Energy Statement

7 Elvetham Road

Fleet, Hampshire, GU51 4QL

Project: 001031-FD

Version: 1.0

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1. Executive Summary

This Energy Statement has been prepared in support of a planning application for the Proposed Development at 7 Elvetham Road, Fleet, Hampshire, GU51 4QL. The design addresses the energy performance policy requirement of Hart District Council. An energy assessment was carried out to achieve the Building Regulations (as amended) through the use of on-site low and zero carbon technology.

A baseline has been developed against which potential savings can be assessed. This baseline is the notional building developed for the Building Regulations (2013) assessment and quantified in terms of CO_2 emissions as Target Emission Rate (TER) for the buildings.
Baseline Target Emission Rate is 28.46

'Be Lean' measures were modelled with improvements to the building fabric to improve insulation and air tightness standards. Building services improvements were also made, which include energy efficient lighting and zonal controls. These measures have brought the building in line with the Target Emission Rate specified above.

The availability of **'Be Clean'** energy efficient systems have been investigated. The proposed development is not within an existing or future district heating network. Furthermore, the size and nature of the proposed development renders Combined Heat and Power (CHP) systems unsuitable due to the lack of a sufficient base heating load.

The potential for low or zero carbon technologies (**'Be Green'**) to further reduce CO_2 emissions (Appendix E) has been taken in consideration. Air Source heating pumps are specified to bring the **Design Emission Rate to 22.04 (22% reduction).**

This Energy Statement defines a strategy to reduce emissions resulting through energy efficiency measures by **22%** compared to the regulated emissions from a building designed to just meet Building Regulations (as amended) Part L1A.

2. Introduction

This Energy Statement has been prepared by Sustain Quality in support of a detailed planning application for the proposed development at 7 Elvetham Road, Fleet, GU51 4QL, a new three-storey residential block providing 14 flats. The proposed development has a total private gross internal floor area of around 822 m².

The report is produced in line with the policies below:

- National Planning Policy Framework (as Amended)
- Part L of the Building Regulations (2013)
- Hart District Council
    - Hart Local Plan Strategy and Sites 2032 (May 2020)

The purpose of this report is to help to evaluate parties to understand the energy consumption and performance of the proposed development and consider its performance in achieving the maximum viable reduction in regulated CO_2 emissions in line with the Energy Hierarchy (Appendix A).

The Energy Hierarchy assesses the feasibility of reducing the energy demand of the building using design strategies to improve the building fabric performance, consider the use of cleaner energy and adopt renewable energy technologies, which includes:

- **Passive Design and Energy Efficient Measures – 'Be Lean'**
- **Energy Efficient Systems – 'Be Clean'**
- **Low and zero carbon sources – 'Be Green'**

This assessment has considered the guidance below to assess feasibility of design specification and efficiently achieve an optimal outcome towards net zero carbon (Appendix C):

- Steps to Achieving a Net Zero Carbon Building - UK Green Building Council (UKGBC)
- Net Zero Carbon Design Principles - London Energy Transformation Initiative (LETI)
- CIBSE guidance to deliver net zero carbon new buildings
- The Sustainable Development Goals
- RIBA 2030 Climate Challenge
- Passive House Trust

It is proposed that the design principles outlined in this report are implemented to meet the planning requirements. In order to demonstrate the envisaged energy performance of the proposed development, an energy mode has been created under the latest version of an approved Standard Method Procedure (SAP) interface, methods and software.

3. Planning Policy Review

National Planning Policy

The National Planning Policy Framework (NPPF – February 2019) sets out the government's planning policies for England, and how they should be applied. It provides a framework within which locally prepared plans for housing and other development can be produced. Chapter 14 on 'Planning for Climate Change' guides how to develop an energy strategy that reduces energy use and carbon emissions in line with best practice.

Achieving sustainable development (appendix C) means that plans should secure net gains within economic, social, and environmental objectives (NPPF, paragraph 8). Environmental objectives include using natural resources prudently, minimising waste, mitigation and adapting to climate change and moving to a low carbon economy.

Part L 2013 Building Regulations – Conservation of Fuel and Power

Reasonable provision shall be made for the conservation of fuel and power in buildings by limiting heat gains and losses through thermal elements and other parts of the building fabric, such as from pipes, ducts and vessels used for space heating, space cooling and hot water services. Fuel and power should also be conserved by providing fixed building services that are energy efficient, have effective controls and are commissioned by testing and adjusting, as necessary, to make sure they use no more fuel and power than is reasonable in the circumstances.

Local Planning Policy

Hart Local Plan Strategy and Sites 2032

"Design

300. Good design is indivisible from good planning. This is because design is about more than just the appearance of buildings; it also concerns the relationships between people and places and how buildings fit together within their local environment to create a distinctive sense of place. Achieving good design will involve creating new buildings and spaces that look good, that are fit for purpose and accessible, and that are adaptable to the changing needs of residents and visitors. Policy NBE9 will enable us to ensure that a good standard of design is achieved, and that the distinctive qualities of our towns and villages will be reflected in new development.

Policy NBE9 Design

"All developments should seek to achieve a high quality design and positively contribute to the overall appearance of the local area.

The development will be supported where it would meet the following relevant criteria:

...j) it incorporates renewable or low carbon energy technologies, where appropriate...

...303. High quality design will also ensure that new development is resilient and enduring. There is a need to protect development from the risks of climate change, through an appropriate layout that avoids or mitigates increased flood risks (i.e. through enabling the incorporation of sustainable drainage systems) and allows buildings to be orientated to benefit from 'solar gain', thereby reducing their energy requirements. The emission of greenhouse gases that is associated with new development can be reduced through including energy generating technologies such as solar panels or ground source heat pumps. The inclusion of renewable and low carbon technologies is encouraged, to be achieved in a way that is consistent with the other objectives of good design...

...305. To support the implementation of Policy NBE9, the Council may produce additional planning policies, supplementary planning documents or supplementary planning guidance.

Renewable and Low Carbon Energy

306. The delivery of renewable and low carbon energy schemes will contribute towards the mitigation of impacts of climate change. An Energy Opportunities Plan (EOP) incorporated within the North Hampshire Renewable Energy and Low Carbon Development Study (2011), demonstrates opportunities for low carbon energy generation potential, including wind, photovoltaic solar, biomass for direct combustion and anaerobic digestion and district heating with combined heat and power (CHP).

307. The District has significant local renewable resource potential and the EOP indicates favoured locations where opportunities might be viable. Development proposals should be in line with the EOP, though other locations or technologies are not precluded. Policy NBE10 identifies the main issues that are likely to be relevant when balancing the merits of any proposals for renewable and low carbon energy generation against any adverse impacts.

Policy NBE10 Renewable and Low Carbon Energy

Proposals for the generation of energy from renewable resources, or low carbon energy development (with the exception of wind turbines) will be supported providing that any adverse impacts are addressed satisfactorily including individual and cumulative landscape and visual impacts. All such applications are subject to the following considerations:

a) *proximity to, and impact on, transport infrastructure and the local highway network;*
b) *the impact on designated sites of European, national, regional and local biodiversity and geological importance;*
c) *the significance or special interest of heritage assets;*
d) *the impact on high grade agricultural land;*
e) *the impact on residential amenity including emissions, noise, odour and visual amenity; and*
f) *the degree to which the developer has demonstrated any wider environmental, economic and social benefits of a scheme as well as how any adverse impacts have been minimised.*

308. When assessing the impacts of a proposal for a renewable energy scheme we will consider the cumulative landscape and visual impacts of the development. Cumulative visual impacts may arise where two or more of the same type of renewable energy development will be visible from the same point or will be visible shortly after each other along the same journey.

309. New developments can be catalysts for decentralised energy network growth and major new developments should assess the feasibility of communal heat distribution to facilitate connecting to an existing decentralised energy network, or where this is not possible, establishing a new network. Opportunities should be taken for appropriate technology to be incorporated into all stages of a building project at an early stage in the planning process."

4. Proposed Development

The proposed development at 7 Elvetham Road, Hampshire, Fleet, GU51 4 QL is a three-storey residential block providing 12 flats; with associated access, landscaping and parking. The proposed development has a total private gross internal floor area of around 1,935 m².

Figure 1 – Street Elevation

The table overleaf contains the estimated carbon dioxide (CO_2) emissions and energy consumption study for the development, and performance against the targets set out in Part L2A of the Building regulations.

Energy Hierarchy	Energy Demand (kg/year)	Energy Demand Savings (%)	Target Emissions Rate (TER)	CO2 Emission Savings (%)
Baseline	64,650	-	28.46	-
'Be Lean' (use less energy)	31,552	51	22.04	22
'Be Clean' (supply energy efficiently)	-	-	-	-
'Be Green' (low or zero carbon technology)	31,552	51	22.04	22

Table 1 – Overall CO_2 emissions and energy demand savings per energy efficiency measure

	Target - Energy Demand (kWh/year)	Energy Demand (kWh/year)	Energy Demand Savings %	Target Emission Rate - TER	Dwelling Emission Rate - DER	CO2 Emissions Savings (%)	Running Costs (£/year)	Private Gross Internal Floor (m²)
Flat 1	5,235	2,518	52	28.9	19.47	33	378	161
Flat 2	5,518	2,853	48	30.39	22.12	27	421	162
Flat 3	5,707	2,797	51	22.17	31.98	31	420	159
Flat 4	5,283	2,521	52	29.62	19.83	33	379	159
Flat 5	5,978	2,840	52	36.04	24.31	33	433	147
Flat 6	4,863	2,434	49	26.89	18.77	30	361	161
Flat 7	4,836	2,701	44	21.7	27.79	22	389	156
Flat 8	5,218	2,700	48	29.29	21.35	27	398	159
Flat 9	4,699	2,379	49	26.41	18.61	29	350	159
Flat 10	5,234	2,757	47	29.78	22.08	26	405	157
Flat 11	5,303	2,458	53	28.65	18.57	35	372	165
Flat 12	6,776	2,594	61	31.66	19.65	38	454	190
7 Elvetham Road	**64,650**	**31,552**	**51**	**28.46**	**22.04**	**22**	**4,760**	**1,935**

Table 2 – CO_2 Emissions and Energy Demand consumption analysis per flat.

5. Energy Assessment Approach

The proposed development has been modelled by a registered energy assessor, using approved energy assessment software.

The energy consumption and associated carbon emission estimated for the development have been assessed under the latest version of Standard Assessment Procedure (SAP) methods with the Carbon Factors utilised in the current Building Regulation SAP 2012 software.

Baseline

The assessment firstly established a baseline assessment of the energy demands and associated CO_2 emission for the development based on current building regulations (2013). The Building Regulations compliant baseline case stipulates that homes and buildings meet the Target Emission Rate (TER).

Energy Hierarchy

The analysis based on the Energy Hierarchy (Appendix A) models the carbon footprint of the proposed development after each stage of the energy hierarchy and includes emissions from regulated energy uses.

Be Lean

Use less energy: Optimise the building fabric, glazing and structure to minimise energy consumption in the first instance by using low U-values and good air tightness and make sure active systems run as energy efficiently as possible.

The development has taken a 'fabric first' approach to reduce energy demand and CO_2 emissions. Fundamental to achieving energy efficiency in any new building is the specification of thermally efficient building materials. Passive design features, such as high levels of insulation and designed to maximise solar gain and limit heat loss through reduced air leakage and enhance thermal bridging, are proven techniques to decrease energy consumption and reduce emissions.

The careful fabric consideration is the most effective and robust measurement for reducing CO_2 emissions, as the performance of the solutions (e.g. wall insulation) is unlikely to deteriorate significantly over time or be subject to change. The table below summarises the passive design and energy efficiency measures that should be considered for the development.

Parameters	Limiting U-values (W/m²K)	Development's U-values (W/m²K)
Ground Floor	0.25	0.13
External Walls	0.30	0.16
Windows	2.00	1.40
Doors	2.00	1.00
Roof	0.20	0.14
Air Permeability Rate	10 m³/hm²	6 m³/hm²

Table 3 – Passive and Energy Efficiency Measures

The implementation of 'Be Lean' measures has brought the development to achieve the required rate in regulated CO_2 emissions the requirements of the Building Regulations Part L (2013) baseline through the use of passive design measures together with the implementation of Air Source Heating Pumps.

Be Clean

Supply energy efficiently: Further reduce carbon emissions through the use of decentralised energy where feasible, such as combined heat and power (CHP), combined cooling and heating power (CCHP) and district heating.

The proposed development has considered the infrastructure and clean energy supply measures to further reduce regulated CO_2 emissions and outline the technologies that will be implemented if feasible.

At the early design stage, the design team has taken into consideration the relative benefits of adopting the systems below:

- On-site technologies: Combined Heat and Power (CHP) and Combined Cooling Heat and Power (CCHP).
- District Heating

There is no suitable 'Be Clean' opportunities deemed to further reduce regulated CO_2 emissions. Therefore, the implementation of 'Be Clean' measures has achieved no reduction in regulated CO_2 emissions beyond the requirements of the Building Regulations Part L (2013) baseline.

Be Green

Use renewable energy: When the Be Lean and Be Clean design elements have been reasonably exhausted, supply energy through renewable sources, where practical.

The renewable technologies listed below have been assessed for their applicability to this development and are listed in the table below. Table 2 also presents the preliminary assessment of renewable technologies for the proposed development.

System	Description	Feasible
Photovoltaics	Appropriately oriented roof space available. Significant building electrical loads.	Yes
Solar thermal (hot water)	Appropriately oriented roof space available. Significant building electrical loads.	Yes
Solar warmed air	Appropriately oriented roof space available. Significant building electrical loads.	No
Wind power	NOABL wind map indicates that a wind speed of 5.5m/s is likely at 10 meters above ground level. However, given that the proposed development is located in a town, wind access and the ability to build a turbine is limited.	No
Air Source Heat Pumps	Space available for installation of ASHP and heating/hot water requirement present.	Yes
Ground Source Heat Pumps	Space available for installation of GSHP and heating/hot water requirement present.	Yes
Anaerobic digestion	It is unlikely that organic waste streams will be generated on site in the quantities required for this form of heat generation plant.	No
Biomass boilers	Significant fuel storage/plant area requirements. Potential noise issues.	No

Table 2- Renewable Technology Preliminary Assessment

A secondary assessment was then completed to further investigate the remaining technologies that were found to be potentially feasible: photovoltaics, air source heat pumps (ASHP), Ground source heat pumps (GSHP).

After careful consideration on which form of low or zero carbon technology (Appendix B), the photovoltaic and solar thermal may be potential strategy to bring the development closer to Net Zero but it would increase the costs of the development which would make it not viable. Due to the complexity of GSHP installation, this strategy may not be suitable for the development. ASHP is considered to be the most viable solution for the proposed development.

The implementation of 'Be Green' measures has achieved a 22% reduction in regulated CO_2 emissions beyond the requirements of the Building Regulations Part L (2013) baseline through the use of passive design measures.

6. Sustainable Development

The client is committed to delivering sustainable development (Appendix F). The design team has considered guidance on Net Zero Carbon (Appendix C) and Passive House (Appendix H) to optimise the energy usage and the health and wellbeing of building users and local community.

The developer is committed to sustainable development and future sustainability requirements and will adhere closely to the requirements set out in the Hart Local Plan Strategy and Sites 2032 published in May 2020. This will be demonstrated through incorporating some features from the Home Quality Mark (Appendix G) where appropriate, some of these features to be considered are listed below:

- **Green roof**
- **Sustainable Transport Options (cycling storage, Electric vehicle charging points, car sharing)**
- **Security**
- **Consideration for recyclable waste**
- **Sustainable Materials**
- **Site Waste, Water, Energy, and Air Quality control and management**

This statement reflects the quality, performance, and attributes of the proposed development at 7 Elvetham Road development, demonstrating the client and design team's commitment to the development's energy-efficiency and overall sustainability.

7. Conclusions

When reviewing the energy strategy for this development, careful consideration has been given to the context site, local planning policy, and building regulations.

The approach taken for the proposed energy strategy for the development has followed the guidance of the Hart District Council. A sequential approach has been adopted in line with the Energy Hierarchy (Appendix A), assessing the feasibility of reducing the energy demand of the building by specifying suitable fabric first, then using energy more cleanly and, lastly, applying renewable technologies. This assessment has also considered the latest industry guidance such as LETI, UKGBC, CIBSE, Passive House, and RIBA.

This Energy Statement defines a strategy to reduce emissions by implementing an energy strategy with an estimated CO_2 savings of **22%** compared to the regulated emissions from a building designed to meet the Building Regulations (2013) Part L1A.

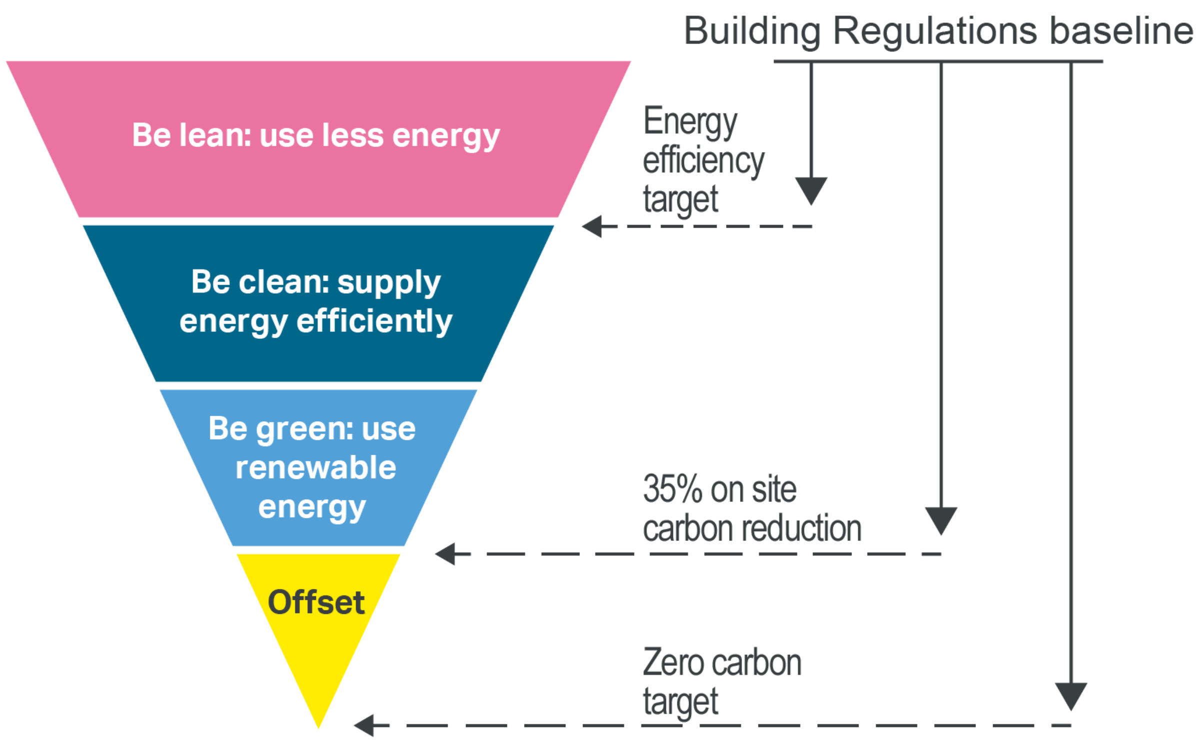
The 7 Elvetham Road developers are committed to sustainable development (Appendix C), which will guide the decision making throughout the design and construction processes. The measures described in this report demonstrate the client's commitment to sustainable development and future requirements.

Appendix A – Energy Hierarchy

To meet the UK government's net zero carbon emissions target for 2050, new developments need to meet planning requirements. This requires the reduction of all greenhouse gases, of which carbon dioxide is most prominent.

The energy hierarchy (Figure below) should inform the design, construction and operation of new buildings. The priority is to minimise energy demand and address how energy will be supplied and renewable technologies incorporated. An important aspect of managing demand will be to reduce peak energy loadings.

Developments are expected to achieve carbon emissions reductions beyond part L from energy efficiency measures by maximising opportunities for on-site electricity and heat production form solar technologies (photovoltaic and thermal) and use innovative building material and smart technologies. This approach will reduce carbon emissions, reduce energy costs to occupants, improve energy resilience and support the growth of green jobs.



Source: Greater London Authority

Appendix B – Energy Efficiency Measures

The reduction of energy consumption is an essential element in the reduction of carbon emissions. The incorporation of good practice energy saving techniques should be considered paramount. This first stage is described as ‘be lean’. Only after the energy consumption has been minimised should consideration be given to the use of renewable technologies. This stage is described as ‘be green’. The last level of the hierarchy is concerned with minimisation the losses associated with the supply of energy, described as ‘be clean’.

Proposed Energy Efficiency Measures

The following energy saving techniques will be incorporated where possible to minimise the development’s energy requirement:

Efficient Lighting

Energy efficient lighting systems combined with the careful use of daylight should be used to minimise both the electricity consumed and the heat load generated by lighting. The lighting control system should be able to adjust the light output in response to varying daylight and occupancy conditions.

Low Energy Heating and Cooling

The demand for heating and cooling should be reduced by using passive means rather than relying on energy intensive systems to achieve comfort. These could include, in addition to the techniques mentioned above, the use of exposed structural mass to moderate peak cooling loads. Consideration should also be given to the reduction of internal loads such as lighting and equipment.

Where mechanical ventilation and cooling are unavoidable, consideration should be given to the use of more efficient systems such as displacement ventilation, chilled beams, or ‘mixed-mode’ systems that allow natural ventilation to be supplemented with mechanical cooling at times of peak demand.

Heat Recovery

Heat recovery systems reduce the heating loads by recycling heat from exhaust air. High efficiency thermal wheels can recover up to about 85% of the heat in the exhaust air.

Variable Speed Drives

Electronically controlled variable speed drives (inverter drives) vary the speed of equipment to suit the demand. They are proven to make significant energy savings and can be applied to pumps, fans and refrigeration compressors.

Building Energy Management Systems (BEMS)

A BEMS can be employed to control and monitor all major items of mechanical equipment. The monitoring system can provide the required sub-metering as well as identification of fault conditions, which can lead to excessive energy consumption. The system may also be able to optimise plant control strategy to ensure optimum operational efficiency.

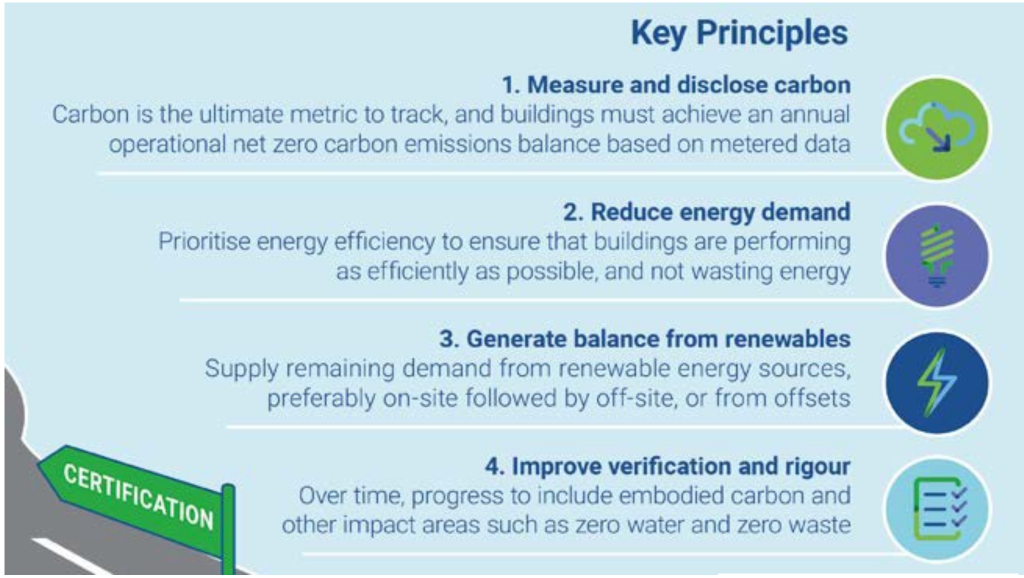
Appendix C – Net Zero Carbon Design

By 2030 all new buildings must operate at net zero to meet our climate change targets. This means that by 2025 all new buildings will need to be designed to meet these targets. We therefore have five years to do it progressively so that it becomes the norm in 2025.

Key Points and Information

The climate emergency is one of the biggest challenges faced by the construction industry today. Following announcements by government, all building must be zero carbon by 2030. This means that the industry must take measures to develop buildings that are constructed and maintained to zero carbon principles throughout their lifetime.

London Energy Transformation Initiative (LETI) and the UK Green Building Council (UKGBC) has created guidelines for good net zero carbon design principles. Some considerations involve building orientation, building size and glazing level at RIBA stage 0-1, then material choices and integration of renewable technology between RIBA stages 2-3. The buildings operational and embodied carbo footprint must also be considered during RIBA stage 3 to ensure that these measures are implemented following planning approval.



UKGBC Infographic

Whole life carbon assessments are a requirement so that the potential carbon impact of the building can be published. Assessments must be completed and audited by a third party. N.B Requirement for external environment assessments such as Home Quality Mark (Appendix D).

UK GBC's Steps to Achieving a Net Zero Carbon Building

This infographic was adapted from UKGBC

1. Establish Net Zero Carbon Scope*

1.1 Net zero carbon – construction

1.2 Net zero carbon – operational energy

2. Reduce Construction Impacts

2.1 A whole life carbon assessment should be undertaken and disclosed for all construction projects to drive carbon reductions

2.2 The embodied carbon impacts from the product and construction stages should be measured and offset at practical completion

3. Reduce Operational Energy Use

3.1 Reductions in energy demand and consumption should be prioritised over all other measures.

3.2 In-use energy consumption should be calculated and publicly disclosed on an annual basis.

4. Increase Renewable Energy Supply

4.1 On-site renewable energy source should be prioritised

4.2 Off-site renewables should demonstrate additionality

5. Offset Any Remaining Carbon

5.1 Any remaining carbon should be offset using a recognised offsetting framework

5.2 The amount of offsets used should be publicly disclosed

D New buildings and major refurbishments targeting net zero carbon for construction should be designed to achieve net zero carbon for operational energy by considering these principles.

* Please also note, a further scope for net zero whole life carbon (1.3) will be developed in the future.

The Greater London Authority suggests the Energy Hierarchy (Appendix A) as an important tool to achieve zero or low carbon developments, which is a sequential approach to design assessing, in turn, the feasibility of reducing the energy demand of the building, using energy more cleanly, and finally, applying renewable technologies. The figure below shows how to achieve Zero Carbon with the use of offsetting, which may not be possible in some areas, which is recommended to increase the renewable generation capacity until it surpasses the building's energy demand.

Operational energy

Implement the following indicative design measures:

Fabric U-values (W/m².K)

Walls	0.13 - 0.15
Floor	0.08 - 0.10
Roof	0.10 - 0.12
Exposed ceilings/floors	0.13 - 0.18
Windows	0.80 (triple glazing)
Doors	1.00

Efficiency measures

Air tightness	<1 (m³/h. m²@50Pa)
Thermal bridging	0.04 (y-value)
G-value of glass	0.6 - 0.5
MVHR	90% (efficiency) ≤2m (duct length from unit to external wall)

Window areas guide (% of wall area)

North	10-15%
East	10-15%
South	20-25%
West	10-15%

Balance daylight and overheating

Include external shading

Include openable windows and cross ventilation

Reduce energy consumption to:

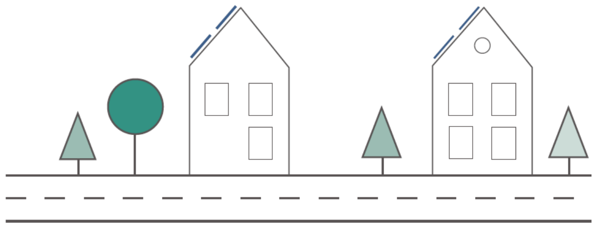
35 kWh/m².yr

Energy Use Intensity (EUI) in GIA, excluding renewable energy contribution

Reduce space heating demand to: 15 kWh/m².yr

Maximise renewables so that 100% of annual energy requirement is generated on-site

Form factor of 1.7 - 2.5



Heating and hot water

Implement the following measures:

Fuel
Ensure heating and hot water generation is fossil fuel free

Heating
Maximum 10 W/m² peak heat loss (including ventilation)

Hot water
Maximum dead leg of 1 litre for hot water pipework

'Green' Euro Water Label should be used for hot water outlets (e.g.: certified 6 L/min shower head – not using flow restrictors).

Demand response

Implement the following measures to smooth energy demand and consumption:

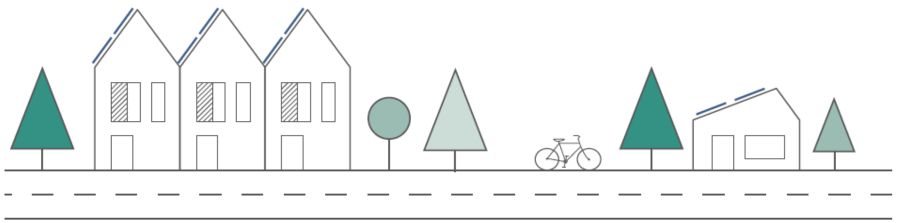
Peak reduction
Reduce heating and hot water peak energy demand

Active demand response measures
Install heating set point control and thermal storage

Electricity generation and storage
Consider battery storage

Electric vehicle (EV) charging
Electric vehicle turn down

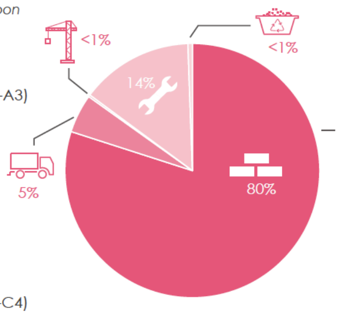
Behaviour change
Incentives to reduce power consumption and peak grid constraints.



Embodied carbon

Focus on reducing embodied carbon for the largest uses:

- Products/materials (A1-A3)
- Transport (A4)
- Construction (A5)
- Maintenance and replacements (B1-B5)
- End of life disposal (C1-C4)



Average split of embodied carbon per building element:

- 30% - Superstructure
- 27% - Substructure
- 20% - Internal finishes
- 17% - Façade
- 5% - MEP

Reduce embodied carbon by 40% or to:

<500 kgCO$_2$/m²

Area in GIA

LONDON ENERGY TRANSFORMATION INITIATIVE

Data disclosure

Meter and disclose energy consumption as follows:

Metering

1. Submeter renewables for energy generation
2. Submeter electric vehicle charging
3. Submeter heating fuel (e.g. heat pump consumption)
4. Continuously monitor with a smart meter
5. Consider monitoring internal temperatures
6. For multiple properties include a data logger alongside the smart meter to make data sharing possible.

123 Disclosure

1. Collect annual building energy consumption and generation
2. Aggregate average operational reporting e.g. by post code for anonymity or upstream meters
3. Collect water consumption meter readings
4. Upload five years of data to GLA and/or CarbonBuzz online platform
5. Consider uploading to Low Energy Building Database.

Appendix D – Net Zero Operational Carbon

The London Energy Transformation Initiative's net zero operational carbon is on next page.

Net Zero Operational Carbon

Ten key requirements for new buildings

By 2030 all new buildings must operate at net zero to meet our climate change targets. This means that by 2025 all new buildings will need to be designed to meet these targets. This page sets out the approach to operational carbon that will be necessary to deliver zero carbon buildings. For more information about any of these requirements and how to meet them, please refer to the: UKGBC - Net Zero Carbon Buildings Framework; BBP - Design for Performance initiative; RIBA - 2030 Climate Challenge; GHA - Net Zero Housing Project Map; CIBSE - Climate Action Plan; and, LETI - Climate Emergency Design Guide.

Low energy use

1. Total Energy Use Intensity (EUI) - Energy use measured at the meter should be equal to or less than:
   - **35 kWh/m²/yr** (GIA) for residential[1]

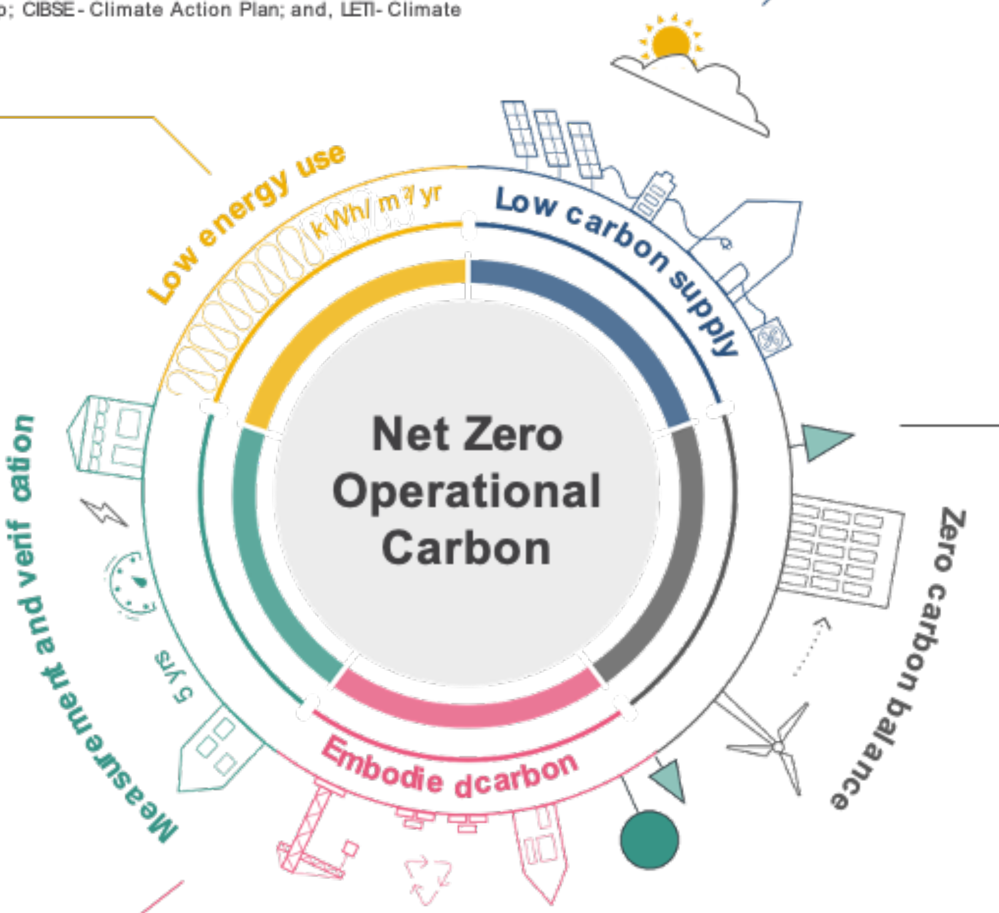
   For non-domestic buildings a minimum DEC B(40) rating should be achieved and/or an EUI equal or less than:
   - **65 kWh/m²/yr** (GIA) for schools[1]
   - **70 kWh/m²/yr** (NLA) or **55 kWh/m²/yr** (GIA) for commercial offices[1,2]
2. Building fabric is very important therefore space heating demand should be less than **15 kWh/m²/yr** for all building types.

Measurement and verifcation

3. Annual energy use and renewable energy generation on-site must be reported and independently verified in-use each year for the first 5 years. This can be done on an aggregated and anonymised basis for residential buildings.

Reducing construction impacts

4. Embodied carbon should be assessed, reduced and verified post-construction.[3]



Low carbon energy supply

5. **Heating and hot water should not be generated using fossil fuels.**
6. The average annual carbon content of the heat supplied (gCO_2/kWh) should be reported.
7. On-site renewable electricity should be maximised.
8. Energy demand response and storage measures should be incorporated and the building annual peak energy demand should be reported.

Zero carbon balance

9. A carbon balance calculation (on an annual basis) should be undertaken and it should be demonstrated that the building achieves a net zero carbon balance.
10. Any energy use not met by on-site renewables should be met by an investment into additional renewable energy capacity off-site OR a minimum 15 year renewable energy power purchase agreement (PPA). A green tariff is not robust enough and does not provide 'additional' renewables.

Developed in collaboration with:

London Energy Transformation Initiative | UK GBC | BBP Better Buildings Partnership

Supported by:

Good Homes Alliance | RIBA Architecture.com | CIBSE

Notes:

Note 1 – Energy use intensity (EUI) targets
The above targets include all energy uses in the building (regulated and unregulated) as measured at the meter and exclude on-site generation. They have been derived from: predicted energy use modelling for best practice; a review of the best performing buildings in the UK; and a preliminary assessment of the renewable energy supply for UK buildings. They are likely to be revised as more knowledge is available in these three fields. As heating and hot water is not generated by fossil fuels, this assumes an all electric building until other zero carbon fuels exist, (kWh targets are the same as $kWh_{electricity}$). Once other zero carbon heating fuels are available this metric will be adapted.

Note 2 – Commercial offices
With a typical net to gross ratio, 70 kWh/m² NLA/yr is equivalent to 55 kWh/m² GIA/yr. Building owners and developers are recommended to target a base building rating of 6 stars using the BBP's Design for Performance process based on NABERS.

Note 3 – Whole life carbon
It is recognised that operational emissions represent only one aspect of net zero carbon in new buildings. Reducing whole life carbon is crucial and will be covered in separate guidance.

Note 4 – Adaptation to climate change
Net zero carbon buildings should also be adapted to climate change. It is essential that the risk of overheating is managed and that cooling is minimised.

Appendix E – Low or Zero Carbon Energy Solutions

Biomass is an alternative solid fuel to conventional fossil fuels. In theory, it is carbon neutral, as the carbon emitted by burning is offset by the carbon absorbed during the growth of the plant.

The most common type of biomass fuel is the woody biomass, which includes forest residues, such as tree thinnings, and energy crops, such as willow short rotation coppice. Biomass is converted into a manageable form that can be directly fed to the heat or power generation plant, thus replacing fossil fuel.

As a result, applications can range from large-scale heating boilers and individual house room heaters, to Combined Heat and Power generation (CHP). For building applications, the fuel usually takes the form of wood chips, logs and pellets. Wood pellets are essentially compacted high-density wood with low moisture content, thus having a higher calorific value per unit volume or weight.

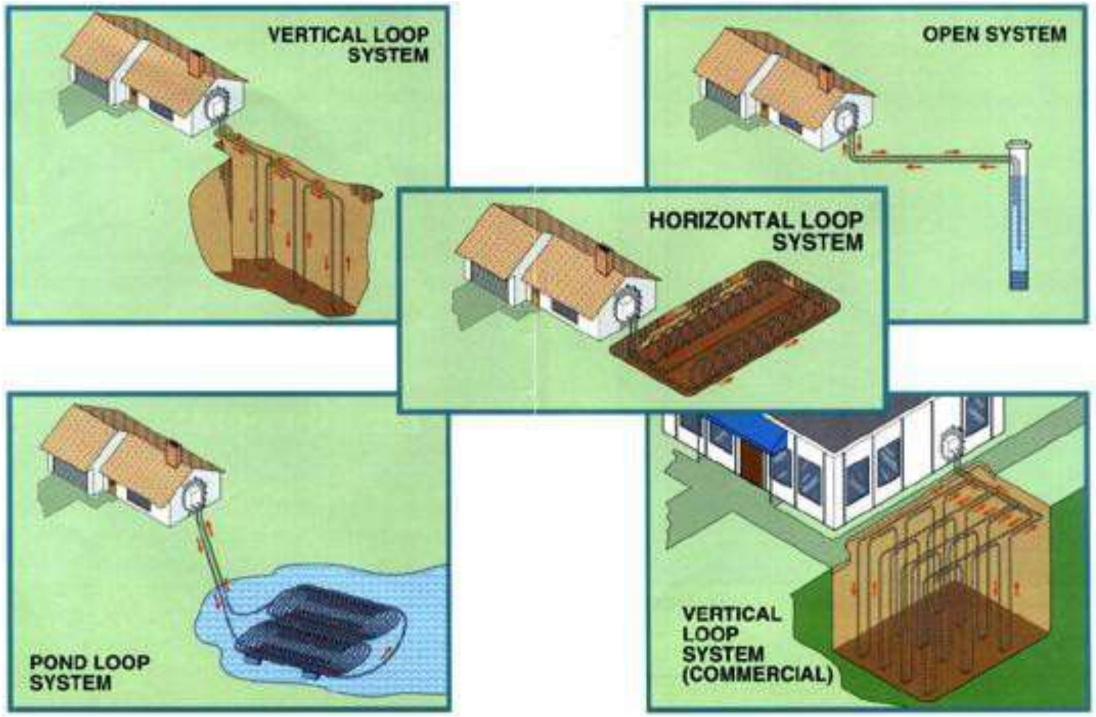
Geothermal energy

Geothermal energy technologies use the heat energy stored in ground; either for direct-use applications, such as using the ground's heat to defrost a driveway or indirectly using it with additional equipment, such as a geothermal heat pump. Most commercial installations couple a heat pump with the ground to upgrade the low-grade heat from the ground or ground water to a higher- grade heat, where it can be used for heating purposes.

The suitability of a ground source system depends heavily on the type of earth coupling heat exchange system used:

Ground source earth coupling options

The right choice of appropriate heat exchanger depends on several factors, such as the size of space heating/hot water system, available site area for the heat exchangers and local ground conditions. Due to the specialist nature of this technology, we recommend that a specialist is employed to size the heat exchangers based on a desktop study of the site's geological conditions – this is normally required in advance of any other contractor appointment.



The main types of ground source heat exchangers are as follows:

Vertical closed loop system

This is a frequently used and simple ground source heat exchanger for small to medium-sized projects. The system is made up of vertically-drilled boreholes, usually up to 100 metres deep, into which two polyethylene pipes with a U-shape connector at the base of the hole are inserted. This effectively provides flow down to the bottom of the hole and back up to the surface.

All flow and return loops are connected together across the site, completing the entire heat exchange loop. Water is pumped around the loop and is then circulated around the heat pump to achieve the required heat exchange. The distance between boreholes is dependent on ground conditions, but is typically a minimum of a 6m x 6m grid, which prevents overlapping of the heat exchange process between loops.

Horizontal closed loop system

Horizontal closed loop heat exchangers are usually applied to small projects, such as individual houses that usually require a relatively low heat output. Consisting of horizontal trenches between 1.5 - 2 metres deep, with either straight pipes or 'slinky' coiled pipes, they require significant excavation work and significant site area to achieve appreciable outputs that are not normally suitable for medium to large projects.

Vertical open borehole system

A further option is a vertical open borehole system. The system involves the abstraction and discharge of natural ground water using boreholes into which pumps are inserted and connected to collapsible pipework. Each borehole pump extracts ground water, circulates it around the heat pump and then discharges the water back to the ground via an absorbing well, some distance from the original abstraction borehole.

The system is capable of providing very high rates of heat exchange for a relatively small number of boreholes, which makes it very efficient in terms of site area required. However, this depends greatly on the availability of ground water, which in turn, varies according to location.

A major downside of this system is that the extraction of water from deep boreholes via pumps consumes a lot of energy, as the water has to be physically lifted to the surface by the pump. This reduces the carbon emissions saved by this system as a whole.

Ground source heat exchange options in summary:

Vertical loop system – closed boreholes

- Moderate heat capacity
- Relatively low installation cost

Vertical open system - open boreholes

- High heat capacity
- High running energy
- High installation cost

Horizontal loop system – straight pipes

- Low capacity
- High installation cost
- Extensive ground excavation work

Horizontal coiled loop system – 'slinky' pipes

- Good capacity
- Low installation cost
- Extensive ground excavation work

Heat pumps

Heat pumps are basically refrigeration units that work in reverse. Instead of cooling being produced and heat rejected, the unit produces heat and rejects cooling. Conventional heat pumps use air as the medium to reject the cool air to atmosphere. Ground source units use the ground as a means of improving the unit efficiency because the ground is a constant 11-13 °C at depths of 50m down. This suits the heat pump much better during the coldest weather than the extremes of air temperature. Reversible heat pumps can also be used for cooling, however this is not being considered for this project.

A heat pump consumes electrical power to drive the compressor and other ancillary elements. The ratio between total energy input and heat energy output of the heat pump is a measure of its efficiency, usually referred to as Coefficient of Performance (COP). A ground source heat pump has a higher COP than an air-cooled heat pump and this additional energy is effectively the ground's natural contribution to the system.

The heat produced by a heat pump is typically used to either provide space heating, for instance, to underfloor heating or radiators, or the heat is used to generate domestic hot water via a storage vessel.

CHP

Combined Heat and Power (CHP) is a process that involves the simultaneous generation of heat and electricity. Any heat that is generated is harnessed via heat recovery equipment. Large commercial size CHP is now fairly common in premises that have a simultaneous demand for heating and electricity for long periods, such as hospitals, recreational centres and hotels. In addition, small CHP systems are now becoming available for individual houses, group residential units and small, non-domestic premises. Compared with using centrally-generated electricity supplied via the grid, CHP can offer a more efficient and economic method of supplying energy demand, if installed and operated appropriately. This is due to the utilisation of heat that is normally rejected to the atmosphere from central generating stations, and by reducing network distribution losses from local generation and use.

Generated heat is used for space and water heating and additional heat storage may be used to lengthen use periods, assist in warm-up and improve overall energy efficiency. For overall good energy efficiency, as with all CHP, usage must be heat-demand led. A sophisticated control system is therefore required and users should be made aware of efficient operating practices.

Solar thermal collectors

Solar thermal collectors (flat plate or evacuated tubes) convert solar thermal energy into heat for hot water generation. They are usually located on South facing roofs at a slope of 45 degrees. Solar collectors that have been properly sized and designed provide approximately 50% of annual hot water demand.

For example, approximately 35m² flat plate solar collectors at a cost of £24,000 generates around 11MWh of hot water resulting in 10% carbon savings.
However, if a CHP unit is used for hot water generation then solar collectors will be redundant.

Photovoltaic

Photovoltaic modules convert sunlight directly into direct current (DC) electricity and can be integrated into buildings. Photovoltaics (PVs) are distinct from other renewable energy technologies since they have no moving parts to maintain and are silent. PV systems can be incorporated into buildings in various ways - on sloped roofs and flat roofs and in façades, atria and shading devices. Modules can be mounted using frames or they can be fully incorporated into the actual building fabric. For example, PV roof tiles are now available that can be fitted in place of standard tiles.

Currently, a PV system costs between £1,500 and £2,500 per kWp. Part of the cost can be offset through the displacement of conventional cladding material. Costs have fallen significantly since the first systems were installed in the 1980s and are predicted to fall further still.

While single crystal silicon remains the most efficient flat plate technology (15– 16% conversion efficiency), it also has the least potential for cost reduction. PV cells made from poly-crystalline silicon have become popular as they are less expensive to produce, although they have a slightly lower efficiency.

Thin film modules are constructed by depositing extremely thin layers of photosensitive materials on a low-cost backing, such as glass, stainless steel or plastic. As far less semiconductor material is required than for crystalline silicon cells, material costs are potentially much lower.

Efficiencies are much lower, around 4–5%, although this can be boosted to 8–10% by depositing two or three layers of thin film material. Thin film production also requires less handling, as the films are produced as large, complete modules and not as individual cells that have to be mounted in frames and wired together. Hence, there is the potential for significant cost reductions when producing in volume.

Wind energy

Wind power is the most successful and fastest-growing renewable energy technology in the UK, with many individual and group installations of varying size, capacity and location. Traditionally, turbines are installed in non-urban areas and there is a strong trend for large offshore wind farms. In comparison with the design and development of ever-bigger machines that are deemed to be more efficient and cost-effective, it is increasingly becoming recognised that smaller devices installed at the point of use, i.e. urban settings, can play an important role in reducing carbon emissions if they become mainstream.

At present, there is a wide range of available off-the-shelf wind products, many manufactured in the UK and EU, with proven good performance and durability. The dominant type is horizontal axis wind turbines (HAWT), which are typically ground-mounted. Vertical axis wind turbines (VAWT) have limited market presence and there is a trade-off between lower efficiency and potentially higher resistance to extreme conditions. Capacity ranges from 500W to more than 1.5MW, but for practical purposes and particularly in built-up areas, machines of more than 1kW and below 500kW are likely to be considered.

Wind technology is also currently one of the most cost-effective renewable energy technologies, which is attributable to the large scale of installations reducing the unit output cost. Individual building or community wind projects, although smaller, have the advantage of feeding electricity directly into the building's electricity circuit, thus sparing costly distribution network development and avoiding distribution losses.

The output largely depends on the wind speed and the correlation between the two is a cube function. This means that in short periods of above average wind speeds, the generation increases exponentially. As a result, it is difficult to make precise calculations of the annual output of a turbine, but average figures can provide useful guidance to designers and architects. In reasonably windy areas (average wind speed of 6m/s) the expected output from 1kW installed is about 2500kWh annually.

The cost per kW installed varies considerably by manufacturer and size of machine, with an indicative bracket of £2,500–£5,000. With a lifespan of more than 20 years, wind turbines can save money, providing the design and planning is carried out robustly.

Building-integrated wind turbines is starting to become more of a reality in the UK however, potential projects may face difficulties with obtaining planning permission. There are now a few examples of permitted development rights for certain rooftop turbines in some local councils. A number of horizontal axis devices specifically designed for building integration are now available commercially, having design and reliability parameters relevant to the urban context. Building-mounted vertical axis devices are under development.

At present, turbines installed near buildings, as well as community installations for groups of buildings, should be regarded as the larger wind energy source related to buildings, when they contribute to the carbon emissions from these premises using 'private wire' networks. However, the contribution of several building-integrated turbines in a development is likely to become significant in the next few years.

Appendix F – United Nations Sustainable Development Goals

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and in the future. (*Source: https://sustainabledevelopment.un.org*)

At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

Today, the Division for Sustainable Development Goals (DSDG) in the United Nations Department of Economic and Social Affairs (UNDESA) provides substantive support and capacity-building for the SDGs and their related thematic issues.

It includes water, energy, climate, oceans, urbanisation, transport, science and technology, the Global Sustainable Development Report (GSDR), partnerships and Small Island Developing States.

Follow DSDG on Facebook at www.facebook.com/sustdev and on Twitter at @SustDev.

DSDG plays a key role in the evaluation of the UN system-wide implementation of the 2030 Agenda and on advocacy and outreach activities relating to the SDGs. In order to make the 2030 Agenda a reality, broad ownership of the SDGs must translate into a strong commitment by all stakeholders to implement the global goals. DSDG aims to help facilitate this engagement.

Appendix G – Home Quality Mark

Home Quality Mark (HQM) helps to demonstrate the high quality of a home and its sustainable credentials. At the same time, it will give house holders the confidence that the new homes are well designed, built, and cost effective to run.

The HQM will do this by providing impartial information from independent experts on a new home's quality. It indicates to householders the overall expected costs, health and wellbeing benefits, and environmental footprint associated with living in the home. Developed by Building Research Establishment (BRE), the Home Quality Mark is part of the BREEAM family of quality and sustainability standards, which assesses all stages of the projects to provide greater clarity on the home performance.

What is HQM?

HQM is a simple but reliable 5-star rating system that allows:

- Consumers to compare new homes in terms of their running costs and environmental footprint, as well as comparing the health and wellbeing. It helps making informed decisions.
- To evaluate new homes operations and set them apart from others by supporting performance claims and explaining the benefits of new homes.
- Public and private sector landlords to set priorities and monitor performance against these priorities throughout the design, construction operational phases, making sure that the properties meet expectations and tenants' current and future needs.
- The financial service providers accurately reflect their lending or affordability criteria. This helps to guide lending decisions by taking into account the reduced operational costs for customers living in better-performing homes.
- Reassures planners, designers, communities and other stakeholders that objectives relating to sustainability and quality of developments are being achieved and robustly monitored.

What HQM Measures?

Delivery: The quality assessment of the design and construction in practice.

Our Surroundings: The value of the local area and ability to work with current and future environment.

My Home: The provision of living spaces that are comfortable, healthy, cost effective and have reduced

Appendix H – Passive House - Low Energy and Healthy Buildings

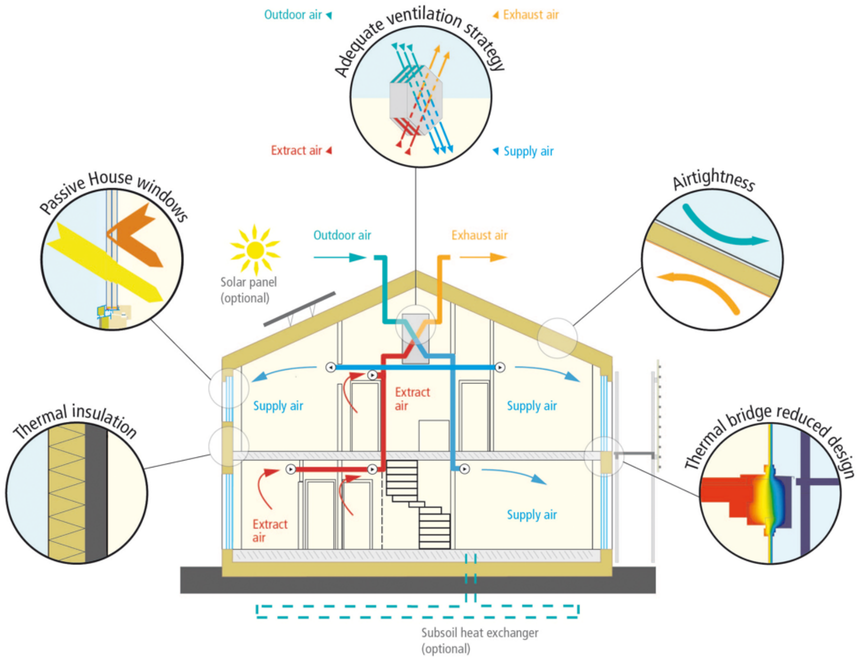
Passive House is a standard and a scientific design tool designed to achieve exceptionally comfortable and healthy living and working conditions combined with low energy demand and minimal carbon emissions.

Passive House does not dictate any particular construction system. Indeed, practically any construction system can be used and adapted to achieve Passive House, though each will have its own advantages and challenges for any particular project.

What is Passive House?

A Passive House can reduce its energy demand by up to 90% compared to ordinary buildings and, combined with on-site or local energy systems. Affordable comfort and health are important for Passive Houses. They provide warm and dry spaces in winter and cool, and fresh air in the summer. Initial costs are outperformed by the lower running costs and financial security since a Passive House is not really affected by the increasing energy costs.

The embodied energy is complementary and compatible with a Passive House. It means that a passive house uses less materials, the materials have lower impact, there is consideration to low carbon industrial processes by using material that absorb carbon and are locally sourced. The air quality and health of building users are also considered in a Passive House. The CO_2 emissions are balanced well through ventilation systems.



Key Elements of a Passive House

The main focus of a Passive House is to minimise the requirement for space heating and cooling via high-specification fabric, and hence achieve low overall energy demand.

Passive House informs and influence every aspect of the design approach and choice of construction system. This should not be seen as limiting creativity of design nor as restricting what construction systems to adopt. To achieve an economic solution, Passive House must be understood and integrated into the design approach and system choice from the outset.

Appendix I – SAP Calculation Reports

The reports extracted from our approved SAP software start on the next page.

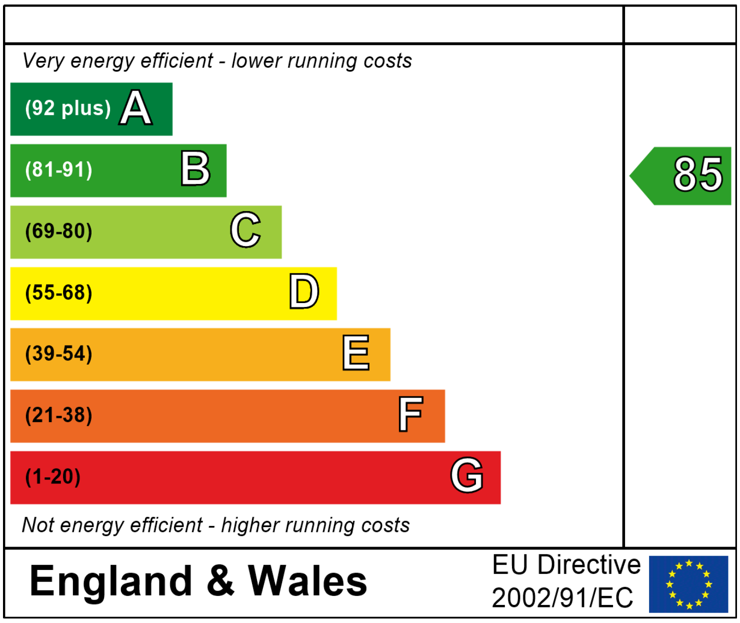
Predicted Energy Assessment

7 ELVETHAM ROAD		Dwelling type:	Mid floor Flat
FLEET		Date of assessment:	24 November 2020
FLEET		Produced by:	Thiago Haberli
GU51 4QL		Total floor area:	62 m²

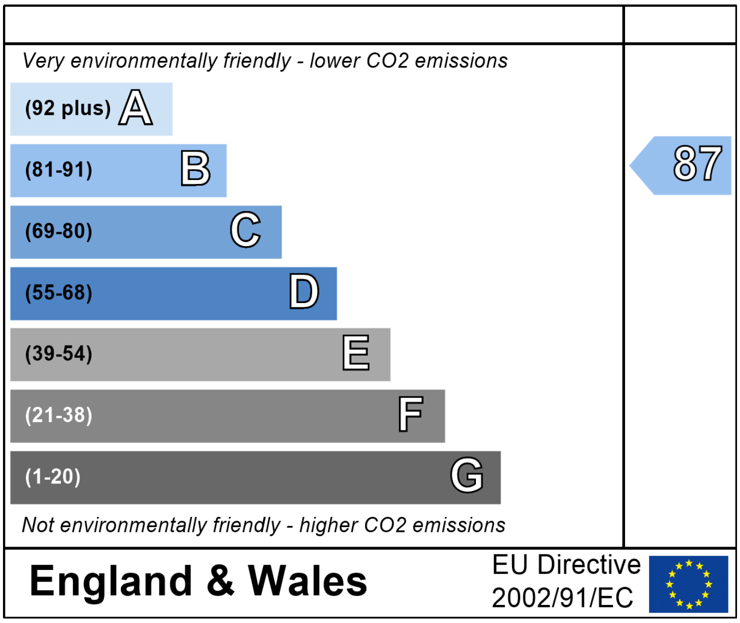
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home’s impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

Predicted Energy Assessment

7 ELVETHAM ROAD
FLEET
FLEET
GU51 4QL

Dwelling type: Mid floor Flat
Date of assessment: 24 November 2020
Produced by: Thiago Haberli
Total floor area: 60 m²

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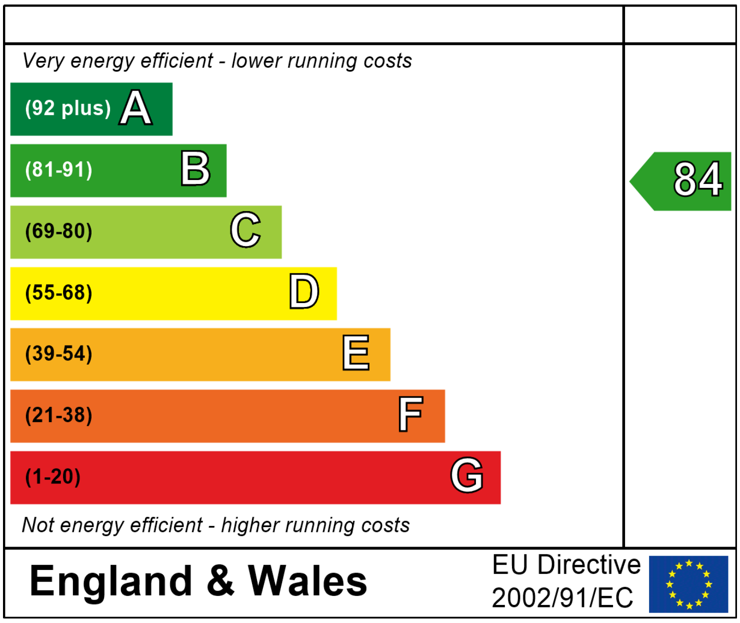

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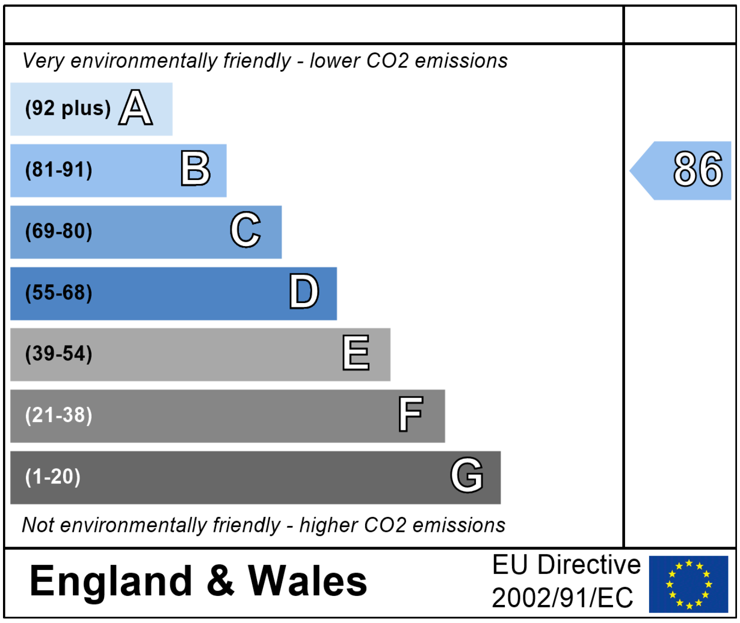

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Predicted Energy Assessment

7 ELVETHAM ROAD
FLEET
FLEET
GU51 4QL

Dwelling type:	Mid floor Flat
Date of assessment:	24 November 2020
Produced by:	Thiago Haberli
Total floor area:	61 m²

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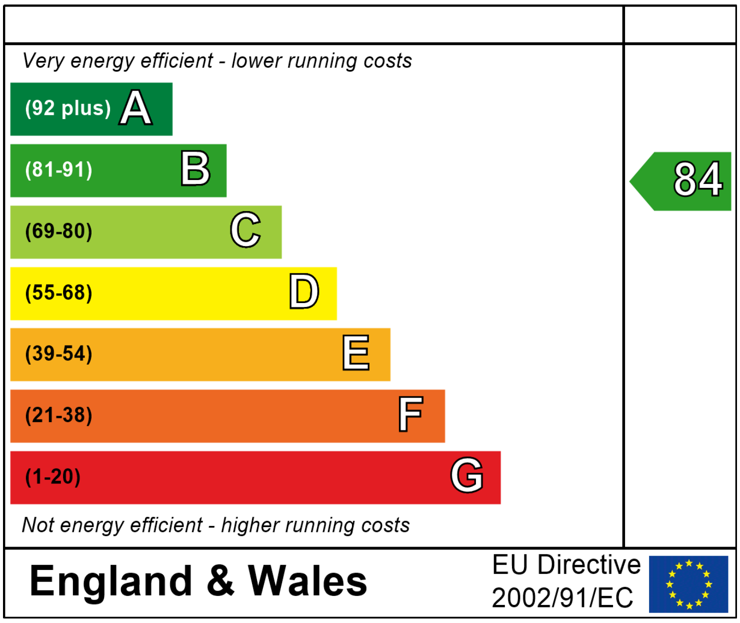

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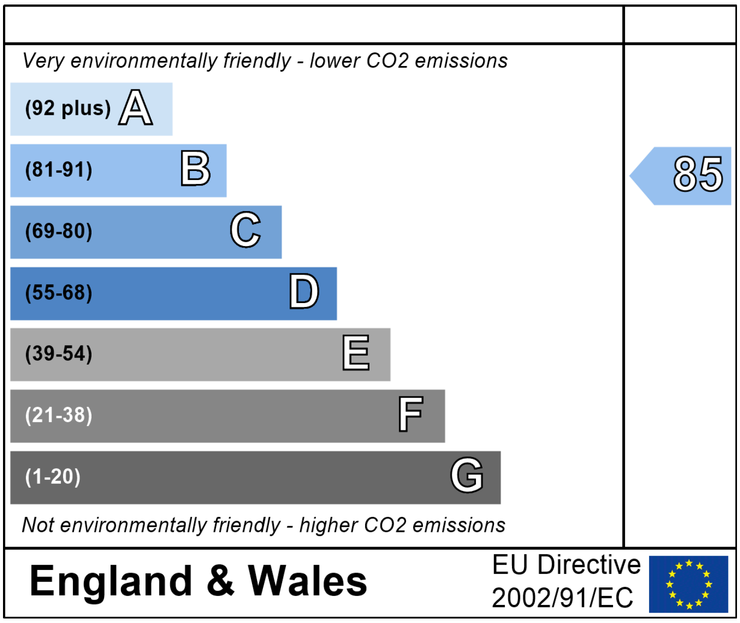

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Predicted Energy Assessment

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FLEET
FLEET
GU51 4QL

Dwelling type: Mid floor Flat
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Produced by: Thiago Haberli
Total floor area: 61 m²

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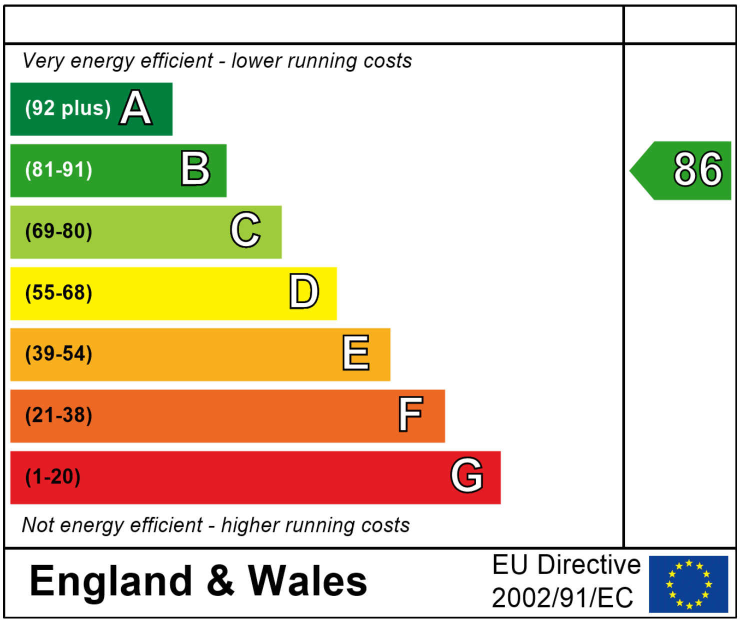

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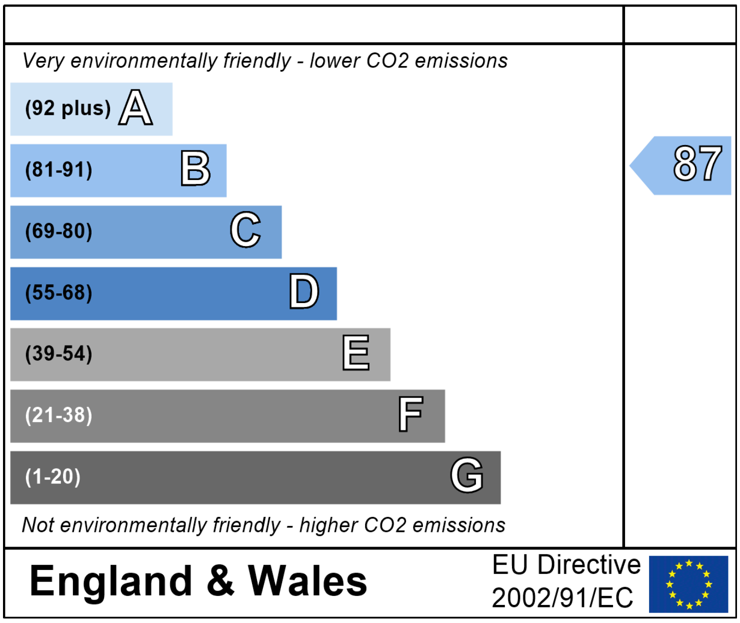

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Predicted Energy Assessment

7 ELVETHAM ROAD
FLEET
FLEET
GU51 4QL

Dwelling type: Mid floor Flat
Date of assessment: 24 November 2020
Produced by: Thiago Haberli
Total floor area: 60.29 m²

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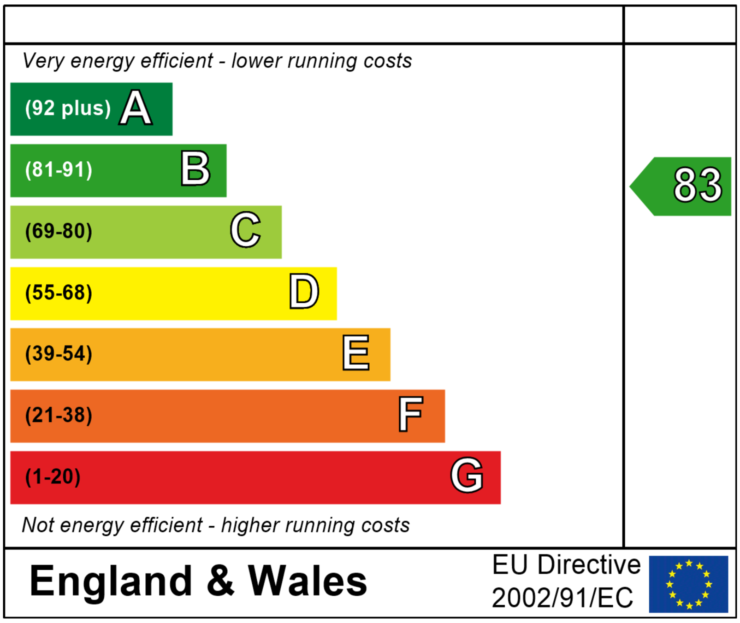

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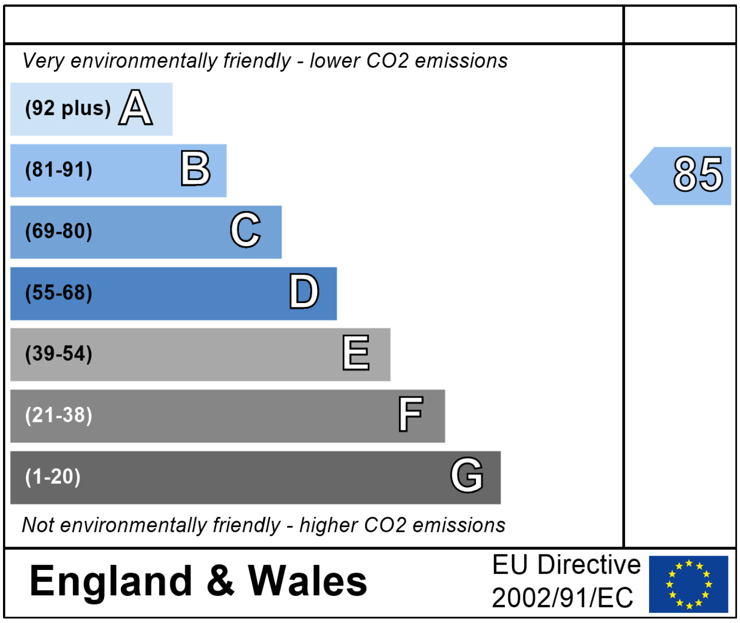

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Predicted Energy Assessment

7 ELVETHAM ROAD
FLEET
FLEET
GU51 4QL

Dwelling type: Ground floor Flat
Date of assessment: 24 November 2020
Produced by: Thiago Haberli
Total floor area: 62 m²

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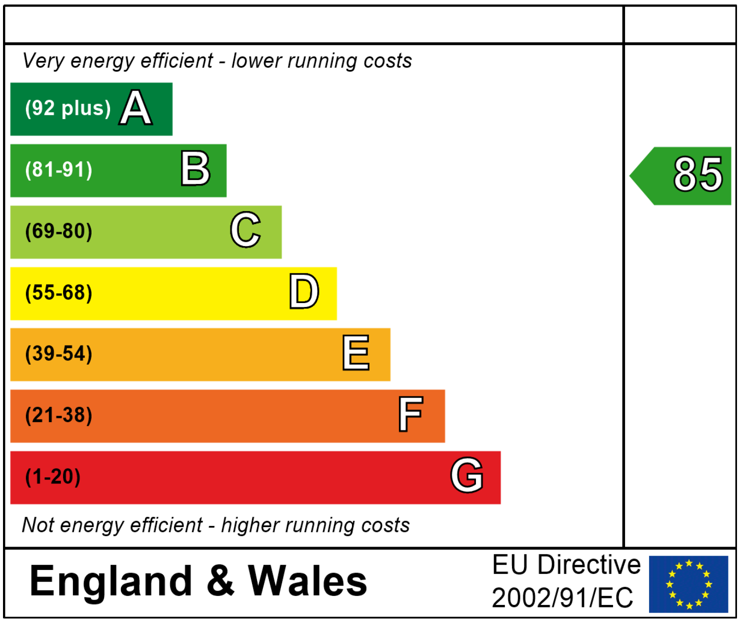

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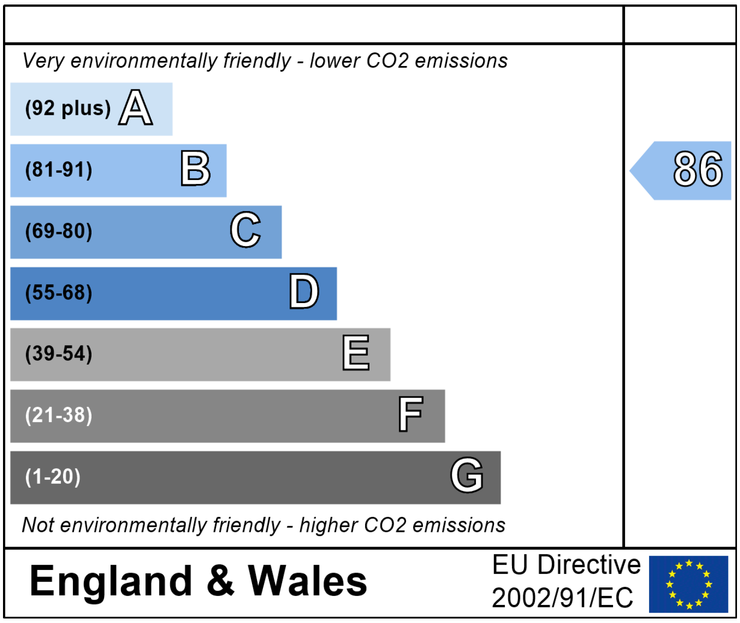

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Predicted Energy Assessment

7 ELVETHAM ROAD
FLEET
FLEET
GU51 4QL

Dwelling type: Ground floor Flat
Date of assessment: 24 November 2020
Produced by: Thiago Haberli
Total floor area: 62.45 m²

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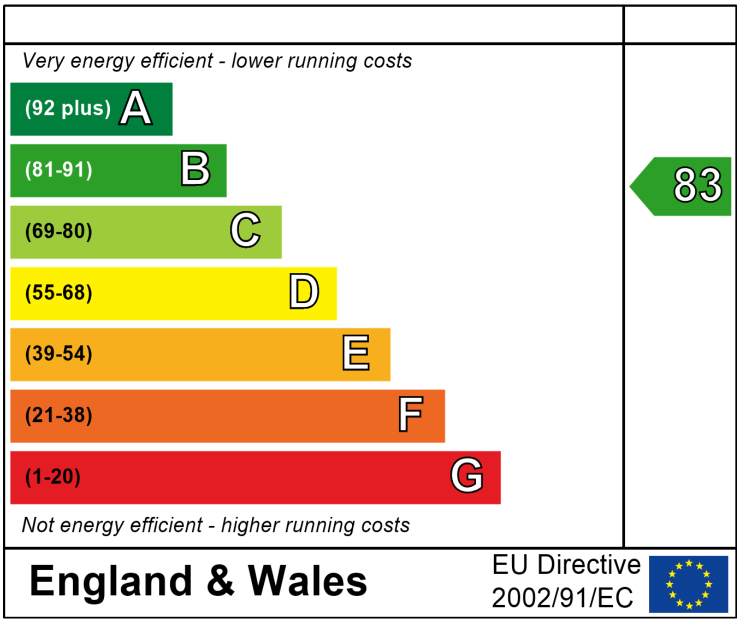

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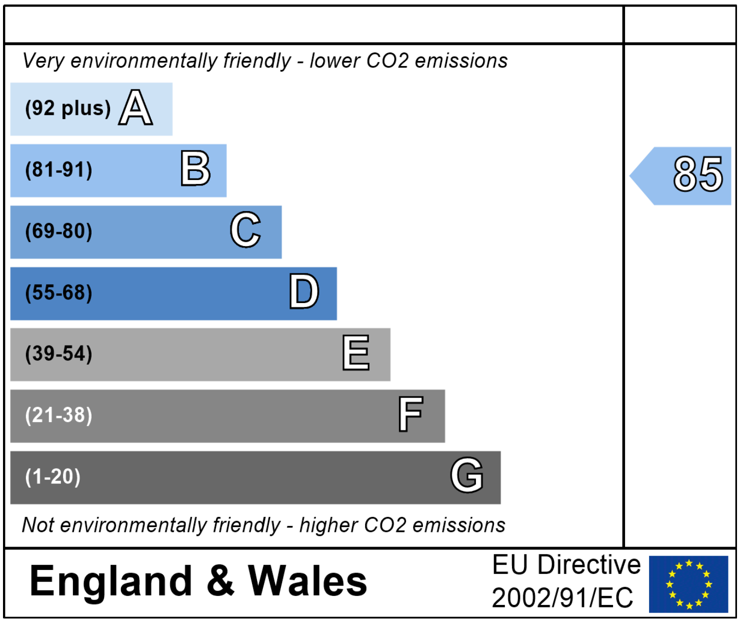

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Predicted Energy Assessment

7 ELVETHAM ROAD		Dwelling type:	Ground floor Flat
FLEET		Date of assessment:	24 November 2020
FLEET		Produced by:	Thiago Haberli
GU51 4QL		Total floor area:	61 m²

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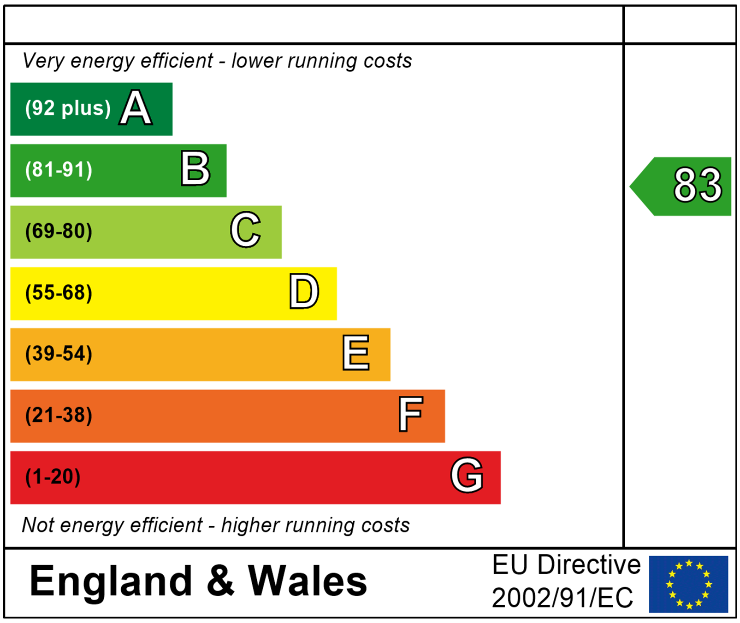

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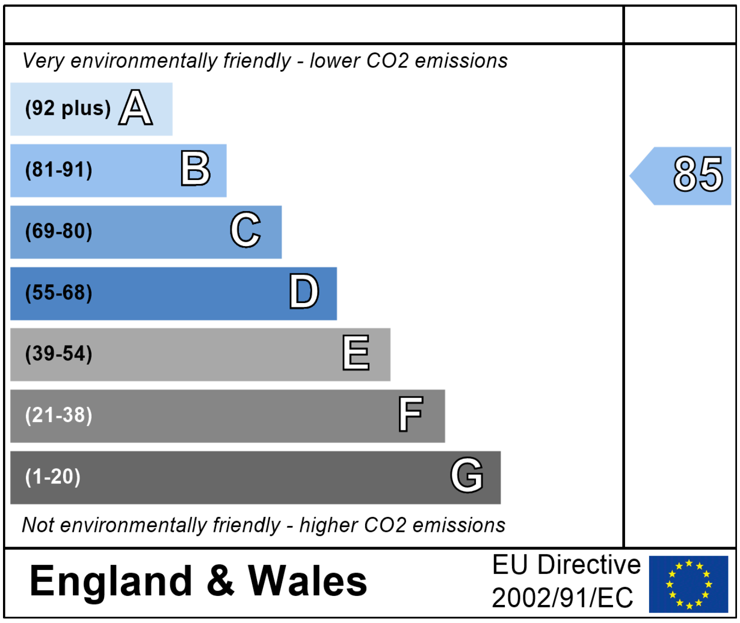

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The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

Predicted Energy Assessment

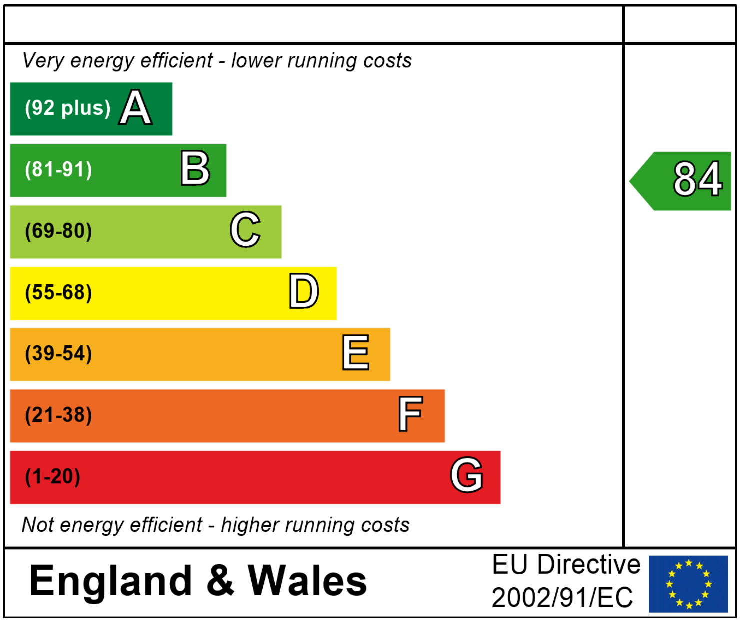
7 ELVETHAM ROAD
FLEET
FLEET
GU51 4QL

Dwelling type: Ground floor Flat
Date of assessment: 24 November 2020
Produced by: Thiago Haberli
Total floor area: 61 m²

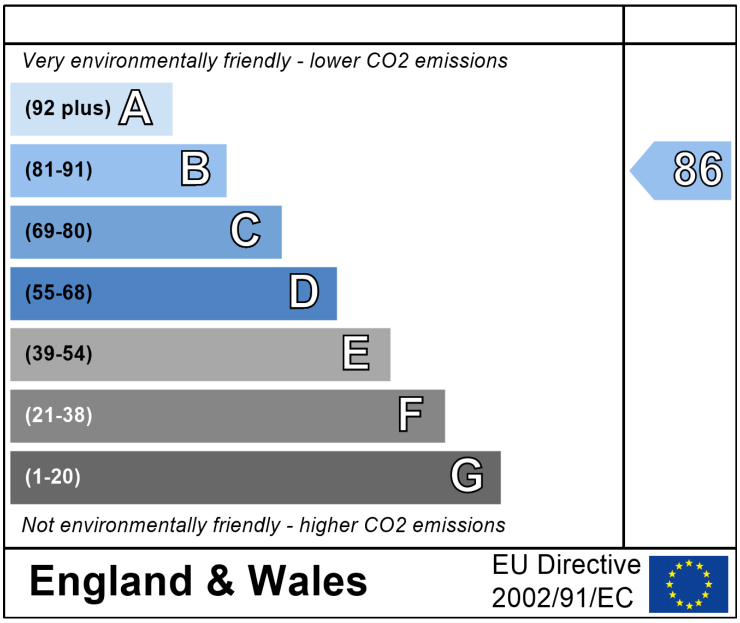
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home’s impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

Predicted Energy Assessment

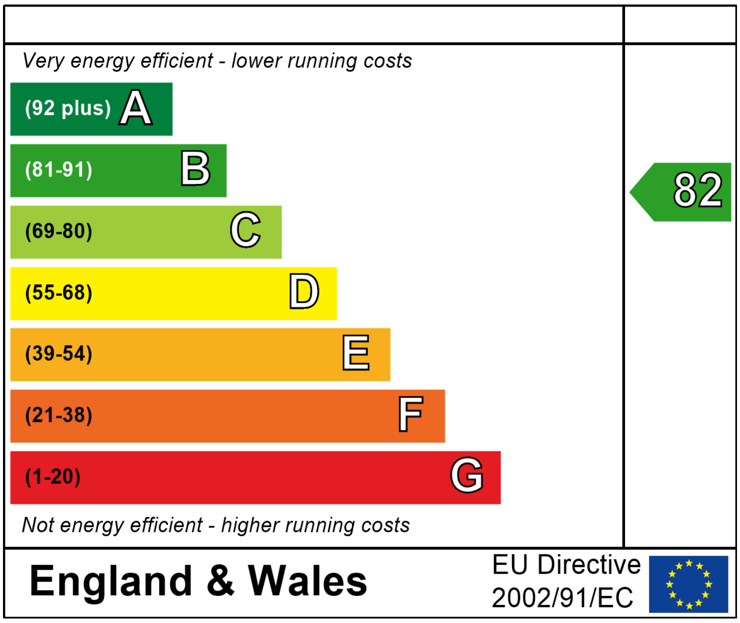
7 ELVETHAM ROAD
FLEET
FLEET
GU51 4QL

Dwelling type: Ground floor Flat
Date of assessment: 24 November 2020
Produced by: Thiago Haberli
Total floor area: 56.55 m²

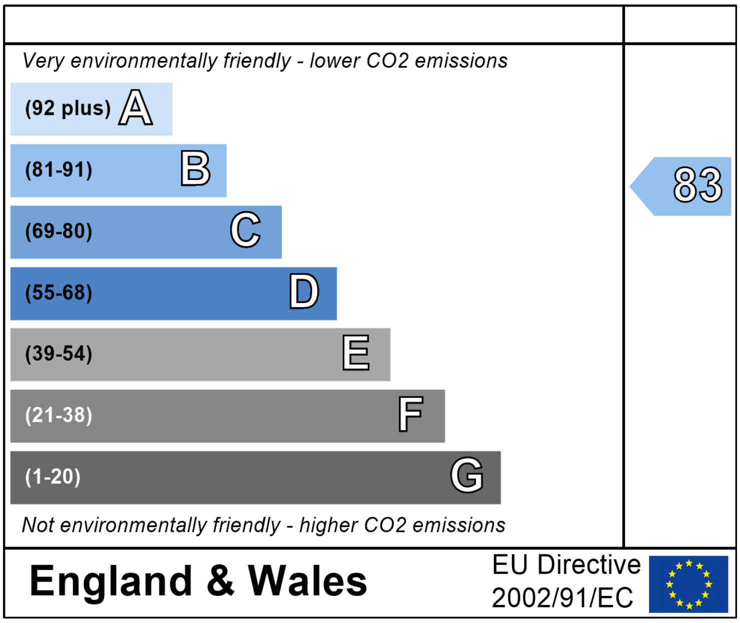
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

Predicted Energy Assessment

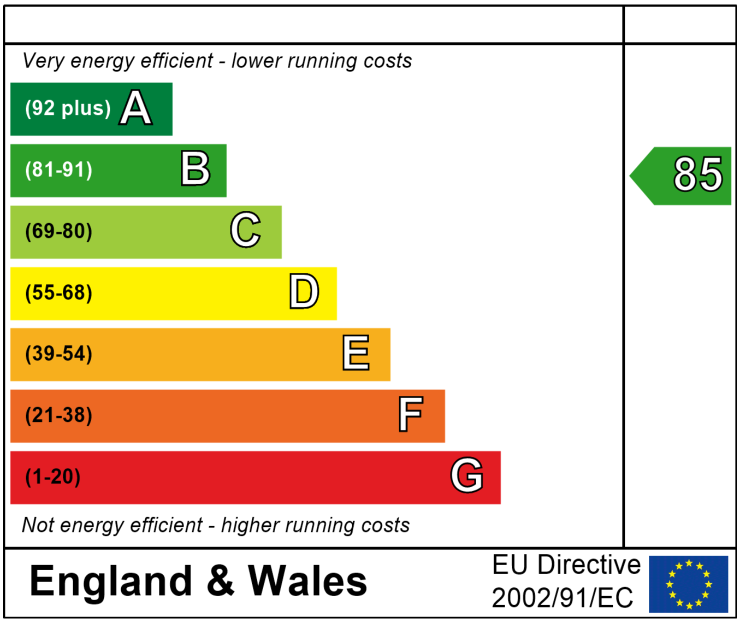
7 ELVETHAM ROAD
FLEET
FLEET
GU51 4QL

Dwelling type: Top floor Flat
Date of assessment: 24 November 2020
Produced by: Thiago Haberli
Total floor area: 63.36 m²

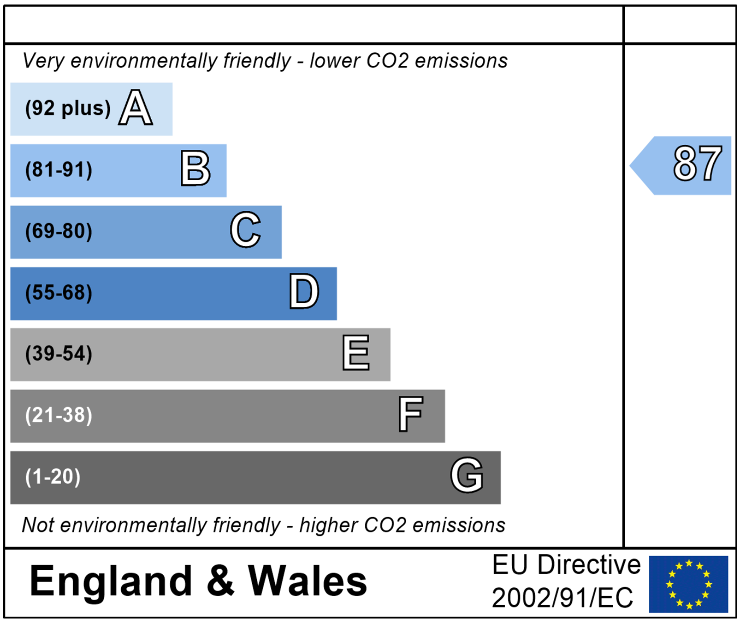
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

Predicted Energy Assessment

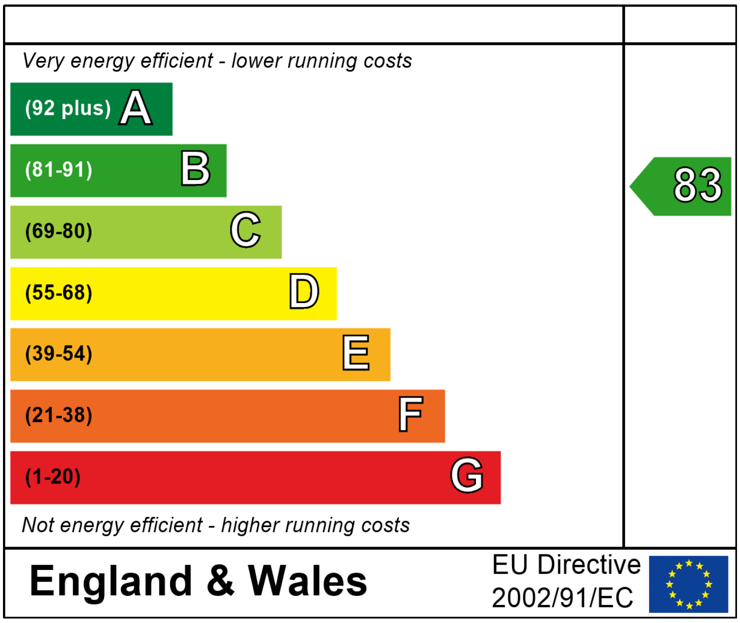
7 ELVETHAM ROAD
FLEET
FLEET
GU51 4QL

Dwelling type:	Top floor Flat
Date of assessment:	24 November 2020
Produced by:	Thiago Haberli
Total floor area:	73.12 m²

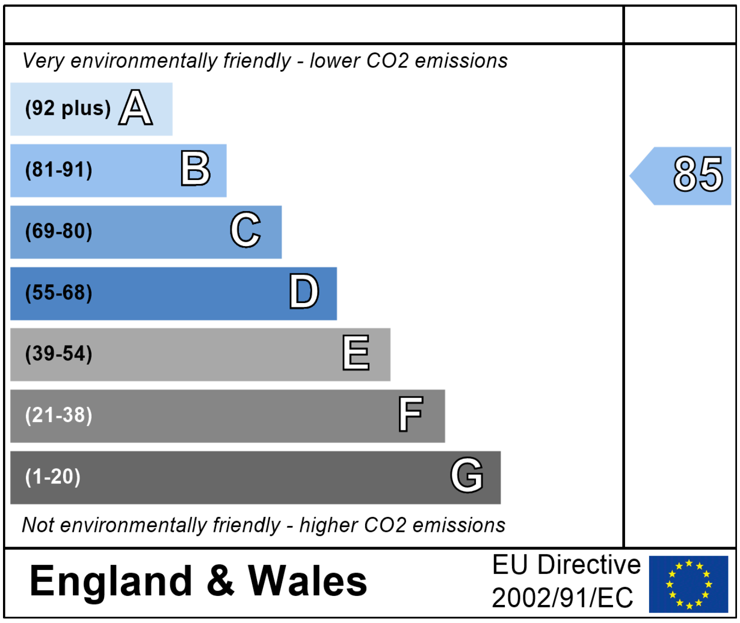
This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



Environmental Impact (CO_2) Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.