Hooke Farm, Effingham Common

Provision of 2 new dwellings

Energy Statement

November 2023

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Contents

Introduction

Pebble Energy have been appointed to produce an Energy Statement to support the planning application for the provision of 2 new-build dwellings at Hooke Farm, Effingham Common.

The Energy Statement will review the heating, cooling and electricity demand for one of the proposed new dwellings to establish the baseline carbon emissions, fabric efficiency and primary energy demand to meet compliance with Guildford Borough Council's Sustainable Design & Construction SPD 2022.

Planning Policy

Climate Change, Sustainable Design, Construction and Energy SPD Factual update

The standards in the Building Regulations 2010 ('the regulations') were amended on 15 June 2022. The changes have an impact on how the following policy and guidance is applied:

1. Local Plan: Strategy and Sites 2015-2034 Policy D2: Climate Change, Sustainable Design, Construction and Energy ('Policy D2'), and

2. The Guildford Climate Change, Sustainable Design, Construction and Energy SPD 2020 ('the SPD').

Building Regulation changes 15 June 2022

Amendments to the regulations and the relevant Approved Documents commenced on 15 June 2022. The changes affected standards in the following areas.

Ventilation.

Energy and carbon emissions.

Electric vehicle charging infrastructure.

Overheating. Transition period

Changes to planning application requirements

. 3.1 Applicants should confirm either that the whole scheme will be subject to the 2022 building regulations or, where they fall within the transition arrangements, identify which buildings will be subject to the 2022 regulations and which will be subject to the outgoing regulations. **Buildings that are subject to the outgoing regulations**

. 3.2 Schemes where all the proposed buildings will be assessed under the outgoing regulations should continue to submit information in accordance with Policy D2 and the SPD. **Schemes that are subject to the new regulations**

. 3.3 Schemes where all the proposed buildings will be assessed under the June 2022 regulations will not need to submit some of the information specified in the SPD. See section 4 below. **Schemes that include buildings subject to different sets of regulations**

. 3.4 Due to the transition period, larger schemes may include some buildings that are subject to the outgoing regulations and some that are subject to the new regulations (see section 2 above). In this case, applicants should submit

information in accordance with Policy D2 and the SPD for the buildings that will be assessed under the outgoing regulations, but do not need to submit all the specified information for the buildings that are assessed under the June 2022 regulations. See section 4 below.

4. Buildings assessed under the June 2022 regulations Minimum 20% carbon reduction

. 4.1 The 2010 regulations have been amended several times since they were introduced. In 2013 they were amended to introduce new Target Emission Rates (TER) for new buildings (the TER is the maximum lawful emission rate for a new building). Policy D2 paragraph 9 requires all new buildings (except retail only developments in Guildford town centre) to achieve a carbon emission rate that is at least 20% lower than the 2013 TER.

. 4.2 The June 2022 regulations change the methodology for assessing building performance including by introducing TERs that are around 31% and 27% lower for new homes and non-residential buildings respectively. Planning decision makers can therefore be confident that any buildings that meet the new regulations will have a Dwelling Emission Rate (DER, for homes) or Building Emission Rate (BER, for non-residential buildings) that is at least 20% lower than the TER.

. 4.3 The SPD asks applicants to provide the 2013 TER and DER or BER for each proposed building with supporting SAP or SBEM/DSM assessments. The Council will no longer ask for this information for any proposed building that the applicant confirms is subject to the June 2022 building regulations as this would require applicants to produce a second set of 2013 SAP or SBEM/DSM assessments alongside the 2022 SAP or SBEM/DSM assessments required by the regulations, and the information is no longer needed to demonstrate that the buildings achieve a 20% carbon reduction against the 2013 TER.

. 4.4 However, SAP or SBEM/DSM data using the 2022 methodology must be provided in order to demonstrate compliance with other policy requirements (see next section). **Energy hierarchy**

. 4.5 Policy D2 paragraph 2 requires schemes to follow the energy hierarchy by prioritising carbon reductions firstly through energy demand reduction, then energy efficient building systems, before delivering further reductions through low carbon energy.

. 4.6 While the June 2022 regulations improve the worst allowable values for thermal efficiency, the improvements are modest and buildings built to the new standards may fall short of the efficiencies that have typically been achieved by applying the energy hierarchy. As a result, it is not possible to assume that the energy hierarchy has been followed simply because a scheme complies with the 2022 regulations.

. 4.7 The SPD asks applicants to provide the TER and DER or BER for the proposed buildings assuming a gas boiler as the main heating system in order to provide a baseline for carbon reductions through energy efficiency and low carbon energy. In the past, housing schemes have typically used gas boilers supplemented by solar PV to design buildings that comply with the Policy D2 carbon emission standard, so providing this data has been straightforward.

. 4.8 New homes have increasingly employed heat pumps instead of gas boilers. The commencement of the new regulations and the approaching implementation date for the proposed Future Homes and Future Buildings standards are expected to further increase this shift. Where homes are proposed to be electrically heated, asking for data that shows gas boiler heating as a baseline would require a second set of modelling assessments to be produced. Additionally, the gas boiler baseline becomes less and less relevant and appropriate as normal construction practice moves away from the provision of gas heating.

. 4.9 As a result, the Council will not require modelling with a gas boiler baseline for buildings assessed under the 2022 regulations where the proposed building does not intended to be heated by gas. Instead, the modelling data produced for the building control process can be submitted, but in order to judge compliance with the energy hierarchy, the submitted data must include:

The TER and DER or BER,

The Target & Dwelling Fabric Energy Efficiency (TFEE) and (DFEE)

Proposed u-values for thermal elements,

Proposed air permeability values

Primary Energy use data

Energy Strategy and C02 Emissions

The approach taken for this development will be to achieve at least the minimum improvement over 2021 Part L1 Building Regulations, therefore a fabric-first approach with reduced U-values and passive design measures can be incorporated in conjunction with the use of low - zero carbon technology where appropriate to achieve the new standards required under Approved Document 2021 Part L.

Fabric insulation standards including glazing and air-tightness will exceed current Building Regulations Part L standards.

Proposed U-values and Fabric Standards

Proposed	Minimum Standards
Floor – 0.12w/m2K	0.18w/m2K
Walls – 0.18w/m2K	0.26w/m2K
Roof – 0.11w/m2K	0.16w/m2K

- Attention will be paid to minimise thermal bridging and air-leakage at junctions by adopting the appropriate Accredited Construction Details.
- 100% of new internal fixed lighting and external lighting will be low energy.
- Air-Source Heat Pumps will be installed to deal with the heating and hot water demand.
- Space heating to have advanced heating controls including zoned time and temperature controls.
- Where provided, all white goods will be A-rated energy efficient.
- Double glazing will be argon-filled, low-e with a proposed U-value of 1.2w/m2K.
- The dwellings will have a design air-permeability figure of 5m3 (h.m2) at 50Pa.
- The proposed dwellings will have a daily water usage figure of no greater than 110ltrs per person per day.
- Orientation of the dwellings and the location and aperture of the windows has been designed for solar gain to reduce heating requirements where possible.

Materials

Consideration will be given to using materials and construction methods that have a low environmental impact such as those achieving an A rating under the BRE Green Guide. Where possible, materials will be selected that have been responsibly sourced (such as FSC timber) recycled or reclaimed.
All insulation materials will have a GWP (Global Warming Potential) of 5 or less.

Water Use

Indoor water use will be restricted by use of fittings with lower flow rates, baths with smaller capacity, dual-flush toilets, washing machines and dishwashers with low water usage.

Sanitary ware, fittings and appliances will be specified as follows to achieve a daily water usage target of no greater than 110 ltrs per person per day to promote water conservation and efficiency measures in all new developments.

Proposed sanitary ware, fittings and flow rates:

Basin taps	5 l/m
Shower valves	8 l/m
Kitchen taps	8 l/m
Bath capacity	150 ltrs
WC dual flush	5/3 ltrs
Washing machines	8 kg load
Dishwasher	0.92 ltrs per place setting

Waste and Recyling

Construction site waste is to be minimised (diverted from landfill) by re-using materials on site (or to/from other sites), returning to the supplier where possible and practical, recovery and recycling, and composting. Hazardous waste will be avoided or minimised where unavoidable.

The kitchen will incorporate fixed bins in the cupboards to encourage recycling and a dedicated area outside will accommodate the refuse and recycling facilities.

Health & Wellbeing

Key rooms have good levels of day-lighting and décor so that the need for artificial lighting will also be reduced.

To ensure the dwellings are usable and adaptable for all potential existing and future owners or occupiers, as many as possible/practical of the Lifetime Homes criteria will be incorporated into the design and construction of the dwellings.

Management

Home user guidance will be provided to the end owner/occupier of the dwelling providing information on the correct, safe and efficient use of their home.

Low and Zero Carbon Technology

The following listed technologies are representative of products that could be implemented on the site to assist in achieving a reduction in CO2 emissions.

Photovoltaics

Photovoltaic panels convert solar radiation into direct current electricity. In principle they are an ideal source of renewable energy as they harness the most abundant source of energy on the Earth. They produce energy from the sun which is converted to electricity being the most useful form of energy.

Photovoltaics are silent in operation, have no moving parts and have a long life span with low maintenance levels. Photovoltaic systems can be connected to the grid or battery arrays in remote locations. Grid connection systems consist of photovoltaic arrays connected to the grid through a charge controller and an inverter.

Photovoltaic cells are more efficient at lower temperatures so good ventilation should be allowed around the modules where possible. Overshadowing and shading reduce energy production and in order to maximize energy output, the modules should be positioned facing south at a 35 degree angle. Output is measured in kWp (kiloWatts peak) being the maximum output a module will produce under standard test conditions.

As photovoltaics are installed usually on the roof of a building, there is no issue relating to use of space and land. They are also completely silent in operation and systems have a typical life expectancy of up to 30 years.

Solar Thermal Panels

Solar Thermal Panels collect solar radiation to heat water that can then be used for either space heating or domestic hot water. There are two types of competing solar thermal technologies; flat – plate and evacuated tube. In summary, evacuated tube collectors are more efficient and therefore require less active collector array than the equivalent output of a flat plate system. However, in general, capital costs for the two technologies are comparable.

The system consists of solar collectors that are often roof mounted. Water is passed through the solar collectors and then to a heat exchanger in a domestic hot water cylinder, which will also have a top up emersion heat option. (gas, biomass or electricity) to ensure reliability of supply.

Solar thermal collectors can still produce energy from diffuse sunlight and are therefore less susceptible to performance reductions from orientation and angle compared to photovoltaics. A typical 3 – 4 sqm collection are system (area dependent on technology) is capable of providing 50% of the annual domestic hot water demand for a typical 2 – 3 bedroom residential dwelling. The proportion of hot water provided varies over the course of a year, with the system achieving 100% during the summer months and 5% during the winter. A typical system of this scale costs in the region of around £2,500 - £3,500 per dwelling. Note that there are an increasing number of solar pre-heat systems for use with combination-boilers available on the market. These reduce the cylinder volume requirement and can therefore be integrated into more dwellings. Similar to photovoltaics, there is no authoritative data on the embodied energy and carbon associated with the production, transport and installation of solar thermal systems. However, research suggests that the carbon payback period for the systems is in the region of 1 - 2 years where off-setting mains electricity and 3 - 4 years where off-setting mains gas. There is no land use or noise issues with solar thermal systems.

Heat Pumps

Heat pump systems are used to transfer heat energy from a source area to a target area. In domestic terms the target area is the heating system within the house. A small amount of electricity is required to power the system but in energy terms this input is greatly outweighed by the heat gained. These systems can usually only produce relatively low temperatures and so are best suited to installations such as under-floor heating. They can usually work around the clock and in virtually all weather conditions. The technology of all of the systems is broadly similar. The main variation comes with the chosen heat source as each source requires a different method for capture.

Ground Source

A ground source heat pump takes warmth from the ground either by way of buried coiled pipework or via a deep borehole. A coiled system is usually cheaper and simpler to install but requires a large expanse of land whereas a borehole is more space-efficient but is usually more costly. Boreholes tend to be better suited to larger developments as this reduces the impact of the greater capital cost. Due to the limited seasonal fluctuation in below-ground temperatures these systems can be effective throughout the year.

Air Source

Air source systems are located above ground and extract heat directly from the air around the units. They are most effective above freezing point but can usually still operate to several degrees below zero, albeit to significantly lower efficiency levels. They are generally considered to be a very cost effective option with low carbon emission output.

Biomass

Biomass boilers are generally highly efficient. A suitably sized system could easily serve the entire heating and hot water needs of the proposed house. A common concern to consider with Biomass is that the boilers require an adjacent fuel store and so the systems tend to require a significant amount of dedicated space.
We also note that the capital cost of any such installation tends to be prohibitively high and regular maintenance is also required to avoid faults developing.

SAP 2021 Calculation (draft)

A draft SAP calculation has been produced for plot 1 incorporating the fabric elements and U-value targets set out in 'Energy Strategy' section of this document combined with an Air Source Heat Pump to deal with the heating and hot water in the proposed dwelling. The results that relate to the guidance set out by Guildford Borough Council's Planning Policy SPD 2022 are as follows:

Carbon Emissions

Dwelling	Size m2	Target Emission Rate	Dwelling Emission Rate	Reduction
Plot 1	168	12.95 kg/CO2year	4.88 kg/CO2year	8.07 kg/CO2year
			DER<TER	**62.32%**

Primary Energy

Dwelling	Size m2	Target Primary Energy	Dwelling Primary Energy	Reduction
Plot 1	168	71.42 kWh/m2	50.47 kWh/m2	20.95 kWh/m2
			DPER<TPER	**29.33%**

Fabric Efficiency

Dwelling	Size m2	Target Fabric Efficiency	Dwelling Fabric Efficiency	Reduction
Plot 1	168	72.5 kWh/m2	68.8 kWh/m2	3.7 kWh/m2
			DFEE<TFEE	**5.03%**

Conclusion

The draft SAP assessment on plot 1 undertaken using SAP 2021 Approved Document Part L methodology demonstrates that proposed dwelling is achieving compliance with regards to Carbon Emissions reduction, Primary Energy reduction and Fabric Efficiency reduction in accordance with the requirements of Guildford Borough Council's Planning Policy SPD 2022.

Report by:

Nick Gill
DipDOCEA, CfSH Assessor, BPEC & ATTMA Engineer.

Appendix 1

Draft SAP Calculations & Predicted EPC

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Wed 15 Nov 2023 17:41:01

Project Information			
Assessed By	Nick Gill	Building Type	House, Detached
OCDEA Registration	EES/027324	Assessment Date	2023-11-15

Dwelling Details			
Assessment Type	As designed	Total Floor Area	168 m^2
Site Reference	Plot 1	Plot Reference	2935
Address	Plot 1 Hooke Farm, Effingham Common		

Client Details	
Name	Runnymede Homes
Company	Array
Address	182 Brooklands Road, Weybridge, KT13 0RJ

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*12.95 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	4.88 $kgCO_2/m^2$	**OK**
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*71.42 kWh_{PE}/m^2*	
Dwelling primary energy	50.47 kWh_{PE}/m^2	**OK**
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*72.5 kWh/m^2*	
Dwelling fabric energy efficiency	68.8 kWh/m^2	**OK**

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**Element with highest individual U-Value**	
External walls	*0.26*	0.18	Walls (1) (0.18)	**OK**
Party walls	*0.2*	N/A	N/A	**N/A**
Curtain walls	*1.6*	N/A	N/A	**N/A**
Floors	*0.18*	0.12	Ground floor (0.12)	**OK**
Roofs	*0.16*	0.11	Roof (1) (0.11)	**OK**
Windows, doors, and roof windows	*1.6*	1.2	North facing openings (1.2)	**OK**
Rooflights	*2.2*	N/A	N/A	**N/A**

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	**Net area [m^2]**	**U-Value [W/m^2K]**
Exposed wall: Walls (1)	196	0.18
Exposed wall: Walls (2)	37.64	0.18
Exposed wall: Walls (3)	3.8	0.18
Ground floor: Ground floor, Ground floor	168	0.12
Exposed roof: Roof (1)	295	0.11

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
North facing openings, window	36	North	0.7	1.2
East facing openings, window	20.2	East	0.7	1.2
South facing openings, window	7.2	South	0.7	1.2
West facing openings, window	5.8	West	0.7	1.2
Entrance, Door	2.2	North	N/A	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1 - Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	**Junction detail**	**Source**	**Psi value [W/mK]**	**Drawing / reference**
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.056	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E3: Sill	Calculated by person with suitable expertise	0.023 **(!)**	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.018 **(!)**	
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.055	
External wall	E12: Gable (insulation at ceiling level)	Calculated by person with suitable expertise	0.037 **(!)**	
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.04	
External wall	E11: Eaves (insulation at rafter level)	Calculated by person with suitable expertise	0.018 **(!)**	
External wall	E13: Gable (insulation at rafter level)	Calculated by person with suitable expertise	0.039 **(!)**	
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.053	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	*8 m^3/hm^2*	
Dwelling air permeability at 50Pa	5 m^3/hm^2, Design value	OK
Air permeability test certificate reference		

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	320.8%
Emitter type	Underfloor
Flow temperature	45°C
System type	Heat Pump
Manufacturer	Vaillant Group UK Ltd
Model	aroTHERM plus 12kW & AI
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: Cylinder	
Capacity	210 litres
Declared heat loss	1.65 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: Cylinder thermostat and HW separately timed	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	*75 lm/W*	
Lowest light source efficacy	80 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	*N/A*	
Specific fan power	N/A	**N/A**
Minimum permitted heat recovery efficiency	*N/A*	
Heat recovery efficiency	N/A	**N/A**
Manufacturer/Model		
Commissioning		

9 Local generation
N/A

10 Heat networks
N/A

11 Supporting documentary evidence
N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	
Signed: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

Predicted Energy Assessment

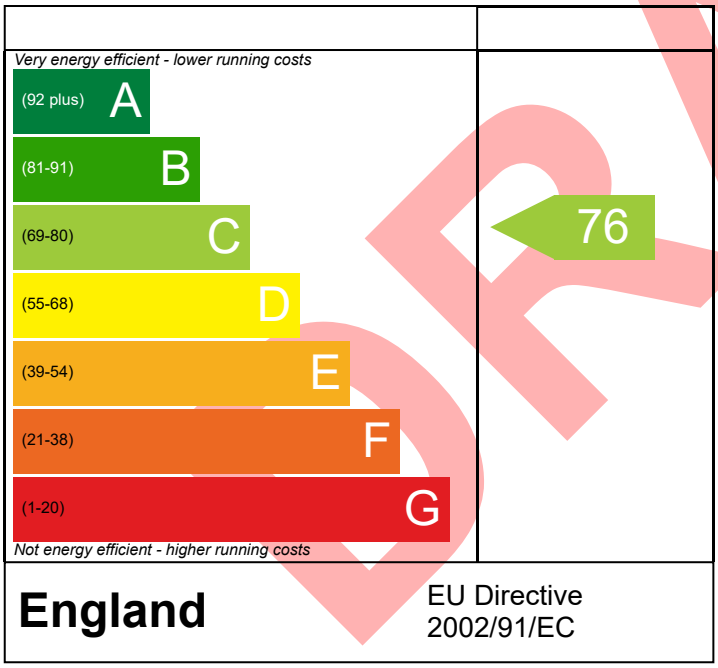
Plot 1, Hooke Farm, Effingham Common

Dwelling type:	House, Detached
Date of assessment:	15/11/2023
Produced by:	Nick Gill
Total floor area:	168 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

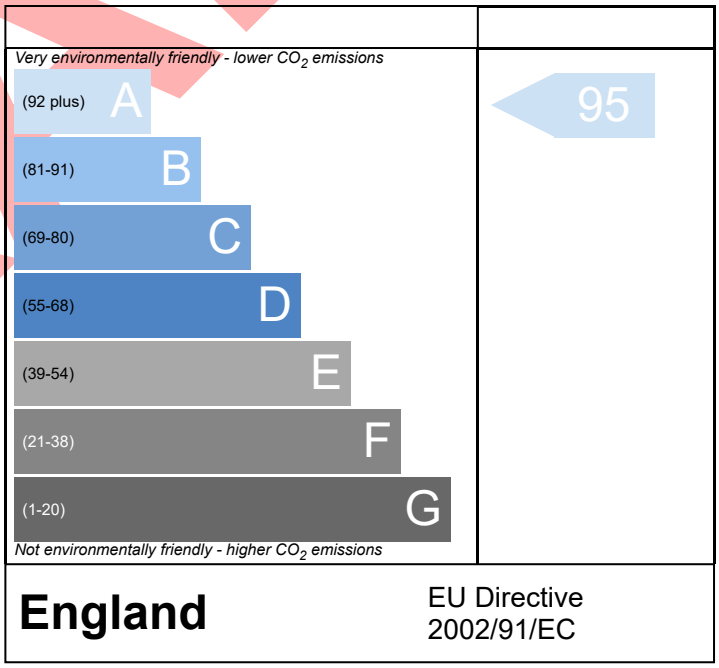
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency 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.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

Summary for Input Data

elmhurst energy

Property Reference	Plot 1	**Issued on Date**	15/11/2023
Assessment Reference	2935	**Prop Type Ref**	
Property	Plot 1, Hooke Farm, Effingham Common		

SAP Rating	76 C	**DER**	4.88	**TER**	12.95
Environmental	95 A	**% DER < TER**			62.32
CO_2 Emissions (t/year)	0.74	**DFEE**	68.84	**TFEE**	72.49
Compliance Check	See BREL	**% DFEE < TFEE**			5.03
% DPER < TPER	29.33	**DPER**	50.47	**TPER**	71.42

Assessor Details	Mr. Nick Gill	**Assessor ID**	AW10-0001
Client	001, Runnymede Homes		

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	North
Property Tenture	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	House, Detached
2.0 Number of Storeys	1
3.0 Date Built	2023
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	95.00 m	168.00 m²	3.20 m

8.0 Living Area 67.00 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External walls	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	240.00	196.00	0.00	None	44.00	Enter Gross Area
Cladding walls	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.18	70.00	65.04	37.64	0.00	None	27.40	Enter Gross Area
Dormer cheeks	Timber Frame	Timber framed wall (one layer of plasterboard)	0.18	9.00	3.80	3.80	0.00	None	0.00	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party wall	Filled Cavity with Edge Sealing	Single plasterboard on dabs both sides, lightweight aggregate blocks, cavity or cavity fill	0.00	110.00	33.20		None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
GF internal walls	Dense block, plasterboard on dabs	75.00	95.00

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Sloped roof	External Slope Roof	Plasterboard, insulated slope	0.11	9.00	295.00	295.00	None	0.00	Enter Gross Area	0.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	168.00

11.2 Internal Floors

Summary for Input Data

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
First floor		Plasterboard ceiling, carpeted chipboard floor	9.00	35.18

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Door	Manufacturer	Solid Door							1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
North facing openings	window	External walls	North	36.00	
East facing openings	window	Cladding walls	East	20.20	
South facing openings	window	Cladding walls	South	7.20	
West facing openings	window	External walls	West	5.80	
Entrance	Door	External walls	North	2.20	

14.0 Conservatory	None	
15.0 Draught Proofing	0	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	22.00	0.06	0.06	No
E3 Sill	Independently assessed	12.00	0.02	0.02	No
E4 Jamb	Independently assessed	68.00	0.02	0.02	No
E5 Ground floor (normal)	Independently assessed	95.00	0.06	0.06	No
E12 Gable (insulation at ceiling level)	Independently assessed	49.00	0.04	0.04	No
E16 Corner (normal)	Independently assessed	35.00	0.04	0.04	No
E11 Eaves (insulation at rafter level)	Independently assessed	45.00	0.02	0.02	No
E13 Gable (insulation at rafter level)	Independently assessed	49.00	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Independently assessed	22.50	-0.05	-0.05	No

Y-value	0.02	W/m²K

18.0 Pressure Testing	Yes	
Designed AP_{50}	5.00	m³/(h.m²) @ 50 Pa
Test Method	Blower Door	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Lighting	80.00	5	400	30

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	106971	
Fuel Type	Electricity	
In Winter	320.80	
In Summer	195.04	
Model Name	aroTHERM plus 12kW & AI	
Manufacturer	Vaillant Group UK Ltd	
System Type	Heat Pump	
Controls SAP Code	2207	
Is MHS Pumped	Pump in unheated space	
Heating Pump Age	2013 or later	
Heat Emitter	Underfloor	

Summary for Input Data

elmhurst energy

Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	45.00

25.0 Main Heating 2 — None

26.0 Heat Networks — None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Cold Water Source	From mains
Bath Count	1
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Cylinder Volume	210.00	L
Loss	1.65	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	Yes	

31.0 Thermal Store — None

34.0 Small-scale Hydro — None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None