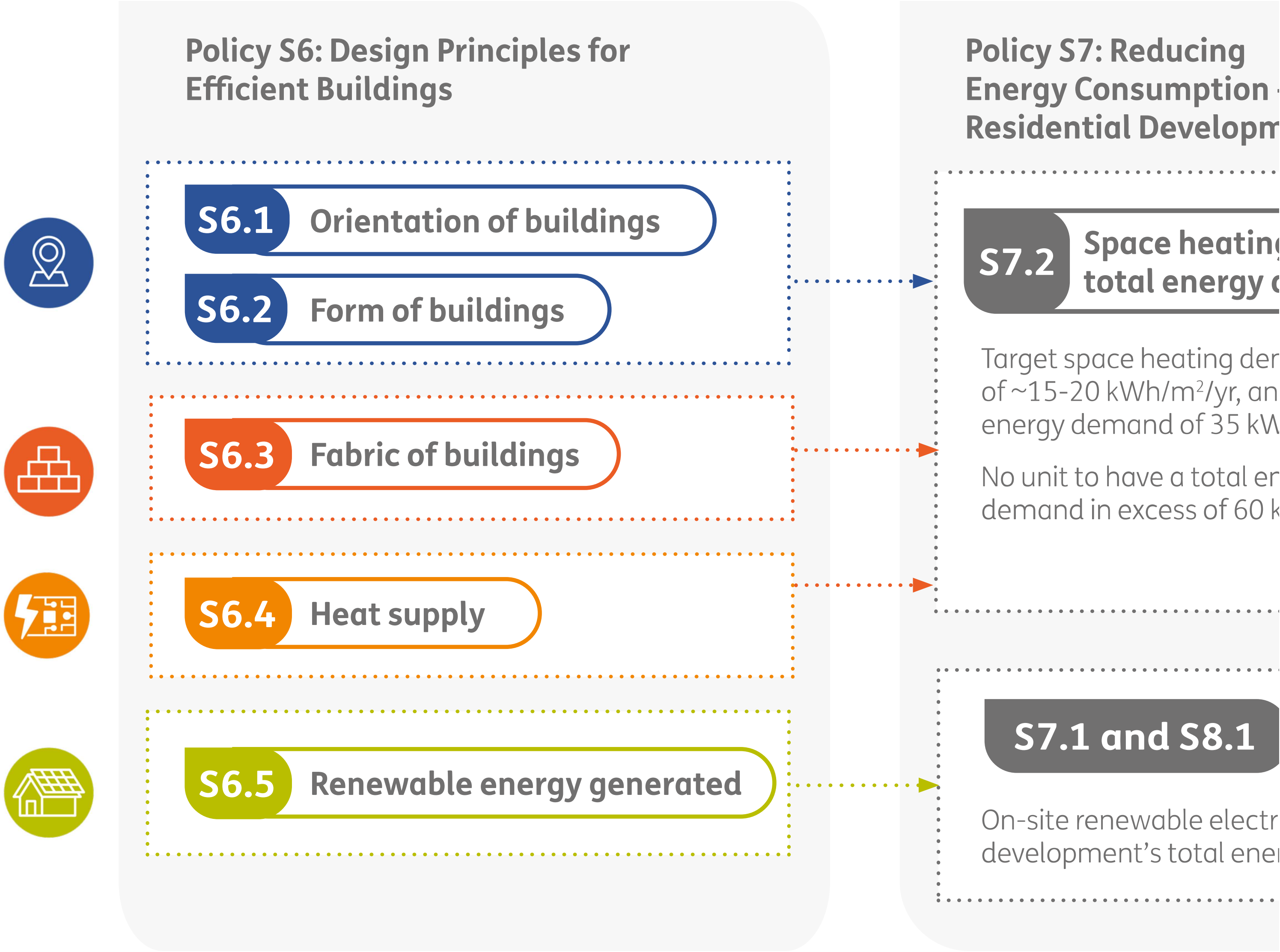
How this guidance relates to local plan policy

The themes presented in this guide relate to the components of Local Plan Policy S6: Design Principles for Efficient Buildings.

Policy S6 acts as an overarching policy. The principles set out in Policy S6, when followed, help to achieve the overall building performance targets set out in Policies S7 and S8.

There are two routes to policy compliance, depending on the methodology chosen to model building performance - SAP or PHPP. These models are explained on page 6.

The decision trees on pages 7 & 8 further explain the routes for compliance, and outline the process of how to comply via either route.



SAP/RdSAP vs PHPP - A non-technical explanation

SAP Standard Assessment Procedure

What is SAP/RdSAP?

SAP (Standard Assessment Procedure) is the UK government's methodology for calculating the energy performance of homes. It is used to demonstrate compliance with Part L (Conservation of Fuel and Power) of the building regulations, and it is also used to generate Energy Performance Certificates (EPCs).

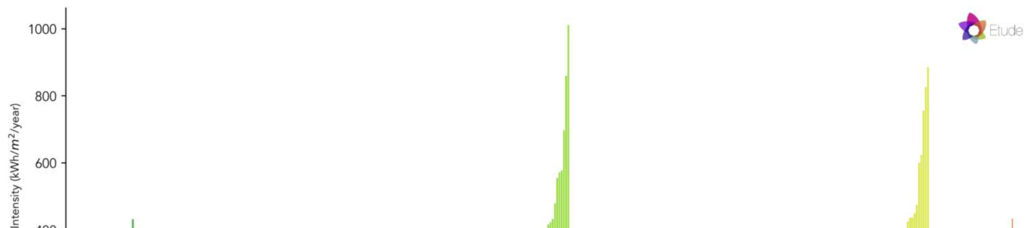
Reduced data SAP (RdSAP) was introduced as a lower cost method of assessing the energy performance of existing dwellings.

Benefits

- Quick and simple methodology which is well known across the industry
- Many inputs are simplified and utilise standard assumptions for consistency and speed
- SAP and RdSAP are compliance tools used to demonstrate

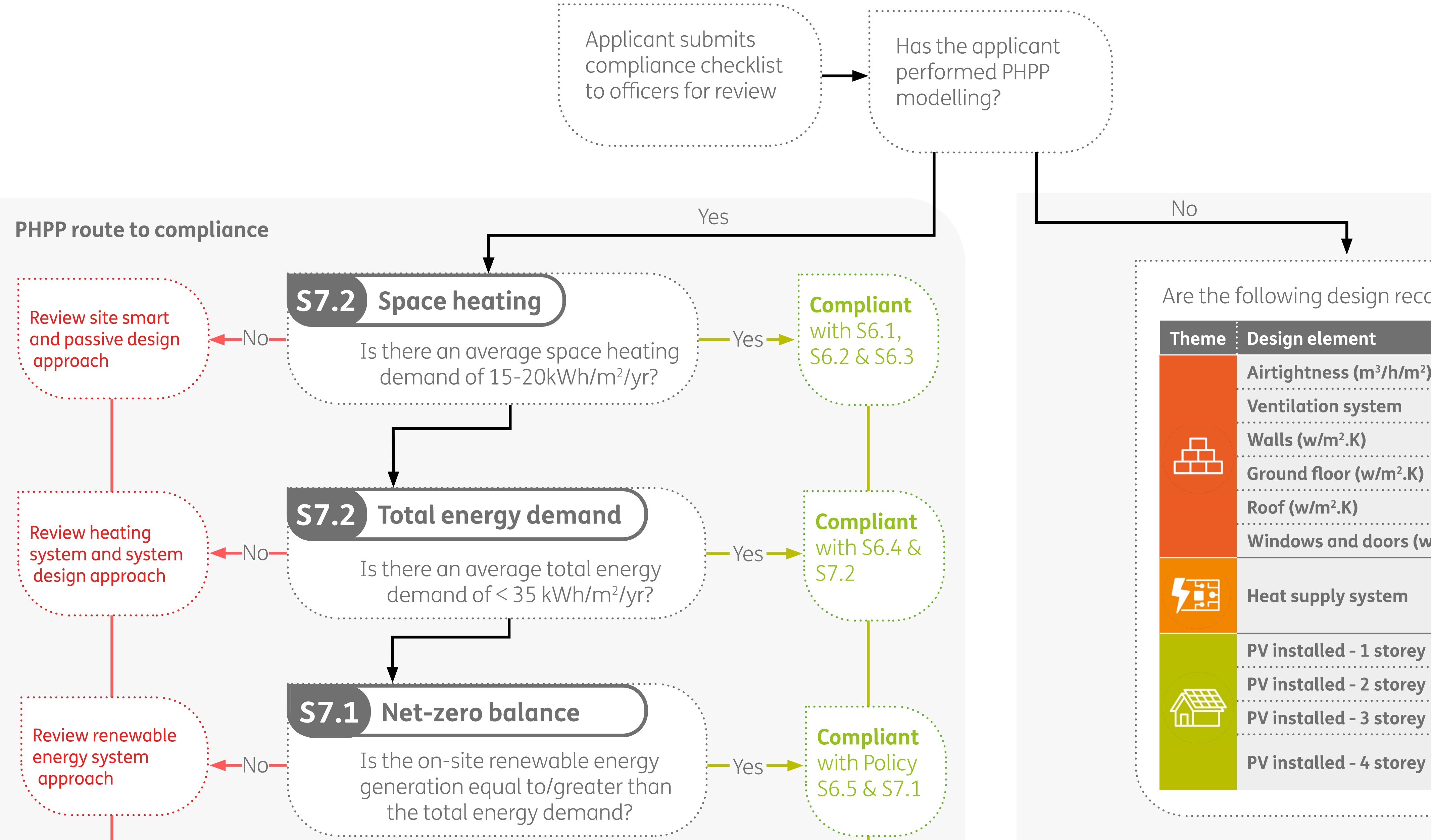
Limitations of SAP/RdSAP in delivering net-zero carbon homes

- SAP/RdSAP does not accurately predict future energy use - Studies have shown that the relationship between EPC ratings and metered energy use is loose. A study carried out by Etude on 420 dwellings in London showed that there was only a 22% reduction in total average energy use from D to B ratings – much less than that predicted by SAP. (See figure below)
- SAP uses many standard assumptions - SAP is primarily a compliance tool, and as such relies on a lot of standard assumptions (e.g. a fixed geographical location). It cannot fully reflect the energy performance of the building.
- SAP does not reward energy efficient building forms - Outputs are based on a relative performance compared to the "notional building" of identical shape instead of an absolute performance level.
- SAP central outputs are out of date - The carbon intensity and unit cost of grid energy are changing year-on-year. Hence, the energy cost and carbon emission metrics of SAP are a poor reflection of reality. Using energy metrics and a zero-carbon definition based on energy balance, as proposed in Policy S7/S8 addresses this.



PHPP

Routes to compliance decision tree - residential buildings



Routes to compliance decision tree - non-residential buildings

Applicant submits compliance checklist to officers for review

Has the applicant performed modelling using an established "design-for-performance" methodology?

Yes / No

Design for Performance route to compliance

S8.2 Space heating

Is there an average space heating demand of 15-20kWh/m²/yr?

Yes → Compliant with S6.1, S6.2 & S6.3

No → Review site smart and passive design approach

S8.2 Total energy demand

Is there an average total energy demand of < 70 kWh/m²/yr?

Yes → Compliant with S6.4 & S8.2

No → Review heating system and system design approach

S8.1 Net-zero balance

Is the on-site renewable energy generation equal to/greater than the total energy demand?

Yes → Compliant with Policy S6.5 & S8.1

No → Review renewable energy system approach

Are the following design reco

Theme	Design element
	Airtightness (m³/h/m²)
	Ventilation system
	Walls (w/m².K)
	Ground floor (w/m².K)
	Roof (w/m².K)
	Windows and doors (w
	Heat supply system
	PV installed - 1 storey
	PV installed - 2 storey
	PV installed - 3 storey

How proposals will be considered

This guidance document presents a clear approach to appraising the compliance of planning applications to Policies S6, S7 and S8, for applicants and officers.

Applicants are strongly encouraged to produce a PHPP model (or equivalent level design-for-performance model for non-residential buildings), as this provides a more robust approach to predicting the in-use energy performance of buildings (see following page for a detailed explanation).

This methodology encourages applicants to take a "design for performance" approach, prioritising technologies and interventions which deliver real-world environmental benefits, over a minimum compliance led design approach.

To make the process easier for applications for those taking this approach, the guidance has outlined two "rapid" routes for demonstrating compliance. If the requirements stipulated for these routes are met, then compliance with the policy is automatic. These routes (shown in the previous pages) are as follows:

1. **PHPP/Design-for-performance Compliance route** - If the applicant has undertaken PHPP (resi)/ "design-for-performance" (non-resi) design analysis, and shown a space heating demand around 15 - 20 kWh/m^2/yr (both resi and likely real-world energy performance of a building. In this case, a recommended specification is provided. If the applicant designs and builds the systems to this specification it is reasonable to predict that the building will be highly energy efficient, and hence automatic policy compliance is granted.

If the applicant doesn't meet automatic compliance, the officer needs to review in detail the applicants compliance checklist, and provide a judgement on whether the intentions of Policy S6, S7 and S8 have reasonably been met. This section provides additional guidance to officers in appraising these applications.

Residential application review guidance

Residential applications might not achieve automatic compliance for three reasons. In these cases, officers have some discretion in considering the level of policy compliance. The following approach is advised:

1. Space heating demand target exceeded - Excedence of the demand target suggests that either Site Smart or Fabric First measures suggested in the guide haven't been implemented. However, it may be that for some units on the site, constraints mean that applicants struggle to achieve the efficient forms and orientation which can
2. Total energy demand target exceeded - the total energy demand target is excee officers should first check if the space heating demand is within target, as ofte high energy demand is due to insufficien passive design measures.

   In the case of good passive design, the energy demand excedence may be due to poor system efficiency, or a high assumption for the energy using behavio of the occupants. We would note here th compliance with the target total energy demand of 35 kWh/m^2/yr is very challen with a direct electric heating system. He pumps offer significant benefits both to energy intensity and future resident bills
3. Net-zero energy balance not achieved - net-zero balance is most challenging to achieve if the total-energy-demand exce the target value.

   However, in certain locations, renewable energy generation may be severely curt due to overshadowing. This could be from other buildings, or from existing site features such as trees. In cases where th applicant can demonstrate curtailment of renewable generation potential from such features, providing the total energy demand target is met officers are advise grant compliance according to the Claus

Site Smart

Optimising building orientation and form

- Relevant policy components
- Design challenges
- Best practice and targets

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Relevant policy components

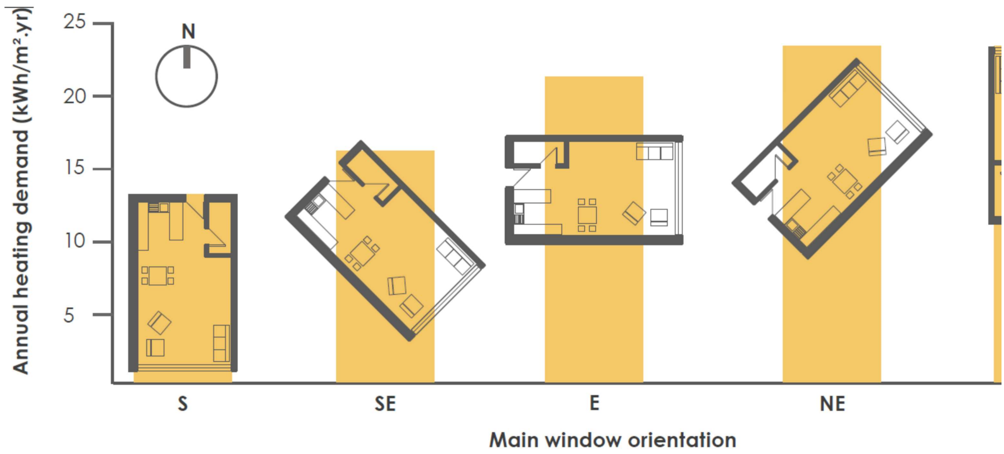
S6.1 Orientation of buildings

Policy text

Positioning buildings to maximise opportunities for solar gain, and minimise winter cold wind heat loss.

Contribution to energy efficiency

A building's orientation can contribute to reducing the space heating energy demand. In the UK over an annual period, north facing windows lead to a net heat loss, whereas south facing windows can normally be designed to achieve a net heat gain.



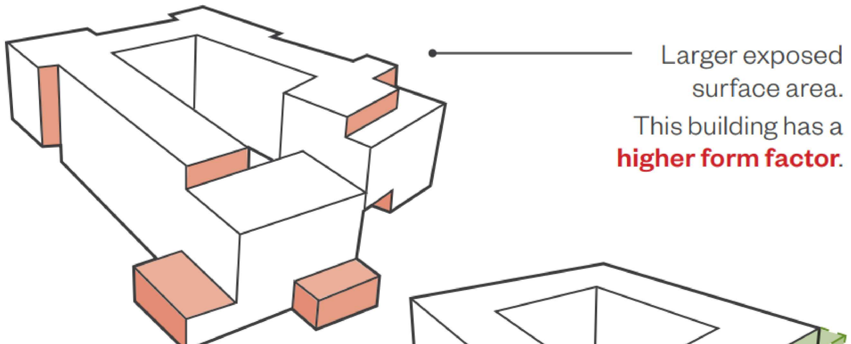
S6.2 Form of buildings

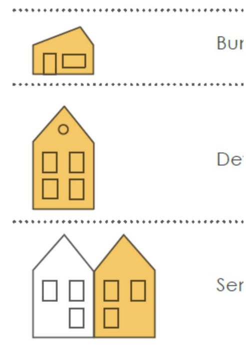
Policy text

Creating buildings that are more efficient to heat and stay warm in colder conditions and stay cool in warmer conditions because of their shape and design.

Contribution to energy efficiency

Simple compact building shapes are more





Design challenges

1 Site geography

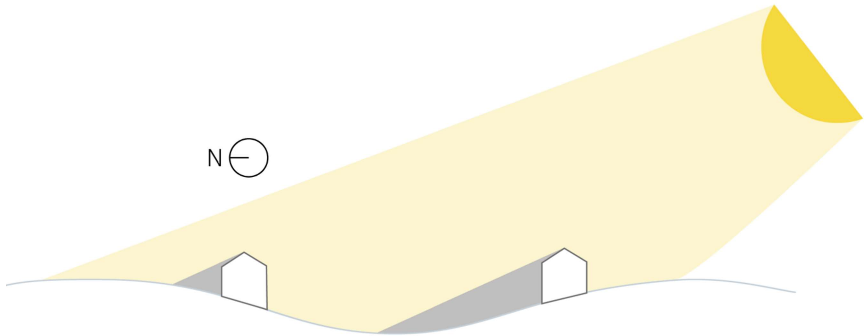
External landscape

Landscape features such as trees can block or limit incidental sunlight. Building orientation, form and site layout should be designed in a way that allows for direct solar incidence while working with existing nature, reducing the need to remove trees.

Neighbouring buildings must also be considered in building placement, as they can cause significant overshadowing, limiting daylight access and solar heat gains, especially in winter.

Topography

The topography of a site can dictate certain building orientations and limit development scope for orienting buildings in an optimum aspect for solar access. Planners should be sensitive to these limitations, and also encourage applicants to utilise existing slopes to maximises solar access.

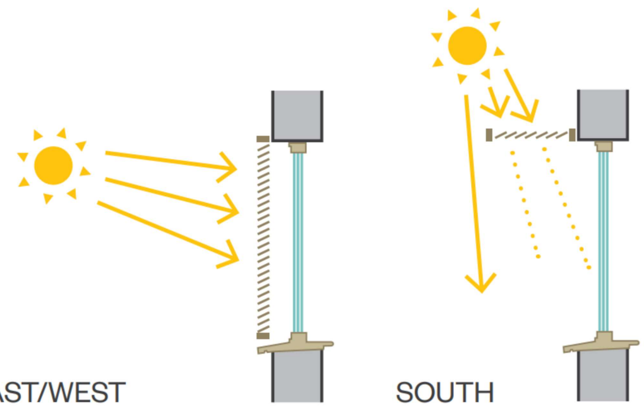


2 The "wrong" solar gains

One of the key aims of this policy is to encourage designers to orient buildings to increase solar incidence and heat gains. Though this will reduce and limit winter heating loads, it can also increase the likelihood of elevated summer solar gains - potentially leading to overheating.

Good building orientations also require designers to consider strategies to limit summer solar gains. Control of solar gain can be achieved through external shading (such as vertical fins, and Brise Soleil), deeper window reveals and attention to window aspect.

Providing external shutters further allows occupants to reduce solar gains to almost zero on the hottest days, keeping internal spaces cool and negating the need for energy hungry air conditioning.



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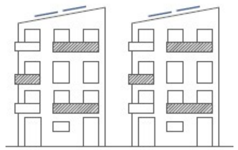
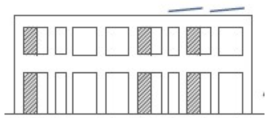
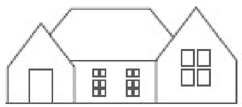
Best practice and targets

S6.1 Orientation of buildings

S6.2 Form of buildings

Form factor - typical targets

Typology		Form factor
	**Small scale housing** (terraced/ semi detached)	1.7 - 2.5
	**Med/large scale housing** (four or more storeys)	<0.8 - 1.5
	**Commercial offices**	1 - 2
	**School**	1 - 3

Source: LETI Climate Emergency Design Guide

$$\text{Form factor} = \frac{\text{Exposed external surface area}}{\text{Gross internal floor area}}$$

Window ratio - typical residential targets

External wall orientation	Window ratio*
North-facing	20 - 30%
East-facing	20 - 40%
South-facing	30 - 40%
West-facing	20 - 40%

*Ratio's are rules of thumb Bioregional and Etude have found from project experience

The ratio of windows to external elevation should broadly be within the percentage range shown.

Be

Fabric First

Optimising building materials and airtightness

- Relevant policy components
- Design challenges
- Best practice and targets

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Relevant policy components

S6.3 Fabric of buildings

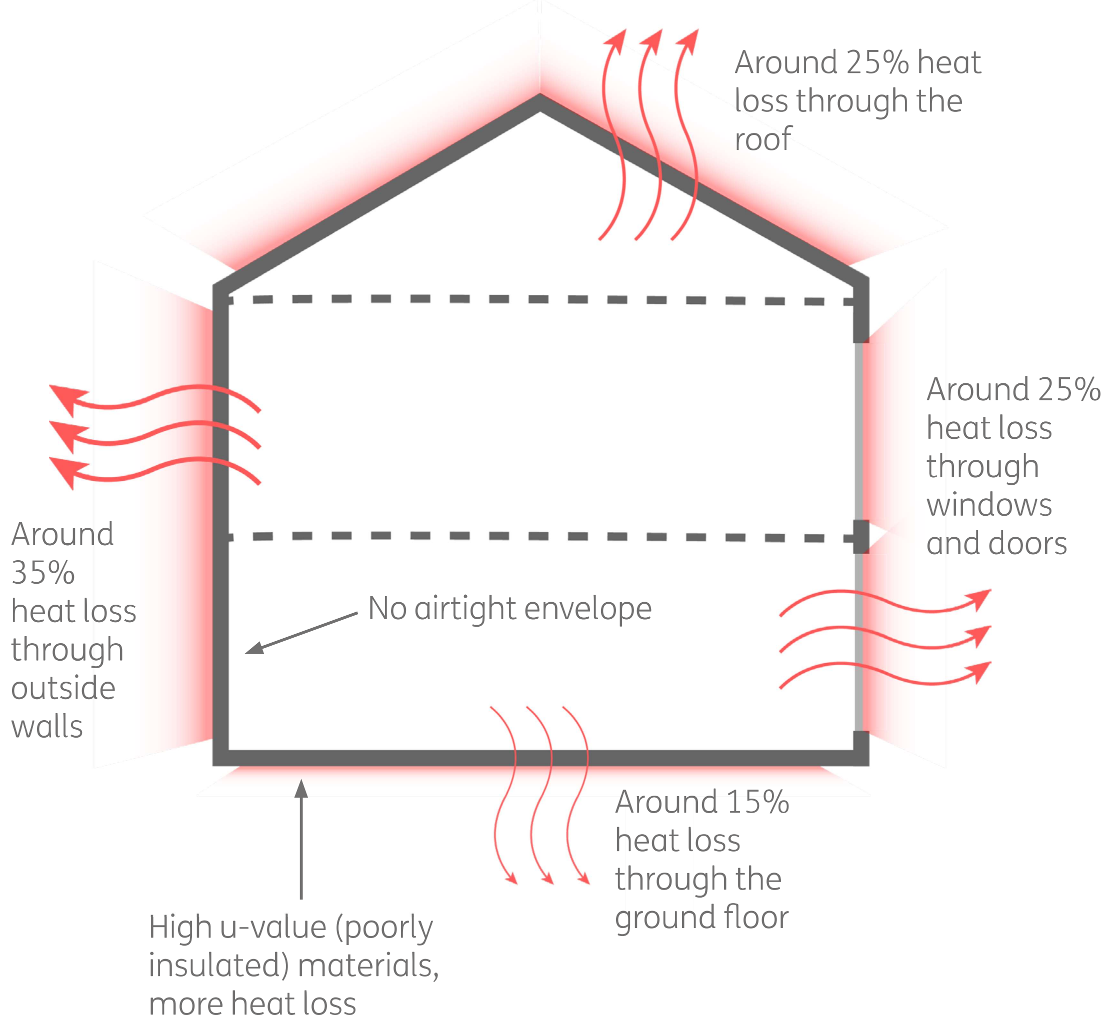
Policy text

Using materials and building techniques that reduce heat and energy needs. Ideally, this could also consider using materials with a lower embodied carbon content and/or high practical recyclable content.

Contribution to energy efficiency

To maintain comfortable, consistent indoor temperatures with minimal energy demand, buildings must isolate the internal from the external environment. This is achieved through the use of highly insulated building materials (measured via u-values), constructed in a way that minimises 'leaky' heat loss (measured via airtightness). Optimising these elements enables control of internal temperatures with a minimum of energy use. Passive measures are also key to minimising resident heating bills.

Location of heat losses in a typical home



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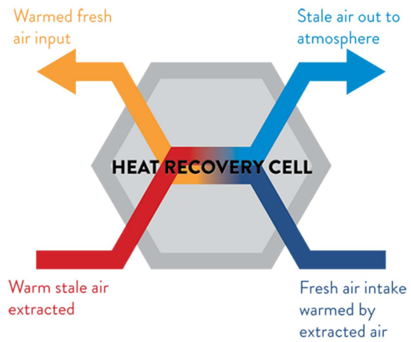
Design challenges

1 Ventilation - Fresh air provision

As high building air-tightness is essential to limit heat losses and maximise building energy efficiency, controlled ventilation is required to deliver the fresh air to meet ventilation requirements and prevent moisture or carbon dioxide build-up.

Where external air quality allows, a "mixed mode" system which uses natural ventilation during summer and shoulder seasons would deliver energy savings through reduced fan energy usage.



For residential buildings, utilising a Mechanical Ventilation with Heat Recovery (MVHR) system provides the greatest energy benefit by reducing winter heat loads. However, there are alternative ventilation systems which do provide some demand control over air infiltration. These should only be considered where MVHR systems are shown by the applicant to be beyond the viability of the project.

2 Ventilation - Hot air purging

Having a highly insulated fabric reduces heat loss and minimises heating loads on the coldest winter days. However, during warmer periods, or when there are unusually high internal heat gains, it is important buildings are designed with the capacity to purge hot air and limit over-heating risk.

Purge ventilation can be provided in two ways:

1. Active ventilation purge - in domestic properties this is delivered through a "boost" mode on the MVHR unit which temporarily increases air-flow. However, this comes at a fan power energy cost. Further, this is often not that effective given the air-flow limits.
2. Natural ventilation purging - A window opening strategy is the most effective at purging hot air due to the significantly greater air-flows. Cross ventilation - where windows open on opposite sides of the building, delivers the greatest flow-rate potential.

Applicants should demonstrate over-heating compliance within Policy S20, preferably through compliance with an industry accepted standard such as CIBSE TM59 and CIBSE TM52.

3

Best practice to meet policy aims - residential

S6.3 Fabric of residential buildings

Indicative specification to comply with Policy S7.2

	Unlikely to comply	Caution needed	Reccomended*
Airtightness ($m^3/h/m^2$)	5+	2-5	<=1
Ventilation system	Natural vent/ extract vent only	MVHR, 75% efficiency	MVHR, 90% efficiency
Walls ($W/m^2.K$)	0.16+	0.14 - 0.15	<=0.13
Ground floor ($W/m^2.K$)	0.13	0.12+	<=0.1
Roof ($W/m^2.K$)	0.13	0.12+	<=0.1
Windows and doors ($W/m^2.K$)	1.1+	0.9+	<=0.8

* The values in this column are Compliant with Policy S7 SAP route

Recommended MVHR specification

Distance from external wall	<2m
Specific fan power	<0.85 W/l/s
Heat recovery	>90%
Thickness of duct insulation mm	>25mm

Recommended solar control

Glazing g-value	<0.5
Shading	External shading where appropriate, internal blinds are

Optimising a building's orientation and form (Policy S6.1 and S6.2) may allow for more

Best practice to meet policy aims - non-residential

S6.3 Fabric of non-residential buildings

Indicative specification to comply with Policy S8.2

	Unlikely to comply	Caution needed	Reccomended*
Airtightness ($m^3/h/m^2$)	5+	2-5	<=1
Ventilation system	Natural vent/ extract vent only	MVHR, 75% efficiency	Mechanical ventilation, with over 85% efficient heat recovery
Walls ($W/m^2.K$)	0.16+	0.14 - 0.15	<=0.13
Ground floor ($W/m^2.K$)	0.13	0.12+	<=0.1
Roof ($W/m^2.K$)	0.13	0.12+	<=0.1
Windows and doors ($W/m^2.K$)	1.1+	0.9+	<=0.8

* The values in this column are Compliant with Policy S8 NCM route

Recommended MVHR specification (if use

Distance from external wall	<2m
Specific fan power	<0.85 W/l/s
Heat recovery	>90%
Thickness of duct insulation mm	>25mm

Recommended solar control

Glazing g-value	<0.4
Visual light transmittance	>0.6
Facde shading strategy	External shading

Optimising a building's orientation and form (Policy S6.1 and S6.2) may allow for more forgiving fabric

Sustainable Systems

Optimising energy systems and hot water demand

- Relevant policy components
- Design challenges
- Best practice and targets

Relevant policy components

S6.4 Heat supply

Policy text

Net zero carbon content of heat supply (for example, this means no connection to the gas network or use of oil or bottled gas)

Contribution to energy efficiency

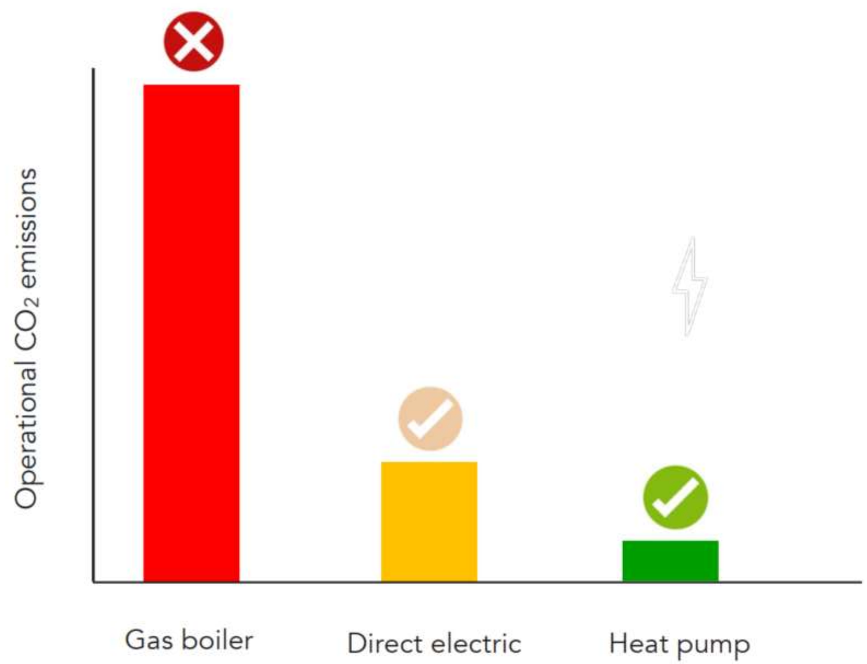
Supplying fossil fuel free energy is key to minimising carbon emissions. For new builds, heat pumps are the most efficient* means of heating a building without reliance on fossil fuels.

Heat pumps come in a variety of forms, can provide both space heating and domestic hot water, and can serve individual buildings or act as communal heating systems.

To ensure energy efficiency is maximised, and to minimise energy demand, the choice of system must be informed by the building and site's context and use case.

*'Direct electric' heating systems are another zero-emissions compatible source of heat, however typically require 3x the amount of electricity than heat pumps to

Why are heat pumps so important?



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[1] Typical 2- electrical ene energy dema G - Feasibility

[2] Calculatio energy costs charge. Gas -

Key Points:

- New buildings need to be low carbon now, and direct electric and heat pump systems can deliver now.
- Heat pumps would use significantly less energy than a direct elec

Design challenges

1 Feasibility of low-carbon heat systems

Low-carbon heating system design requires a sensitivity to site conditions and whole-system design considerations which are not as critical to traditional fossil fuel based heating systems. Here, some critical considerations are provided which will help guide applicants and advise planners on whether an optimal system selection has been made:

- **Air-source heat pump** -
  - Requires appropriately positioned external units, accoustically baffled if necessary
  - Appropriately sized hot-water/thermal stores to buffer demands and allow for optimum operation
  - Deliver a space heating system optimised for low flow temperatures to deliver maximum heating efficiency for the heat pump
- **Closed-loop Ground source heat pump** -
  - Requires array sizing to allow for recharge of ground temperature over annual period. Applicants should demonstrate long-term temperature stability achieved. This can be either through a balanced load, or by ensuring sufficient boreholes are within the array to achieve geothermal recharge
  - Preferably a study on ground conditions with assessment of conductivity performed
- **Open-loop ground source heat pump** -

2 Efficient fixtures and fittings

Electrification of hot water generation is necessary for decarbonisation. However, hot water demand is very concentrated at specific points in the day, putting potentially large peak demands on the electrical grid. Absolute demand reduction technologies - such a low flow fixtures and tank insulation should be prioritised.

The AECB Good Practice Fittings Standard (below) provides recommended specifications. See the full guide for more information.

Appliance/ fitting	AECB Good Practice Fittings Standard
Showers	6 to 8 l/min measured at installation
Basin taps	4 to 6 l/min measured at installation (per pillar tap or per mixer outlet)
Kitchen sink taps	6 to 8 l/min measured at installation
WCs	≤ 6 l full flush when flushed with the water supply connected.

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Best practice to meet policy aims

S6.4 Heat supply

Indicative heating system to comply with policy S7.2/8.2

	Unlikely to comply	Caution needed	Recommended*
Heat supply system	Direct electric	Heat pump, above 45°C flow temperature for space heating	Heat pump, below 45°C flow temperature for space heating

*Compliant with Policy S7/8 SAP route

Heat pumps will perform more efficiently in a building with low u-value building materials and high airtightness .

Recommendations to maximise system efficiency

Reduce flow rates	The AECB water standards (prior page) provide clear guidance on sensible flow rates for showers and taps in low energy buildings.
Reduce distribution losses	All pipework must be insulated and designed to ensure there are no 'dead legs' containing more than 1 litre. Tapping points (e.g. taps, shower connections) should be clustered near the hot water source. Small bore pipework should be careful sized based on peak demands, minimising the diameter where possible.
Insulate to minimise losses from hot water tanks	The standby losses of hot water tanks are highly variable, and can have a significant impact on overall energy use. Target a hot water tank heat loss of less than 1 kWh/day equivalent to 0.75 W/K.

Green Generation

Optimising local renewable energy generation and use

- Relevant policy components
- Design challenges
- Best practice and targets

Relevant policy components

S6.5 Renewable energy generated

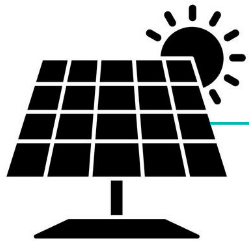
Policy text

Generating enough energy from renewable sources on-site (and preferably on plot) to meet reasonable estimates of all regulated and unregulated total annual energy demand across the year.

Contribution to energy efficiency

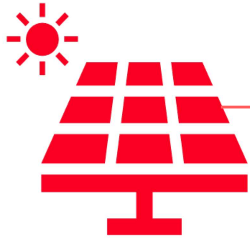
Local energy generation can provide an important contribution to building energy use, while reducing the demands on grid infrastructure. Most common at the building scale is the integration of photovoltaic panels of various forms, but solar thermal installations can also be cost effective where sufficient and well controlled hot water storage is utilised. On-site consumption of local generation should be maximised to provide greatest value and minimise impact on grid constraints.

Solar photovoltaics



- Principle technology for policy compliance
- Panels can currently achieve over 20% efficiency and are capable of generating up to 400W each
- BEIS small scale solar statistics estimate a cost of around £1000/kWp for a residential scale array

Solar thermal systems



- Evacuated tube solar thermal systems can achieve efficiencies of around 60%
- Need to ensure there is sufficient demand to absorb hot water generation in summer months
- Can be more expensive upfront than equivalent area of Solar PV

Design challenges

1 Feasibility of renewable generation

Site layout & context

Solar renewable energy generation, whether photovoltaic or solar thermal, requires unobstructed access to direct sunlight for optimum operation. Overshadowing can lead to poor system efficiency, limited annual generation potential or even system damage. Planners should ensure that the impacts of overshadowing have been considered, and solar generation positioned accordingly. As a rule of thumb, annual solar irradiation of >700 kWh/m^2 is considered sufficient for economic solar generation.

Optimising roof utilisation

To maximise solar generation, roofs should be oriented to the south, or along a shallow east-west axis. Achieving maximum generation potential requires careful utilisation of space and consideration of panel angles. The following general advice should guide planners in reviewing this:

- Solar photovoltaic - Generally maximising roof area utilisation is more important than optimising panel angle and orientation. The optimal panel angle for a single panel is 32° oriented directly south, but panels at a shallower angle (always > 15° to prevent settlement) typically only lose 5 - 10% off this optimum, but enable a larger roof area to be utilised.

2 Grid export limitations

Central Lincolnshire lies on the boundary of the district networks of the national grid and northern power grids.

District networks manage the high and medium voltage lines and substations which deliver power from the main grids transmission network. These substations have limited bounds of voltage for normal operation, and hence only have capacity for a limited amount of "embedded" generation within each sub-station area. Some areas of the grid are at capacity and further renewable generation can only be provided if 100% of it is utilised on site. Applicants should approach the DNO on this issue, as often grid upgrades can be made to support deeper renewables integration.

Northern power grid constraints map example:

3

Best practice to meet policy aims

S6.5 Renewable generation guidelines

Solar PV provision compliant with Policy S7 and S8 SAP/ NCM route

Height of building	Target PV roof area fraction - residential	Target PV roof area fraction - non-resi
1 storey	25%	50%
2 storey	50%	80%
3 storey	75%	Maximise roof PV area
4 storey	Maximise roof PV area	

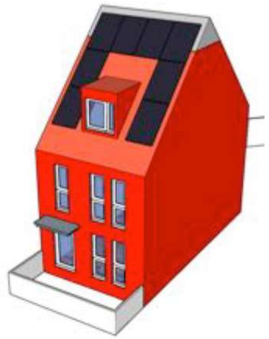
The above area proportions reflect the typical roof fraction required to achieve an energy balance on different building heights. Buildings above the height of four stories may struggle to achieve an energy balance using rooftop solar, and hence maximum roof utilisation is considered sufficient to demonstrate compliance

Examples of best practice

Typical development

Space heating demand: **15 kWh/m²/yr**

Orientation: **south-southwest**



2.7 kWp — Nominal array power

62 kWh/m²fp — Specific energy generation

Minimum solar generation potential on typology. With a single roof aspect available, 8x340W PV panels would be sufficient to generate 27 kWh/m²/yr and therefore potentially achieve zero carbon performance if a very low energy building is specified.

Appendices

- Key resources/ further reading
- Glossary

Key resources and further reading

[LETI Climate Emergency Design Guide]

[RIBA Plan for Use Guide]

[Passivhaus Easi Guide]

[Cotswold Net Zero Carbon Toolkit]

[Passivhaus Trust Good Practice Guide to Airtightness]

[National Model Design Code Guidance Notes]

[AECB Good Practice Fittings Standard]

[Central Lincolnshire Climate Change Evidence Base: Task G - Feasibility]

[HVDH Domestic heating design guide (2021)]

Glossary

Absolute zero carbon – Refers to a development that has zero carbon embodied or operational emissions, and zero offsetting is required.

Active frontages - Refers to the frontage of buildings where there is an active visual engagement between those in the street and those on the ground and upper floors of buildings – for example through large windows, shop-fronts, and building entrances.

Auxiliary energy use– Auxiliary energy is the energy used by equipment (pumps and fans) and is part of the regulated emissions that are calculated for a building.

BREEAM– The Building Research Establishment is an internally recognised sustainability assessment scheme. Non-residential buildings are assessed at the design and post construction stage and certificates awarded based on meeting criteria surrounding sustainable design, construction and operation. The New Construction scheme is used to assess all non-residential spaces and the Community scheme is used for masterplan community developments.

Brise soleil- An architectural feature of a building designed to reduce heat gain and deflect sunlight. Examples of this include 'fins' on a building façade.

Building Regulations– Produced by the government, these national technical guidance documents confirm how building regulations must be complied with during construction. Example approved documents include: Part B Fire Safety, Part F Ventilation and Part L Conservation of Fuel and Power.

warming potential of CO2 to provide a simple number.

Demand response- Refers to a change in the power consumption of a building to better match the demand for power with the supply. A simple example of this would be running a washing machine when energy demand is lower.

Design for Performance - A modelling approach which attempts to predict the energy use of a building using realistic assumptions about building use and performance. This differs to compliance approaches which use standardised assumptions. For non-residential buildings, methodologies such as CIBSE TM54, NABERS and PHPP are well established within industry.

Energy Use Intensity (EUI)– Measures the building's energy efficiency and is the annual measure of energy consumed by the building. EUI can be estimated at Design Stage and then the kWh from energy bills when the building is in use can be compared to the target.

EPC - Energy performance certificate. The certificate presents a score, ranging from 0 - 100, which provides a reflection of the buildings normative energy performance. Required for all domestic dwellings on the market either for sale or rental.

Fabric first approach – Refers to prioritising and maximising the energy efficiency of building components and materials when designing a scheme, before considering the use of energy systems.

G-value– G-values are the solar transmittance that

LETI- The London Energy Transformation Initiati a volunteer network of over 1000 built environm professionals working to ensure London transitio to become net zero carbon. They have written and published a series of guides including their Embodied Carbon Primer, Climate Emergency De Guide and Climate Emergency Retrofit Guide.

Life cycle analysis (LCA) – Refers to a method o assessing the environmental impacts associated with all stages of a development's life cycle.

Local generation- Refers to energy that is gener on-site

Low flow fixtures- Refers to appliances within a building that are designed to use less water than their traditional counterparts. An example of this an aerated tap, or low-flow toilet.

MEP systems– Mechanical, electrical and plumb engineering are the essential systems required t make a building comfortable for people to use. This includes heating, cooling, ventilation, lightir power, freshwater and wastewater.

NABERS - The National Australian Built Environm Rating System is an assessment scheme measu a building's energy efficiency and carbon emissio based on annual operational performance (and updated every year).

Natural surveillance – Refers to the ability to se in and out of an area. It involves designing a site physical features in a way that maximises the visibility of a given space, as to deter crime and optimise potential to see suspicious activity if it occurs.

This guide was produced by Bioregional and Etude for the Central Lincolnshire Joint Strategic Planning Committee.

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