

Energy Statement

Land between School Road & Orchard Road, Hurst

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Executive Summary

This Energy Statement has been prepared in support of a reserved matters planning application for the construction of 23, 1 and 2-bedroom apartments and 3, 4 and 5-bedroom semi-detached and detached houses on land between School Road and Orchard Road, Hurst.

Outline planning permission was granted (at appeal) and Condition 10 says;

With or before the submission of reserved matters, a baseline for the level of carbon reduction shall be agreed in writing with the local planning authority, and details of sustainability measures to show that the development will result in carbon reductions equal to or below that baseline shall then be submitted to the local planning authority for approval in writing. No building shall be occupied until the sustainability measures associated with that property are installed in full working order in accordance with the approved details, and they shall thereafter be retained unless they are replaced by more efficient and sustainable technology.

SAP calculations have been prepared for representative apartments and houses and the results aggregated across similar unit types to provide an accurate assessment of the total carbon dioxide emissions arising from the site and have allowed different systems to be tested.

The adopted planning policy (CC05) requires a reduction in emissions of at least 10% through the installation of low-carbon and/or renewable technologies.

In order to demonstrate the reduction from the installation of renewable technologies, SAP calculations have been prepared for the baseline scenario, which are based on the installation of gas boilers. The DER Worksheets for the modelled units for the baseline scenario (gas) are attached as Appendix 1.

The fabric insulation standards and the construction specification of the apartments and houses will exceed the minimum required by the Building Regulations. Various technologies are considered appropriate but it is proposed to install air source heat pumps into each of the 17 houses and to install exhaust air heat pumps into each of the six apartments. The SAP calculations for the modelled units are attached as Appendix 2.

All units will benefit from renewable technologies.

The carbon dioxide emissions and the reductions from the installation of air source and exhaust air heat pumps can be summarised as follows;

	Total Emissions	% Reduction
	kg CO ₂ per year	
Baseline (DER emissions based on gas boilers)	32,649	
Emissions after Heat pumps	9,520	70.84%

The proposals meet the requirements of the planning condition.

1.0 Introduction

This report has been commissioned by KP Holding Group Ltd and provides an Energy Statement in support of a reserved matters planning application for the construction of 23, 1 and 2-bedroom apartments and 3, 4 and 5-bedroom semi-detached and detached houses on land between School Road and Orchard Road, Hurst.

Outline planning permission was granted (at appeal) and Condition 10 says;

With or before the submission of reserved matters, a baseline for the level of carbon reduction shall be agreed in writing with the local planning authority, and details of sustainability measures to show that the development will result in carbon reductions equal to or below that baseline shall then be submitted to the local planning authority for approval in writing. No building shall be occupied until the sustainability measures associated with that property are installed in full working order in accordance with the approved details, and they shall thereafter be retained unless they are replaced by more efficient and sustainable technology.

The report describes the methodology used in assessing the development and the initiatives proposed.

The apartments and houses will be designed and constructed to reduce energy demand and carbon dioxide emissions.

The objective is to reduce the energy demand to an economic minimum by making investments in the parts of the buildings that have the greatest impact on energy demand and are the most difficult and costly to change in the future, namely the building fabric.

Once cost-effective structures have been designed, low-carbon and renewable technologies have been considered to provide further emissions reductions.

The following hierarchy has been followed:

- Lean reduce demand and consumption
- Clean increase energy efficiency
- Green provide low carbon renewable energy sources

The report has been prepared by Ivan Ball of Bluesky Unlimited who are sustainability consultants.

2.0 Planning Policy

Wokingham Borough Local Development Framework – Adopted Core Strategy Development Plan Document, January 2010

Policy CC05: Renewable energy and decentralised energy networks

1. *Local opportunities to contribute towards decentralised energy supply from renewable and low-carbon technologies will be encouraged*
2. *Planning permission will only be granted for proposals that deliver a minimum 10% reduction in carbon emissions through renewable energy or low carbon technology where the development is for:*
 - a) *Schemes of more than 10 dwellings (gross), or*
 - b) *Non-residential proposals of more than 1,000 sq m gross floorspace.*
3. *Proposals for renewable energy and decentralised energy works, including wind turbines, must demonstrate that:*
 - a) *They are appropriate in scale, location and technology type;*
 - b) *Are compatible with the surrounding area, including the impact of noise and odour;*
 - c) *Do not have a damaging impact on the local topography and landscape;*
 - d) *There is no significant impact upon heritage assets, including views important to their setting;*
 - e) *In the case of wind turbines, take account of their cumulative effect and properly reflect their increasing impact on the landscape and on local amenity.*

3.0 Assessment Methodology

The baseline carbon dioxide emissions from the homes have been established using agreed building specifications and SAP calculations have been prepared for representative units based on the installation of gas boilers. This provides a baseline against which a second set of calculations can be compared.

Emission Factors

The CO₂ emission factors, where applicable, used throughout this report have been taken from the Building Regulation Approved Document L - 2021.

	kg CO ₂ /kWh
Grid supplied and displaced electricity	0.136
Mains gas	0.210

4.0 Proposal

The energy strategy within this Statement has been based on the following accommodation schedule.

Unit Type	Number	Area	Total Area
		m ²	m ²
1-Bedroom Apartment	2	50.6	101.2
2-Bedroom Apartment	3	70.5	211.5
2-Bedroom Apartment	1	76.5	76.5
3-Bedroom Semi-detached houses	2	94.2	188.4
3-Bedroom Semi-detached house	1	97.0	97.0
3-Bedroom Semi-detached houses	6	97.8	586.8
3-Bedroom Semi-detached house	1	105.6	105.6
4-Bedroom Detached house	1	107.4	107.4
4-Bedroom Detached house	3	168.3	504.9
5-Bedroom Detached house	3	220.8	662.4
	23		2,641.7

5.0 Energy Efficiency

5.1 Demand Reduction (Be Lean and Be Clean)

Design

The energy performance of a building is affected by its design, construction and use and whilst occupant behaviour is beyond the remit of this statement, better design and construction methods can significantly reduce the life cycle emissions of a building and assist the occupant to reduce consumption.

Sustainable design is not just about incorporating renewable technologies; buildings should be designed at the outset to provide suitable environmental conditions for the occupants whilst also consuming as little energy as practical.

(i) Passive Solar Gain

Passive measures include allowing for natural ventilation and exposed thermal mass coupled with high levels of insulation, air tightness and the control of solar gain.

The Proposed Site Plan positions the homes generally with either a northwest and southeast orientation or a southwest and northeast orientation. This maximises the benefit from solar gain and there are no homes with a solely northerly outlook.

All homes have access to direct sunlight at some point throughout the day.

(ii) Natural Daylighting

The orientation and the size of the windows have been optimised to maximise the amount of natural daylight and therefore reduce the demand for artificial lighting.

(iii) Efficient Building Fabric

a. Building Envelope

U-values of the building envelope must meet Building Regulations Part L1 standards and further improvements to U-values will reduce the home's heating requirements.

The modelling has been based upon the use of traditional load-bearing construction with external walls built with 100mm internal block, 150mm fully filled cavities using Dritherm 32 insulation and 100mm brickwork externally.

Ground floors will be insulated with 150mm PIR insulation or similar and roofs (lofts) with 450mm of mineral wool insulation comprising 150mm between joists and 300mm over.

Windows are proposed as double glazed with Low 'e' soft coat and argon filled.

It is proposed to set maximum limits for the elemental U-values as follows:

Element	Part L Limiting U-values	Proposed U-values	Proposed Improvement
	W/m ² K	W/m ² K	
Ground Floors	0.18	0.11	39%
External Walls	0.26	0.18	31%
Party Walls	0.20	0.00	100%
Roofs	0.16	0.10	38%
Windows	1.60	1.40	13%
External Doors	1.60	1.20	25%
g factor for Glazing	0.52		

b. Air Leakage

Large amounts of heat are lost in winter through air leakage from a building (also referred to as infiltration or air permeability) often through poor sealing of joints and openings in the building

The Building Regulations set a minimum standard for air permeability of 8 m³ of air per hour per m² of envelope area, at 50Pa. The homes will target a 50% improvement over Building Regulations and will seek to achieve a permeability of 4.0 m³/hr/m² or better.

c. Thermal Bridging

The significance of Thermal Bridging, as a potentially major source of fabric heat losses, is increasingly understood.

Improving the U-values for the main building fabric without accurately addressing the Thermal Bridging is no longer an option and will not achieve the fabric energy efficiency and energy and CO₂ reduction targets set out in this strategy.

The thermal details for the buildings will be modelled at the detailed working drawing stage but for the purposes of this assessment the thermal details formulated by the Recognised Construction Details have been used. Any details not available on the RCD website will be modelled.

These will enable the buildings to achieve the higher energy efficiency requirements of the Building Regulations.

The following table provides the values currently used within the modelled SAP calculations.

Reference	Location	PSI Value
		W/mK
E2	Other Lintels (including other steel lintels)	0.028
E3	Sill	0.024
E4	Jamb	0.019
E5	Ground Floor (Normal)	0.046
E6	Intermediate Floor	0.000
E7	Party Floor	0.036
E10	Eaves (Ceiling)	0.051
E12	Gable (Ceiling)	0.029
E16	Corner (normal)	0.037
E17	Corner (inverted)	-0.079
E18	Party Wall	0.041

d. Ventilation

As a result of increasing thermal efficiency and air tightness, Building Regulations Approved Document F was also revised in 2021 to address the possibility of overheating and poor air quality.

Active Design Measures will include;

(i) Efficient Lighting and Controls

Throughout the scheme natural lighting will be optimised.

Approved Document L requires internal light fittings to have lamps with a minimum luminous efficacy of 80 light source lumens per circuit-watt. It is assumed the specification will achieve this standard.

External lighting will be fitted with automatic controls, which switch off luminaires in response to daylight.

(ii) Space Heating and Hot Water

The baseline SAP modelling has been based upon the use of a Vaillant gas boiler installed to each unit but the proposed specification is based upon the installation of Vaillant aroTHERM air source heat pumps installed to each house and NIBE F470 exhaust air heat pumps to each apartment.

5.2 Establishing Baseline Carbon Dioxide Emissions - GAS

There are two, 1-bedroom apartments and four, 2-bedroom apartments. The apartment building is 2-storey and therefore the emissions from ground and top-floor apartments will be broadly similar. SAP calculations have therefore been prepared for a 2-bedroom ground-floor apartment at 70.5 m², which are proposed as representative of all apartments.

There are 10, semi-detached houses with floor areas between 94.2 – 105.6 m². SAP calculations have been prepared for a 3-bedroom semi-detached house at 97.8 m², which are proposed as representative of all semi-detached houses.

There is one detached house at 107.4 m² and three detached houses at 168.3 m². SAP calculations have been prepared for a 4-bedroom detached house at 168.3 m², which are proposed as representative of these four houses.

There are three detached houses at 220.8 m² and SAP calculations have been prepared for one of these, which are proposed as representative of these three houses.

The DER Worksheets are attached as Appendix 1 but the emissions can be summarised as follows:

2-Bedroom Ground-floor Apartment – 70.5 m ² - Based on GAS boilers	CO ₂ DER
	kg/m ² /yr
Space heating	5.73
Water heating	5.99
Electricity for pumps, fans & lighting	0.54
Total	12.26

3-Bedroom Semi-detached house – 97.8 m ² - Based on GAS boilers	CO ₂ DER
	kg/m ² /yr
Space heating	6.91
Water heating	4.83
Electricity for pumps, fans & lighting	0.44
Total	12.19

4-Bedroom Detached house – 168.3 m ² - Based on GAS boilers	CO ₂ DER
	kg/m ² /yr
Space heating	8.12
Water heating	4.37
Electricity for pumps, fans & lighting	0.33
Total	12.82

5-Bedroom Detached house – 220.8 m ² - Based on GAS boilers	CO ₂ DER
	kg/m ² /yr
Space heating	8.62
Water heating	3.35
Electricity for pumps, fans & lighting	0.27
Total	12.24

Using the above results, the total site CO₂ emissions from the site for the baseline scenario (GAS) can be calculated as follows;

	Area	CO ₂ DER
	m ²	kg/yr
Apartments	389.2	4,772
Semi-detached houses	977.8	11,919
Detached houses (107.4 – 168.3 m ²)	612.3	7,850
Detached houses (220.8 m ²)	662.4	8,108
Total	2,641.7	32,649

The baseline emissions from the site based on the installation of gas heating system to all units is calculated as **32,649 kg CO₂ per year**.

5.3 Low-Carbon and Renewable Technologies (Be Clean and Be Green)

The carbon dioxide emissions established above have been used to test the viability of various renewable and low carbon technologies as follows. This section determines the appropriateness of each renewable technology.

The Government's Renewable Obligation defines renewable energy in the UK. The identified technologies are;

- Small hydro-electric
- Landfill and sewage gas
- Onshore and offshore wind
- Biomass
- Tidal and wave power
- Geothermal power
- Solar

The use of landfill or sewage gas, offshore wind or any form of hydroelectric power is not suitable for the site due to its location. The remaining technologies are considered below;

Wind

Wind turbines are available in various sizes from large rotors able to supply whole communities to small roof or wall-mounted units for individual dwellings.

The Government wind speed database predicts local wind speeds at School Road to be 4.7 m/s at 10m above ground level and 5.5 m/s at 25m above ground level. This is below the level generally required for commercial investment in large wind turbines. In addition the land take, potential for noise and signal interference make a large wind turbine unsuitable for this development.

Roof mounted turbines could be used at the development to generate small but valuable amounts of renewable electricity but the small output and contribution to total emissions means any investment would be small and purely tokenism. In addition the use of wind turbines will have a detrimental aesthetic impact on the appearance of the development.

Combined Heat and Power and Community Heating

Combined heat and power (CHP) also called co-generation is a de-centralised method of producing electricity from a fuel and 'capturing' the heat generated for use in buildings. The plant is essentially a small-scale electrical power station.

The production and transportation of electricity via the National Grid is very inefficient with over 65% of the energy produced at the power station being lost to the atmosphere and through transportation.

CHP units are generally gas fuelled and generate electricity with heat being a by-product. The heat is usually used to meet the hot water load, which is fairly consistent throughout the year.

Historically CO₂ savings have been achieved because gas has been used to generate electricity and gas has had a lower emissions factor than electricity. However, with the de-carbonisation of the electricity grid the benefit of CHP is negated.

CHP is not proposed.

Ground Source Heat Pumps

Sub soil temperatures are reasonably constant and predictable in the UK, providing a store of the sun's energy throughout the year. Below London the groundwater in the lower London aquifer is at a fairly constant temperature of 12° C. Ground source heat pumps (GSHP) extract this low-grade heat and convert it to usable heat for space heating.

GSHP operates on a similar principle to refrigerators, transferring heat from a cool place to a warmer place. They operate most efficiently when providing space heating at a low temperature, typically via under floor heating or with low temperature radiators.

Whilst the houses are set in private garden areas it is unlikely there will be sufficient external ground area to sustain a horizontal collection system and the installation of ground source heat pumps is likely to require the use of a bore hole collection system to each house.

The use of ground source heat pumps with bore-hole collection systems to the houses is feasible but would be an expensive option when compared with some other technologies. The installation of ground source heat pumps into apartments is not practical.

Solar

(i) Solar Water Heating

Solar hot water panels use the sun's energy to directly heat water circulating through panels or pipes. The technology is simple and easily understood by purchasers.

Solar hot water heating panels are based generally around two types, which are available being 'flat plate collectors' and 'evacuated tubes'. Flat plate collectors can achieve an output of up to 1,124 kWh/annum (Schuco) and evacuated tubes can achieve outputs up to 1,365 kWh/annum (Riomay).

Panels are traditionally roof mounted and for highest efficiencies should be mounted plus or minus 30 degrees of due south. Evacuated tubes can be laid horizontally on flat roofs but flat plate collectors are recommended for installation at an incline of 30 degrees. It is assumed solar panels could reduce the energy demand of the hot water requirements by 50%.

The installation of solar hot water panels would only be applicable to those units fitted with a hot water cylinder, namely the detached houses. The total reduction in emissions from the installation of hot water panels to each detached house is calculated of **2,448 kg CO₂ per year**, which equates to a reduction in total (DER) emissions of **7.50%**.

The installation of solar hot water panels to the detached houses is feasible but the reduction in emissions would not meet the requirements of the planning policy or the planning condition. Solar hot water heating panels are not proposed.

(ii) Photovoltaics

Photovoltaic panels (PV) provide clean silent electricity. They generate electricity during most daylight conditions although they are most efficient when exposed to direct sunlight or are orientated to face plus or minus 30 degrees of due south.

PV panels can be integrated into many different aspects of a development including roofs, walls, shading devices or architectural panels. The panels typically have an electrical warranty of 20-25 years and an expected system lifespan of 25-40 years.

Whilst the installation of photovoltaic panels to the dwellings is feasible, the preference for the heating system is to install heat pumps, which will reduce emissions significantly. Photovoltaic panels are not proposed.

Air Source Heat Pumps (ASHP)

Air sourced heat pumps operate using the same reverse refrigeration cycle as ground source heat pumps, however the initial heat energy is extracted from the external air rather than the ground. These heat pumps can be reversed to provide cooling to an area although this reduces the coefficient of performance of the pumps.

A further set of SAP calculations have been prepared for the units modelled above but with the benefit of an air source heat pump installed to each house and an exhaust air heat pump installed to each apartment.

The DER Worksheets are attached as Appendix 2 but the emissions can be summarised as follows:

2-Bedroom Ground-floor Apartment – 70.5 m ²	CO ₂ DER
	kg/m ² /yr
Space heating	1.33
Water heating	1.80
Electricity for pumps, fans & lighting	0.37
Total	3.49

3-Bedroom Semi-detached house – 97.8 m ²	CO ₂ DER
	kg/m ² /yr
Space heating	1.51
Water heating	2.33
Electricity for pumps, fans & lighting	0.32
Total	4.17

4-Bedroom Detached house – 168.3 m ²	CO ₂ DER
	kg/m ² /yr
Space heating	1.76
Water heating	1.33
Electricity for pumps, fans & lighting	0.25
Total	3.35

5-Bedroom Detached house – 220.8 m ²	CO ₂ DER
	kg/m ² /yr
Space heating	1.83
Water heating	1.02
Electricity for pumps, fans & lighting	0.22
Total	3.07

Using the above results, the total site CO₂ emissions from the site for the baseline scenario (GAS) can be calculated as follows;

	Area	CO ₂ DER
	m ²	kg/yr
Apartments	389.2	1,358
Semi-detached houses	977.8	4,077
Detached houses (107.4 – 168.3 m ²)	612.3	2,051
Detached houses (220.8 m ²)	662.4	2,034
Total	2,641.7	9,520

The emissions from the site based on the installation of air source and exhaust air heat pumps to all units is calculated as **9,520 kg CO₂ per year**.

The reduction in emissions as a result of the installation of heat pumps is **23,129 kg CO₂ per year**, which equates to a reduction of **70.84%**.

5.4 Summary of Calculations and Proposals for Low-carbon and Renewable Technologies

The baseline carbon emissions based on the installation of gas heating systems are assessed as **32,649 kg CO₂ per year**.

The local planning policy requires a reduction in emissions of 10% through the installation of low-carbon and/or renewable technologies.

Various technologies are considered above and whilst wind turbines, combined heat and power, ground source heat pumps, flue-gas or waste-water heat recovery units are not considered appropriate the use of solar hot water heating, photovoltaic panels and air source and exhaust air heat pumps, are considered feasible and appropriate (albeit the use of solar hot water heating and photovoltaic panels are not proposed).

Be Lean

The construction standards proposed include U-values, which demonstrate good practice and improve upon those required by the Building Regulations. Air tightness standards are targeted at a 50% improvement upon the minimum required by the Building Regulations.

Be Clean and Be Green

Various technologies are considered above and it is proposed to install air source heat pumps into all houses and to install exhaust air heat pumps into each apartment.

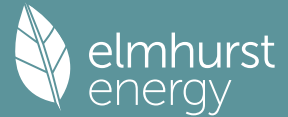
As a result of these installations the total emissions from the site are assessed as **9,520 kg CO₂ per year**.

The reduction in emissions from the installation of renewable technologies is therefore 23,129 kg CO₂ per year, which equates to a reduction of 70.84%.

The proposal complies with the emissions reduction target required by planning Condition 10.

Appendix 1 – DER Worksheets for the Modelled Units based on Gas Baseline

Full SAP Calculation Printout



Property Reference	Hurst 2BF GND 71 GAS				Issued on Date	07/06/2025
Assessment Reference	Hurst 2BF GND 71 GAS		Prop Type Ref	Hurst 2BF GND 71 GAS		
Property	Land between , School Rd & Orchard Rd, Hurst, Berkshire					
SAP Rating	86 B	DER	12.26	TER	11.42	
Environmental	90 B	% DER < TER				-7.36
CO ₂ Emissions (t/year)	0.76	DFEE	28.08	TFEE	31.11	
Compliance Check	See BREL	% DFEE < TFEE				9.73
% DPER < TPER	-15.35	DPER	68.83	TPER	59.67	
Assessor Details	Mr. Ivan Ball				Assessor ID	DE88-0001
Client						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	70.5000 (1b)	2.4000 (2b)	169.2000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.5000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	169.2000 (5)

2. Ventilation rate

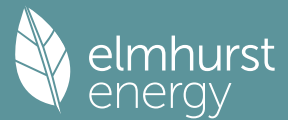
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	1 * 10 = 10.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	10.0000 / (5) = 0.0591 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2591 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2202 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2808	0.2753	0.2698	0.2423	0.2368	0.2092	0.2092	0.2037	0.2202	0.2368	0.2478	0.2588 (22b)
Effective ac	0.5394	0.5379	0.5364	0.5293	0.5280	0.5219	0.5219	0.5208	0.5243	0.5280	0.5307	0.5335 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows & Glazed Doors			10.0000	1.3258	13.2576		(27)
Ground Floor			70.5000	0.1100	7.7550		(28a)
External Wall	57.0200	10.0000	47.0200	0.1800	8.4636		(29a)
Total net area of external elements Aum(A, m ²)			127.5200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.4762		(33)
Main dwelling							
Party Wall			24.2200	0.0000	0.0000		(32)
Party Ceiling			70.5000				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				6.7000	0.0280	0.1876	
E3 Sill				6.7000	0.0240	0.1608	
E4 Jamb				17.4000	0.0190	0.3306	
E18 Party wall between dwellings				4.8000	0.0410	0.1968	
E16 Corner (normal)				7.2000	0.0370	0.2664	
E5 Ground floor (normal)				23.7600	0.0460	1.0930	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							2.2352 (36)
Point Thermal bridges						(36a) =	0.0000

Full SAP Calculation Printout



Total fabric heat loss (33) + (36) + (36a) = 31.7113 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	30.1193	30.0338	29.9501	29.5565	29.4829	29.1401	29.1401	29.0766	29.2721	29.4829	29.6318	29.7876 (38)
Heat transfer coeff	61.8307	61.7452	61.6614	61.2678	61.1942	60.8514	60.8514	60.7880	60.9835	61.1942	61.3432	61.4989 (39)
Average = Sum(39)m / 12 =												61.2675

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.8770	0.8758	0.8746	0.8690	0.8680	0.8631	0.8631	0.8622	0.8650	0.8680	0.8701	Dec 0.8723 (40)
HLP (average)												0.8690
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2582 (42)

Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)

Hot water usage for baths 71.5694 70.5065 69.0097 66.2499 64.1834 61.8919 60.6542 62.1405 63.7589 66.2108 69.0275 71.3275 (42b)

Hot water usage for other uses 37.7563 36.3833 35.0103 33.6374 32.2644 30.8915 30.8915 32.2644 33.6374 35.0103 36.3833 37.7563 (42c)

Average daily hot water use (litres/day) 100.6800 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	109.3257	106.8898	104.0201	99.8873	96.4478	92.7834	91.5457	94.4050	97.3963	101.2211	105.4108	109.0837 (44)
Energy conte	173.1452	152.2097	159.8750	136.7407	129.8373	114.0880	110.7166	116.8931	120.0993	137.3561	150.1770	170.7988 (45)
Energy content (annual)										Total = Sum(45)m =		1671.9368
Distribution loss (46)m = 0.15 x (45)m	25.9718	22.8315	23.9812	20.5111	19.4756	17.1132	16.6075	17.5340	18.0149	20.6034	22.5265	25.6198 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	2.1779	1.9480	2.0874	1.8303	1.6780	1.4185	1.3582	1.4787	1.5674	1.8279	1.9419	2.1521 (61)
Total heat required for water heating calculated for each month												
WWHRS	175.3231	154.1577	161.9623	138.5710	131.5153	115.5065	112.0748	118.3718	121.6668	139.1841	152.1189	172.9509 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h												
	175.3231	154.1577	161.9623	138.5710	131.5153	115.5065	112.0748	118.3718	121.6668	139.1841	152.1189	172.9509 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1693.4031 (64)
Electric shower(s)												1693 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month												
	58.1153	51.0967	53.6803	45.9239	43.5904	38.2889	37.1528	39.2366	40.3249	46.1279	50.4193	57.3286 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.0853	118.5588	107.0853	110.6549	107.0853	110.6549	107.0853	107.0853	110.6549	107.0853	110.6549	107.0853 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	198.4612	200.5206	195.3310	184.2829	170.3366	157.2291	148.4724	146.4130	151.6026	162.6508	176.5970	189.7046 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281 (71)
Water heating gains (Table 5)	78.1119	76.0368	72.1509	63.7831	58.5893	53.1790	49.9366	52.7374	56.0068	61.9999	70.0268	77.0546 (72)
Total internal gains	443.5315	454.9892	434.4403	418.5939	395.8842	377.9360	362.3674	363.1088	375.1373	391.6090	417.1518	433.7176 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g Specific data or Table 6c	FF Specific data or Table 6c	Access factor Table 6d	Gains W					
Northeast	1.8200	11.2829	0.5200	0.7000	0.7700	5.1800 (75)						
Southeast	2.7700	36.7938	0.5200	0.7000	25.7093 (77)							
Northwest	5.4100	11.2829	0.5200	0.7000	15.3976 (81)							
Solar gains	46.2869	85.6787	135.3845	198.1787	249.7525	260.1641	245.7415	205.3973	156.8356	99.5883	56.6857	38.8065 (83)
Total gains	489.8184	540.6679	569.8248	616.7726	645.6367	638.1000	608.1089	568.5061	531.9729	491.1974	473.8375	472.5240 (84)

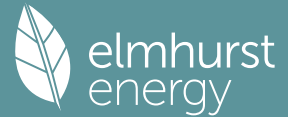
7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	79.1813	79.2909	79.3987	79.9087	80.0048	80.4555	80.4555	80.5395	80.2813	80.0048	79.8106	79.6085
alpha	6.2788	6.2861	6.2932	6.3272	6.3337	6.3637	6.3637	6.3693	6.3521	6.3337	6.3207	6.3072
util living area	0.9951	0.9900	0.9779	0.9291	0.8036	0.5998	0.4390	0.4891	0.7456	0.9480	0.9890	0.9961 (86)

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MIT	20.1277	20.2656	20.4607	20.7303	20.9194	20.9892	20.9987	20.9975	20.9613	20.7263	20.3847	20.0991 (87)
Th 2	20.1871	20.1881	20.1891	20.1939	20.1948	20.1989	20.1989	20.1997	20.1973	20.1948	20.1930	20.1911 (88)
util rest of house												
	0.9936	0.9869	0.9709	0.9078	0.7552	0.5293	0.3598	0.4055	0.6757	0.9277	0.9851	0.9949 (89)
MIT 2	19.1695	19.3453	19.5917	19.9224	20.1285	20.1929	20.1985	20.1988	20.1718	19.9244	19.5014	19.1362 (90)
Living area fraction									fLA = Living area / (4) =			0.3929 (91)
MIT	19.5460	19.7069	19.9332	20.2398	20.4392	20.5057	20.5129	20.5126	20.4820	20.2394	19.8484	19.5145 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5460	19.7069	19.9332	20.2398	20.4392	20.5057	20.5129	20.5126	20.4820	20.2394	19.8484	19.5145 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9921	0.9846	0.9683	0.9092	0.7707	0.5567	0.3909	0.4384	0.7016	0.9290	0.9830	0.9935	(94)
Useful gains	485.9266	532.3555	551.7534	560.7781	497.5988	355.2477	237.7346	249.2482	373.2446	456.3140	465.7630	469.4662	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W													
	942.6684	914.2558	828.3074	694.7681	534.7907	359.3731	238.1062	249.9977	389.1972	589.8780	782.0296	941.8259	(97)
Space heating kWh													
	339.8159	256.6370	205.7561	96.4728	27.6707	0.0000	0.0000	0.0000	0.0000	99.3717	227.7120	351.4356	(98a)
Space heating requirement - total per year (kWh/year)												1604.8717	
Solar heating kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh													
	339.8159	256.6370	205.7561	96.4728	27.6707	0.0000	0.0000	0.0000	0.0000	99.3717	227.7120	351.4356	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1604.8717	
Space heating per m2										(98c) / (4) =		22.7641	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													83.4000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	339.8159	256.6370	205.7561	96.4728	27.6707	0.0000	0.0000	0.0000	0.0000	99.3717	227.7120	351.4356	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	407.4531	307.7182	246.7100	115.6748	33.1783	0.0000	0.0000	0.0000	0.0000	119.1507	273.0359	421.3856	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	175.3231	154.1577	161.9623	138.5710	131.5153	115.5065	112.0748	118.3718	121.6668	139.1841	152.1189	172.9509	(64)
Efficiency of water heater (217)m													
	86.0374	85.8021	85.3663	84.3859	82.8756	81.8000	81.8000	81.8000	81.8000	84.4257	85.6329	81.8000	(216)
Fuel for water heating, kWh/month													
	203.7755	179.6666	189.7264	164.2110	158.6901	141.2060	137.0107	144.7088	148.7369	164.8599	177.6407	200.8522	(219)
Space cooling fuel requirement													
(221)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa													
	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting													
	22.2502	17.8500	16.0719	11.7750	9.0953	7.4310	8.2971	10.7848	14.0084	18.3798	20.7600	22.8686	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													1924.3066 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													81.8000
Water heating fuel used													2011.0848 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
central heating pump													41.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													86.0000 (231)
Electricity for lighting (calculated in Appendix L)													179.5720 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													0.0000 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses													4200.9634 (238)

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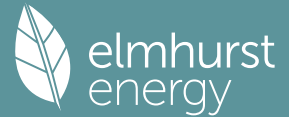
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1924.3066	0.2100	404.1044 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2011.0848	0.2100	422.3278 (264)
Space and water heating			826.4322 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	179.5720	0.1443	25.9178 (268)
Total CO2, kg/year			864.2792 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.2600 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1924.3066	1.1300	2174.4665 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2011.0848	1.1300	2272.5258 (278)
Space and water heating			4446.9923 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	179.5720	1.5338	275.4336 (282)
Total Primary energy kWh/year			4852.5266 (286)
Dwelling Primary energy Rate (DPER)			68.8300 (287)

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Property Reference	Hurst 3BH SEMI 98 GAS				Issued on Date	07/06/2025
Assessment Reference	Hurst 3BH SEMI 98 GAS		Prop Type Ref	Hurst 3BH SEMI 98 GAS		
Property	Land between, School Rd & Orchard Rd, Hurst, Berkshire					
SAP Rating	86 B	DER	12.19	TER	9.97	
Environmental	89 B	% DER < TER				-22.27
CO ₂ Emissions (t/year)	1.03	DFEE	31.67	TFEE	32.61	
Compliance Check	See BREL	% DFEE < TFEE				2.88
% DPER < TPER	-30.96	DPER	67.94	TPER	51.88	
Assessor Details	Mr. Ivan Ball				Assessor ID	DE88-0001
Client						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	48.9000 (1b)	x 2.4000 (2b)	= 117.3600 (1b) - (3b)
First floor	48.9000 (1c)	x 2.4000 (2c)	= 117.3600 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 234.7200 (5)

2. Ventilation rate

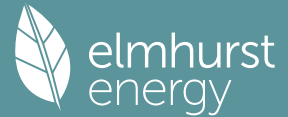
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.0852 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2852 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2424 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3091	0.3030	0.2970	0.2667	0.2606	0.2303	0.2303	0.2242	0.2424	0.2606	0.2727	0.2849 (22b)
Effective ac	0.5478	0.5459	0.5441	0.5356	0.5340	0.5265	0.5265	0.5251	0.5294	0.5340	0.5372	0.5406 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows & Glazed Doors			17.4500	1.3258	23.1345		(27)
External Doors			1.8900	1.2000	2.2680		(26a)
Ground Floor			48.9000	0.1100	5.3790		(28a)
External Wall	95.0400	19.3400	75.7000	0.1800	13.6260		(29a)
External Roof	48.9000		48.9000	0.1000	4.8900		(30)
Total net area of external elements Aum(A, m ²)			192.8400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30)		= 49.2975		(33)
Main dwelling							
Party Wall			45.5000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				11.5000	0.0280		0.3220
E3 Sill				8.3000	0.0240		0.1992
E4 Jamb				27.0000	0.0190		0.5130
E5 Ground floor (normal)				19.8000	0.0460		0.9108
E16 Corner (normal)				9.6000	0.0370		0.3552
E6 Intermediate floor within a dwelling				19.8000	0.0000		0.0000

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E10 Eaves (insulation at ceiling level)	10.6600	0.0510	0.5437
E12 Gable (insulation at ceiling level)	9.4800	0.0290	0.2749
E18 Party wall between dwellings	9.6000	0.0410	0.3936
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5124 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	52.8098 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
42.4289	42.2852	42.1444	41.4829	41.3591	40.7830	40.7830	40.6763	41.0049	41.3591	41.6095	41.8713	(38)
(38)m												
Heat transfer coeff	95.2388	95.0951	94.9543	94.2928	94.1690	93.5928	93.5928	93.4862	93.8148	94.1690	94.4194	(39)
Average = Sum(39)m / 12 =											94.2922	
HLP	0.9738	0.9723	0.9709	0.9641	0.9629	0.9570	0.9570	0.9559	0.9593	0.9629	0.9654	(40)
HLP (average)											0.9641	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7182 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	80.4992	79.3037	77.6202	74.5160	72.1916	69.6143	68.2221	69.8939	71.7141	74.4720	77.6401	80.2271 (42b)
Hot water usage for other uses	42.4671	40.9229	39.3786	37.8344	36.2901	34.7458	34.7458	36.2901	37.8344	39.3786	40.9229	42.4671 (42c)
Average daily hot water use (litres/day)												113.2420 (43)
Daily hot water use	122.9664	120.2266	116.9988	112.3503	108.4817	104.3601	102.9680	106.1840	109.5485	113.8506	118.5630	122.6942 (44)
Energy conte	194.7487	171.2011	179.8228	153.8020	146.0372	128.3229	124.5308	131.4780	135.0843	154.4942	168.9147	192.1095 (45)
Energy content (annual)										Total = Sum(45)m =		1880.5461
Distribution loss (46)m = 0.15 x (45)m	29.2123	25.6802	26.9734	23.0703	21.9056	19.2484	18.6796	19.7217	20.2626	23.1741	25.3372	28.8164 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	2.2106	1.9855	2.1378	1.8928	1.8480	1.6715	1.6377	1.6910	1.6965	1.8804	1.9843	2.1853 (61)
Total heat required for water heating calculated for each month	196.9593	173.1866	181.9605	155.6948	147.8853	129.9944	126.1685	133.1690	136.7807	156.3746	170.8990	194.2949 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	196.9593	173.1866	181.9605	155.6948	147.8853	129.9944	126.1685	133.1690	136.7807	156.3746	170.8990	194.2949 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1903.3675 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	65.3066	57.4207	60.3255	51.6124	49.0194	43.0852	41.8159	44.1392	45.3396	51.8394	56.6602	64.4227 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	135.9103	135.9103	135.9103	135.9103	135.9103	135.9103	135.9103	135.9103	135.9103	135.9103	135.9103	135.9103 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	130.3759	144.3448	130.3759	134.7218	130.3759	134.7218	130.3759	130.3759	134.7218	130.3759	134.7218	130.3759 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	252.7213	255.3438	248.7353	234.6665	216.9073	200.2161	189.0654	186.4429	193.0514	207.1201	224.8794	241.5706 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5910	36.5910	36.5910	36.5910	36.5910	36.5910	36.5910	36.5910	36.5910	36.5910	36.5910	36.5910 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.7282	-108.7282	-108.7282	-108.7282	-108.7282	-108.7282	-108.7282	-108.7282	-108.7282	-108.7282	-108.7282	-108.7282 (71)
Water heating gains (Table 5)	87.7777	85.4475	81.0827	71.6838	65.8863	59.8406	56.2042	59.3268	62.9717	69.6767	78.6947	86.5897 (72)
Total internal gains	537.6480	551.9091	526.9669	507.8452	479.9426	458.5516	439.4186	439.9188	454.5180	473.9458	505.0690	525.3093 (73)

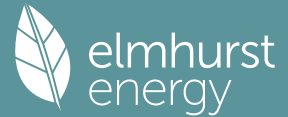
6. Solar gains

[Jan]						Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d			Gains W
Northeast						8.8800	11.2829	0.5200	0.7000	0.7700			25.2738 (75)
Southwest						8.5700	36.7938	0.5200	0.7000	0.7700			79.5409 (79)
Solar gains	104.8147	186.9330	278.0684	381.9158	461.8922	473.5579	450.3156	388.3555	313.6696	212.6131	127.0726		88.7103 (83)
Total gains	642.4626	738.8422	805.0353	889.7610	941.8347	932.1095	889.7341	828.2742	768.1876	686.5589	632.1416		614.0195 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	71.3120	71.4197	71.5257	72.0275	72.1221	72.5661	72.5661	72.6489	72.3944	72.1221	71.9309	71.7320

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alpha	5.7541	5.7613	5.7684	5.8018	5.8081	5.8377	5.8377	5.8433	5.8263	5.8081	5.7954	5.7821
util living area	0.9968	0.9922	0.9807	0.9362	0.8204	0.6244	0.4601	0.5137	0.7717	0.9583	0.9924	0.9975 (86)
MIT	19.9241	20.0961	20.3345	20.6507	20.8830	20.9807	20.9972	20.9948	20.9381	20.6353	20.2230	19.8911 (87)
Th 2	20.1052	20.1064	20.1077	20.1133	20.1144	20.1193	20.1193	20.1203	20.1174	20.1144	20.1122	20.1100 (88)
util rest of house	0.9957	0.9897	0.9744	0.9157	0.7706	0.5462	0.3695	0.4184	0.6980	0.9405	0.9896	0.9967 (89)
MIT 2	18.8475	19.0674	19.3695	19.7602	20.0173	20.1084	20.1184	20.1184	20.0762	19.7500	19.2345	18.8089 (90)
Living area fraction	18.9950	19.2084	19.5017	19.8822	20.1360	20.2279	20.2388	20.2385	20.1943	19.8713	19.3700	18.9572 (92)
MIT	18.9950	19.2084	19.5017	19.8822	20.1360	20.2279	20.2388	20.2385	20.1943	19.8713	19.3700	18.9572 (93)
Temperature adjustment												0.0000
adjusted MIT												0.0000

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9938	0.9862	0.9687	0.9093	0.7719	0.5561	0.3819	0.4314	0.7050	0.9343	0.9862	0.9952 (94)
Useful gains	638.5035	728.6648	779.8679	809.0732	726.9849	518.3831	339.7941	357.3069	541.5538	641.4571	623.4192	611.0429 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1399.5309	1360.6543	1234.5671	1035.5403	794.4054	526.7355	340.5679	358.8453	571.7309	873.0666	1158.5228	1397.2302 (97)
Space heating kWh	566.2043	424.6969	338.2962	163.0563	50.1609	0.0000	0.0000	0.0000	0.0000	172.3174	385.2746	584.9233 (98a)
Space heating requirement - total per year (kWh/year)												2684.9301
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	566.2043	424.6969	338.2962	163.0563	50.1609	0.0000	0.0000	0.0000	0.0000	172.3174	385.2746	584.9233 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2684.9301
Space heating per m2										(98c) / (4) =		27.4533 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												83.4000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	566.2043	424.6969	338.2962	163.0563	50.1609	0.0000	0.0000	0.0000	0.0000	172.3174	385.2746	584.9233 (98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000 (210)
Space heating fuel (main heating system)	678.9021	509.2289	405.6309	195.5111	60.1449	0.0000	0.0000	0.0000	0.0000	206.6156	461.9600	701.3469 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	196.9593	173.1866	181.9605	155.6948	147.8853	129.9944	126.1685	133.1690	136.7807	156.3746	170.8990	194.2949 (64)
Efficiency of water heater (217)m	86.5968	86.3811	85.9739	85.0482	83.3766	81.8000	81.8000	81.8000	81.8000	85.1322	86.2614	86.6566 (217)
Fuel for water heating, kWh/month	227.4441	200.4912	211.6463	183.0665	177.3702	158.9174	154.2402	162.7982	167.2136	183.6846	198.1176	224.2124 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	27.0895	21.7322	19.5675	14.3360	11.0735	9.0472	10.1016	13.1305	17.0552	22.3773	25.2752	27.8424 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												3219.3406 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												81.8000
Water heating fuel used												2249.2024 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												41.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												218.6281 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												5773.1711 (238)

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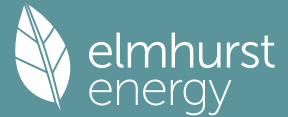
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3219.3406	0.2100	676.0615 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2249.2024	0.2100	472.3325 (264)
Space and water heating			1148.3940 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	218.6281	0.1443	31.5548 (268)
Total CO2, kg/year			1191.8781 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.1900 (273)

----- 13a. Primary energy - Individual heating systems including micro-CHP -----

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3219.3406	1.1300	3637.8549 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2249.2024	1.1300	2541.5987 (278)
Space and water heating			6179.4536 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	218.6281	1.5338	335.3391 (282)
Total Primary energy kWh/year			6644.8935 (286)
Dwelling Primary energy Rate (DPER)			67.9400 (287)

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Property Reference	Hurst 4BH DET 168 GAS				Issued on Date	07/06/2025
Assessment Reference	Hurst 4BH DET 168 GAS		Prop Type Ref	Hurst 4BH DET 168 GAS		
Property	Land between, School Rd & Orchard Rd, Hurst, Berkshire					
SAP Rating	86 B	DER	12.82	TER	8.70	
Environmental	87 B	% DER < TER				-47.36
CO ₂ Emissions (t/year)	1.91	DFEE	37.24	TFEE	38.24	
Compliance Check	See BREL	% DFEE < TFEE				2.61
% DPER < TPER	-55.13	DPER	70.73	TPER	45.59	
Assessor Details	Mr. Ivan Ball				Assessor ID	DE88-0001
Client						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	84.1500 (1b)	x 2.4000 (2b)	= 201.9600 (1b) - (3b)
First floor	84.1500 (1c)	x 2.4000 (2c)	= 201.9600 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	168.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 403.9200 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.0743 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2743 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2331 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2972	0.2914	0.2856	0.2564	0.2506	0.2215	0.2215	0.2156	0.2331	0.2506	0.2623	0.2739 (22b)
Effective ac	0.5442	0.5425	0.5408	0.5329	0.5314	0.5245	0.5245	0.5233	0.5272	0.5314	0.5344	0.5375 (25)

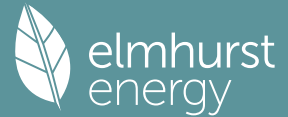
3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows & Glazed Doors			28.0800	1.3258	37.2273		(27)
External Doors			3.7800	1.2000	4.5360		(26a)
Ground Floor			84.1500	0.1100	9.2565		(28a)
External Wall	193.0100	31.8600	161.1500	0.1800	29.0070		(29a)
External Roof	84.1500		84.1500	0.1000	8.4150		(30)
Total net area of external elements Aum(A, m ²)			361.3100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	88.4418		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	18.5500	0.0280	0.5194
E2 Other lintels (including other steel lintels)	13.4000	0.0240	0.3216
E3 Sill	41.1000	0.0190	0.7809
E4 Jamb	40.2100	0.0460	1.8497
E5 Ground floor (normal)	28.8000	0.0370	1.0656
E16 Corner (normal)	9.6000	-0.0790	-0.7584
E17 Corner (inverted - internal area greater than external area)	40.2100	0.0000	0.0000
E6 Intermediate floor within a dwelling	24.6600	0.0510	1.2577
E10 Eaves (insulation at ceiling level)			

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E13 Gable (insulation at rafter level) 15.6000 0.0340 0.5304
 Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.5668 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 94.0086 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	72.5352	72.3066	72.0825	71.0297	70.8328	69.9159	69.9159	69.7461	70.2691	70.8328	71.2312	71.6478
Average = Sum(39)m / 12 =	166.5438	166.3152	166.0911	165.0383	164.8414	163.9245	163.9245	163.7547	164.2777	164.8414	165.2398	165.6564
HLP	0.9896	0.9882	0.9869	0.9806	0.9794	0.9740	0.9740	0.9730	0.9761	0.9794	0.9818	0.9843
HLP (average)												0.9806
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9603 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths													85.1987 (42b)
Hot water usage for other uses													44.9463 (42c)
Average daily hot water use (litres/day)													119.8530 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	130.1451	127.2453	123.8291	118.9093	114.8148	110.4526	108.9792	112.3829	115.9439	120.4971	125.4846	129.8570	(44)
Energy content (annual)	206.1180	181.1957	190.3207	162.7809	154.5628	135.8143	131.8008	139.1536	142.9704	163.5135	178.7758	203.3247	(45)
Distribution loss (46)m = 0.15 x (45)m													1990.3312
Water storage loss:	30.9177	27.1793	28.5481	24.4171	23.1844	20.3722	19.7701	20.8730	21.4456	24.5270	26.8164	30.4987	(46)
Store volume													250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6800 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.9072 (55)
Total storage loss	28.1232	25.4016	28.1232	27.2160	28.1232	27.2160	28.1232	28.1232	27.2160	28.1232	27.2160	28.1232	(56)
If cylinder contains dedicated solar storage	28.1232	25.4016	28.1232	27.2160	28.1232	27.2160	28.1232	28.1232	27.2160	28.1232	27.2160	28.1232	(57)
Primary loss	37.2980	33.6885	37.2980	36.0948	37.2980	36.0948	37.2980	37.2980	36.0948	37.2980	36.0948	37.2980	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	271.5391	240.2857	255.7419	226.0917	219.9840	199.1251	197.2220	204.5747	206.2812	228.9347	242.0866	268.7459	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	271.5391	240.2857	255.7419	226.0917	219.9840	199.1251	197.2220	204.5747	206.2812	228.9347	242.0866	268.7459	(64)
12Total per year (kWh/year)													2760.6126 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	120.8712	107.5196	115.6186	104.7733	103.7291	95.8069	96.1607	98.6055	98.1863	106.7052	110.0916	119.9424	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	148.0146	148.0146	148.0146	148.0146	148.0146	148.0146	148.0146	148.0146	148.0146	148.0146	148.0146	148.0146	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	177.3812	196.3863	177.3812	183.2939	177.3812	183.2939	177.3812	177.3812	183.2939	177.3812	183.2939	177.3812	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	339.8119	343.3381	334.4522	315.5352	291.6560	269.2128	254.2194	250.6932	259.5791	278.4961	302.3753	324.8185	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.8015	37.8015	37.8015	37.8015	37.8015	37.8015	37.8015	37.8015	37.8015	37.8015	37.8015	37.8015	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-118.4116	-118.4116	-118.4116	-118.4116	-118.4116	-118.4116	-118.4116	-118.4116	-118.4116	-118.4116	-118.4116	-118.4116	(71)
Water heating gains (Table 5)	162.4612	159.9994	155.4013	145.5184	139.4208	133.0652	129.2483	132.5343	136.3699	143.4209	152.9050	161.2129	(72)
Total internal gains	750.0587	770.1282	737.6390	714.7519	678.8623	652.9762	628.2532	628.0130	646.6472	669.7025	708.9786	733.8169	(73)

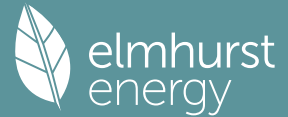
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
Southeast				10.3800	36.7938	0.5200	0.7000	0.7700	96.3401 (77)				
Southwest				5.4500	36.7938	0.5200	0.7000	0.7700	50.5832 (79)				
Northwest				12.2500	11.2829	0.5200	0.7000	0.7700	34.8653 (81)				
Solar gains	181.7885	321.2339	470.2871	634.2682	757.4946	772.7175	736.3675	641.2703	526.5761	363.3258	219.8497	154.2084	(83)
Total gains	931.8472	1091.3621	1207.9261	1349.0202	1436.3569	1425.6938	1364.6207	1269.2833	1173.2233	1033.0284	928.8283	888.0254	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

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Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	70.1767	70.2732	70.3680	70.8169	70.9015	71.2981	71.2981	71.3720	71.1448	70.9015	70.7305	70.5527
alpha	5.6784	5.6849	5.6912	5.7211	5.7268	5.7532	5.7532	5.7581	5.7430	5.7268	5.7154	5.7035
util living area	0.9987	0.9964	0.9901	0.9629	0.8776	0.6978	0.5221	0.5811	0.8366	0.9774	0.9966	0.9990 (86)
MIT	19.7857	19.9563	20.2041	20.5413	20.8209	20.9643	20.9942	20.9897	20.9001	20.5368	20.0991	19.7548 (87)
Th 2	20.0920	20.0932	20.0943	20.0995	20.1005	20.1051	20.1051	20.1059	20.1033	20.1005	20.0985	20.0964 (88)
util rest of house	0.9982	0.9952	0.9866	0.9493	0.8353	0.6154	0.4194	0.4745	0.7689	0.9665	0.9953	0.9987 (89)
MIT 2	18.6609	18.8799	19.1962	19.6208	19.9445	20.0840	20.1031	20.1021	20.0323	19.6217	19.0670	18.6246 (90)
Living area fraction									FLA = Living area /	(4) =		0.1105 (91)
MIT	18.7852	18.9988	19.3076	19.7225	20.0414	20.1812	20.2016	20.2002	20.1282	19.7228	19.1810	18.7495 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7852	18.9988	19.3076	19.7225	20.0414	20.1812	20.2016	20.2002	20.1282	19.7228	19.1810	18.7495 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9972	0.9930	0.9823	0.9421	0.8321	0.6229	0.4307	0.4861	0.7711	0.9604	0.9932	0.9979 (94)
Useful gains	929.2634	1083.7696	1186.6007	1270.9058	1195.2451	888.0183	587.6787	617.0167	904.6657	992.1020	922.5261	886.1367 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	2412.4205	2344.8509	2127.2263	1786.1255	1375.0016	914.9032	590.3894	622.2933	990.3058	1503.8221	1996.2701	2410.2148 (97)
Space heating kWh	1103.4689	847.4466	699.8254	370.9582	133.7388	0.0000	0.0000	0.0000	0.0000	380.7197	773.0956	1133.9141 (98a)
Space heating requirement - total per year (kWh/year)												5443.1674
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1103.4689	847.4466	699.8254	370.9582	133.7388	0.0000	0.0000	0.0000	0.0000	380.7197	773.0956	1133.9141 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5443.1674
Space heating per m2										(98c) / (4) =		32.3421 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												83.6000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	1103.4689	847.4466	699.8254	370.9582	133.7388	0.0000	0.0000	0.0000	0.0000	380.7197	773.0956	1133.9141 (98)
Space heating efficiency (main heating system 1)	83.6000	83.6000	83.6000	83.6000	83.6000	0.0000	0.0000	0.0000	0.0000	83.6000	83.6000	83.6000 (210)
Space heating fuel (main heating system)	1319.9388	1013.6921	837.1118	443.7299	159.9747	0.0000	0.0000	0.0000	0.0000	455.4063	924.7556	1356.3566 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	271.5391	240.2857	255.7419	226.0917	219.9840	199.1251	197.2220	204.5747	206.2812	228.9347	242.0866	268.7459 (64)
Efficiency of water heater (217)m	81.6649	81.4410	80.9977	79.9623	77.7793	74.6000	74.6000	74.6000	74.6000	79.9915	81.2739	79.6000 (216)
Fuel for water heating, kWh/month	332.5040	295.0428	315.7396	282.7479	282.8312	266.9238	264.3727	274.2288	276.5164	286.1989	297.8653	328.8564 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	36.8563	29.5675	26.6223	19.5046	15.0659	12.3090	13.7436	17.8645	23.2042	30.4452	34.3878	37.8807 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												6510.9658 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.6000
Water heating fuel used												3503.8277 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												41.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												297.4515 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												

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Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	10398.2450	(238)

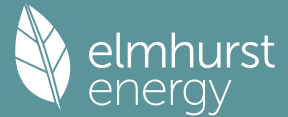
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	6510.9658	0.2100	1367.3028	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3503.8277	0.2100	735.8038	(264)
Space and water heating			2103.1066	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	297.4515	0.1443	42.9314	(268)
Total CO2, kg/year			2157.9673	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.8200	(273)

----- 13a. Primary energy - Individual heating systems including micro-CHP -----

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	6510.9658	1.1300	7357.3914	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3503.8277	1.1300	3959.3253	(278)
Space and water heating			11316.7167	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	297.4515	1.5338	456.2410	(282)
Total Primary energy kWh/year			11903.0585	(286)
Dwelling Primary energy Rate (DPER)			70.7300	(287)

Full SAP Calculation Printout



Property Reference	Hurst 5BH DET 221 GAS			Issued on Date	07/06/2025
Assessment Reference	Hurst 5BH DET 221 GAS	Prop Type Ref	Hurst 5BH DET 221 GAS		
Property	Land between, School Rd & Orchard Rd, Hurst, Berkshire				
SAP Rating	87 B	DER	12.24	TER	7.88
Environmental	87 B	% DER < TER			-55.33
CO ₂ Emissions (t/year)	2.38	DFEE	38.51	TFEE	38.60
Compliance Check	See BREL	% DFEE < TFEE			0.23
% DPER < TPER	-62.00	DPER	67.31	TPER	41.55
Assessor Details	Mr. Ivan Ball			Assessor ID	DE88-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	110.4000 (1b)	x 2.4000 (2b)	= 264.9600 (1b) - (3b)
First floor	110.4000 (1c)	x 2.4000 (2c)	= 264.9600 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	220.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 529.9200 (5)

2. Ventilation rate

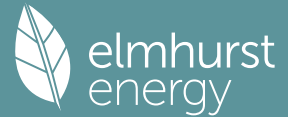
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.0755 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2755 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2342 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2986	0.2927	0.2868	0.2576	0.2517	0.2225	0.2225	0.2166	0.2342	0.2517	0.2634	0.2751 (22b)
Effective ac	0.5446	0.5428	0.5411	0.5332	0.5317	0.5247	0.5247	0.5235	0.5274	0.5317	0.5347	0.5379 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows & Glazed Doors			44.6900	1.3258	59.2481		(27)
External Doors			3.7800	1.2000	4.5360		(26a)
Ground Floor			110.4000	0.1100	12.1440		(28a)
External Wall	217.8200	48.4700	169.3500	0.1800	30.4830		(29a)
External Roof	110.4000		110.4000	0.1000	11.0400		(30)
Total net area of external elements Aum(A, m ²)			438.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	117.4511		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				28.1500	0.0280	0.7882	
E3 Sill				18.9000	0.0240	0.4536	
E4 Jamb				48.6000	0.0190	0.9234	
E5 Ground floor (normal)				45.3800	0.0460	2.0875	
E16 Corner (normal)				38.4000	0.0370	1.4208	
E17 Corner (inverted - internal area greater than external area)				19.2000	-0.0790	-1.5168	
E6 Intermediate floor within a dwelling				45.3800	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)				45.3800	0.0510	2.3144	

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Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal bridges
Total fabric heat loss

(33) + (36) + (36a) = 123.9222 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	95.2305	94.9278	94.6312	93.2379	92.9772	91.7636	91.7636	91.5389	92.2311	92.9772	93.5045	94.0559	(38)
Heat transfer coeff	219.1526	218.8500	218.5534	217.1600	216.8993	215.6858	215.6858	215.4611	216.1532	216.8993	217.4267	217.9780	(39)
Average = Sum(39)m / 12 =												217.1588	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9925	0.9912	0.9898	0.9835	0.9823	0.9768	0.9768	0.9758	0.9790	0.9823	0.9847	0.9872	(40)
HLP (average)												0.9835	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 3.0290 (42)

Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)

Hot water usage for baths 86.5319 85.2468 83.4371 80.1003 77.6017 74.8312 73.3348 75.1318 77.0885 80.0530 83.4585 86.2394 (42b)

Hot water usage for other uses 45.6497 43.9897 42.3297 40.6697 39.0097 37.3497 37.3497 39.0097 40.6697 42.3297 43.9897 45.6497 (42c)

Average daily hot water use (litres/day) 121.7284 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	132.1816	129.2365	125.7668	120.7700	116.6115	112.1810	110.6845	114.1415	117.7582	122.3827	127.4482	131.8891	(44)
Energy conte	209.3434	184.0311	193.2989	165.3281	156.9815	137.9396	133.8633	141.3311	145.2076	166.0722	181.5734	206.5064	(45)
Energy content (annual)												2021.4765	
Distribution loss (46)m = 0.15 x (45)m	31.4015	27.6047	28.9948	24.7992	23.5472	20.6909	20.0795	21.1997	21.7811	24.9108	27.2360	30.9760	(46)
Water storage loss:													
Store volume												250.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6800	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9072	(55)
Total storage loss	28.1232	25.4016	28.1232	27.2160	28.1232	27.2160	28.1232	28.1232	27.2160	28.1232	27.2160	28.1232	(56)
If cylinder contains dedicated solar storage	28.1232	25.4016	28.1232	27.2160	28.1232	27.2160	28.1232	28.1232	27.2160	28.1232	27.2160	28.1232	(57)
Primary loss	37.2980	33.6885	37.2980	36.0948	37.2980	36.0948	37.2980	37.2980	36.0948	37.2980	36.0948	37.2980	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	274.7645	243.1211	258.7200	228.6389	222.4026	201.2504	199.2845	206.7522	208.5184	231.4934	244.8842	271.9276	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	274.7645	243.1211	258.7200	228.6389	222.4026	201.2504	199.2845	206.7522	208.5184	231.4934	244.8842	271.9276	(64)
12Total per year (kWh/year)												2791.7579	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	121.9436	108.4624	116.6088	105.6202	104.5333	96.5136	96.8465	99.3295	98.9302	107.5559	111.0218	121.0003	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	198.0658	219.2871	198.0658	204.6680	198.0658	204.6680	198.0658	198.0658	204.6680	198.0658	204.6680	198.0658	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	390.4083	394.4595	384.2506	362.5170	335.0822	309.2974	292.0715	288.0203	298.2292	319.9628	347.3976	373.1825	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	(71)
Water heating gains (Table 5)	163.9027	161.4024	156.7323	146.6948	140.5017	134.0466	130.1700	133.5074	137.4030	144.5644	154.1969	162.6348	(72)
Total internal gains	823.8113	846.5835	810.4832	785.3142	745.0842	716.4465	688.7418	688.0280	708.7348	734.0276	777.6970	805.3176	(73)

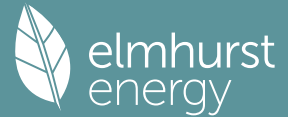
6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W							
Northeast	2.8400	11.2829	0.5200	0.7000	0.7700	8.0831	(75)						
Southeast	17.3600	36.7938	0.5200	0.7000	0.7700	161.1237	(77)						
Southwest	2.8400	36.7938	0.5200	0.7000	0.7700	26.3589	(79)						
Northwest	21.6500	11.2829	0.5200	0.7000	0.7700	61.6190	(81)						
Solar gains	257.1847	461.2329	692.5754	961.2119	1170.7217	1203.6402	1143.2152	980.5846	784.6078	526.3416	312.2642	217.3683	(83)
Total gains	1080.9960	1307.8164	1503.0586	1746.5261	1915.8059	1920.0867	1831.9570	1668.6126	1493.3425	1260.3692	1089.9613	1022.6859	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

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Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	69.9665	70.0632	70.1583	70.6085	70.6933	71.0911	71.0911	71.1652	70.9373	70.6933	70.5218	70.3435	
alpha	5.6644	5.6709	5.6772	5.7072	5.7129	5.7394	5.7394	5.7443	5.7292	5.7129	5.7015	5.6896	
util living area	0.9993	0.9977	0.9923	0.9652	0.8721	0.6848	0.5122	0.5815	0.8509	0.9838	0.9981	0.9995	(86)
MIT	19.7106	19.8908	20.1611	20.5284	20.8265	20.9672	20.9947	20.9896	20.8893	20.4913	20.0317	19.6792	(87)
Th 2	20.0896	20.0907	20.0918	20.0971	20.0981	20.1027	20.1027	20.1035	20.1009	20.0981	20.0961	20.0940	(88)
util rest of house	0.9991	0.9969	0.9896	0.9522	0.8287	0.6026	0.4109	0.4746	0.7855	0.9757	0.9973	0.9993	(89)
MIT 2	18.5629	18.7944	19.1401	19.6033	19.9478	20.0835	20.1009	20.0996	20.0211	19.5644	18.9793	18.5258	(90)
Living area fraction									FLA = Living area / (4) =			0.0928	(91)
MIT	18.6694	18.8962	19.2349	19.6892	20.0294	20.1655	20.1839	20.1823	20.1017	19.6505	19.0770	18.6329	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.6694	18.8962	19.2349	19.6892	20.0294	20.1655	20.1839	20.1823	20.1017	19.6505	19.0770	18.6329	(93)

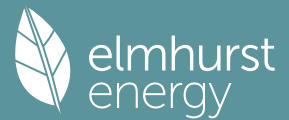
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9985	0.9954	0.9858	0.9447	0.8250	0.6087	0.4202	0.4843	0.7855	0.9700	0.9959	0.9989	(94)
Useful gains	1079.3318	1301.7879	1481.7886	1649.9295	1580.4682	1168.7071	769.8265	808.0799	1173.0540	1222.5472	1085.5291	1021.5309	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	3149.0979	3063.0586	2783.2482	2342.9862	1806.6410	1200.4083	772.9936	814.9299	1297.2837	1963.0464	2604.1244	3146.0612	(97)
Space heating kWh	1539.9060	1183.5739	968.2859	499.0009	168.2726	0.0000	0.0000	0.0000	0.0000	550.9314	1093.3886	1580.6506	(98a)
Space heating requirement - total per year (kWh/year)												7584.0099	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	1539.9060	1183.5739	968.2859	499.0009	168.2726	0.0000	0.0000	0.0000	0.0000	550.9314	1093.3886	1580.6506	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7584.0099	
Space heating per m2										(98c) / (4) =		34.3479	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													83.7000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	1539.9060	1183.5739	968.2859	499.0009	168.2726	0.0000	0.0000	0.0000	0.0000	550.9314	1093.3886	1580.6506	(98)	
Space heating efficiency (main heating system 1)	83.7000	83.7000	83.7000	83.7000	83.7000	0.0000	0.0000	0.0000	0.0000	83.7000	83.7000	83.7000	(210)	
Space heating fuel (main heating system)	1839.7921	1414.0668	1156.8530	596.1779	201.0425	0.0000	0.0000	0.0000	0.0000	658.2215	1306.3185	1888.4714	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating														
Water heating requirement	274.7645	243.1211	258.7200	228.6389	222.4026	201.2504	199.2845	206.7522	208.5184	231.4934	244.8842	271.9276	(64)	
Efficiency of water heater (217)m	82.2089	82.0254	81.6371	80.6605	78.3424	74.7000	74.7000	74.7000	74.7000	80.8323	81.9043	79.7000	(216)	
Fuel for water heating, kWh/month	334.2272	296.3975	316.9147	283.4582	283.8855	269.4115	266.7797	276.7768	279.1412	286.3871	298.9883	330.5960	(219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	41.3664	33.1857	29.8800	21.8914	16.9095	13.8152	15.4255	20.0506	26.0437	34.1708	38.5958	42.5161	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1												9060.9437	(211)	
Space heating fuel - main system 2												0.0000	(213)	
Space heating fuel - secondary												0.0000	(215)	
Efficiency of water heater												79.7000		
Water heating fuel used												3522.9638	(219)	
Space cooling fuel												0.0000	(221)	
Electricity for pumps and fans:														
central heating pump												41.0000	(230c)	
main heating flue fan												45.0000	(230e)	
Total electricity for the above, kWh/year												86.0000	(231)	
Electricity for lighting (calculated in Appendix L)												333.8509	(232)	
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation												0.0000	(233)	
Wind generation												0.0000	(234)	
Hydro-electric generation (Appendix N)												0.0000	(235a)	
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)	
Appendix Q - special features														

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Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	13003.7583 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

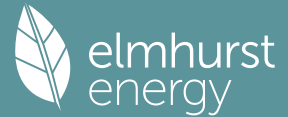
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	9060.9437	0.2100	1902.7982 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3522.9638	0.2100	739.8224 (264)
Space and water heating			2642.6206 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	333.8509	0.1443	48.1850 (268)
Total CO2, kg/year			2702.7348 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.2400 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	9060.9437	1.1300	10238.8664 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3522.9638	1.1300	3980.9491 (278)
Space and water heating			14219.8154 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	333.8509	1.5338	512.0716 (282)
Total Primary energy kWh/year			14861.9878 (286)
Dwelling Primary energy Rate (DPER)			67.3100 (287)

Appendix 2 – DER Worksheets for the Modelled Units based on Heat Pumps

Full SAP Calculation Printout



Property Reference	Hurst 2BF GND 71 EAHF				Issued on Date	07/06/2025	
Assessment Reference	Hurst 2BF GND 71 EAHF			Prop Type Ref	Hurst 2BF GND 71 EAHF		
Property	Land between , School Rd & Orchard Rd, Hurst, Berkshire						
SAP Rating	87 B	DER	3.49	TER	10.94		
Environmental	97 A	% DER < TER				68.10	
CO ₂ Emissions (t/year)	0.22	DFEE	28.08	TFEE	31.11		
Compliance Check	See BREL	% DFEE < TFEE				9.73	
% DPER < TPER	35.75	DPER	36.67	TPER	57.07		
Assessor Details	Mr. Ivan Ball				Assessor ID	DE88-0001	
Client							

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	70.5000 (1b)	2.4000 (2b)	169.2000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.5000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	169.2000 (5)

2. Ventilation rate

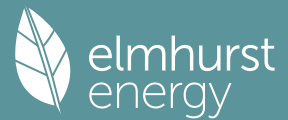
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	1 * 10 = 10.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	10.0000 / (5) = 0.0591 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2591 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2202 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2808	0.2753	0.2698	0.2423	0.2368	0.2092	0.2092	0.2037	0.2202	0.2368	0.2478	0.2588 (22b)
Effective ac	0.5394	0.5379	0.5364	0.5293	0.5280	0.5219	0.5219	0.5208	0.5243	0.5280	0.5307	0.5335 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows & Glazed Doors			10.0000	1.3258	13.2576		(27)
Ground Floor			70.5000	0.1100	7.7550		(28a)
External Wall	57.0200	10.0000	47.0200	0.1800	8.4636		(29a)
Total net area of external elements Aum(A, m ²)			127.5200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.4762		(33)
Main dwelling							
Party Wall			24.2200	0.0000	0.0000		(32)
Party Ceiling			70.5000				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				6.7000	0.0280	0.1876	
E3 Sill				6.7000	0.0240	0.1608	
E4 Jamb				17.4000	0.0190	0.3306	
E18 Party wall between dwellings				4.8000	0.0410	0.1968	
E16 Corner (normal)				7.2000	0.0370	0.2664	
E5 Ground floor (normal)				23.7600	0.0460	1.0930	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							2.2352 (36)
Point Thermal bridges						(36a) =	0.0000

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Total fabric heat loss (33) + (36) + (36a) = 31.7113 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	30.1193	30.0338	29.9501	29.5565	29.4829	29.1401	29.1401	29.0766	29.2721	29.4829	29.6318	29.7876 (38)
Heat transfer coeff	61.8307	61.7452	61.6614	61.2678	61.1942	60.8514	60.8514	60.7880	60.9835	61.1942	61.3432	61.4989 (39)
Average = Sum(39)m / 12 =												61.2675

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.8770	0.8758	0.8746	0.8690	0.8680	0.8631	0.8631	0.8622	0.8650	0.8680	0.8701	0.8723 (40)
HLP (average)												0.8690
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2582 (42)

Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)

Hot water usage for baths 71.5694 70.5065 69.0097 66.2499 64.1834 61.8919 60.6542 62.1405 63.7589 66.2108 69.0275 71.3275 (42b)

Hot water usage for other uses 37.7563 36.3833 35.0103 33.6374 32.2644 30.8915 30.8915 32.2644 33.6374 35.0103 36.3833 37.7563 (42c)

Average daily hot water use (litres/day) 100.6800 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	109.3257	106.8898	104.0201	99.8873	96.4478	92.7834	91.5457	94.4050	97.3963	101.2211	105.4108	109.0837 (44)
Energy conte	173.1452	152.2097	159.8750	136.7407	129.8373	114.0880	110.7166	116.8931	120.0993	137.3561	150.1770	170.7988 (45)
Energy content (annual)										Total = Sum(45)m =		1671.9368
Distribution loss (46)m = 0.15 x (45)m	25.9718	22.8315	23.9812	20.5111	19.4756	17.1132	16.6075	17.5340	18.0149	20.6034	22.5265	25.6198 (46)
Water storage loss:												
Store volume												170.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8424 (55)
Total storage loss	26.1144	23.5872	26.1144	25.2720	26.1144	25.2720	26.1144	26.1144	25.2720	26.1144	25.2720	26.1144 (56)
If cylinder contains dedicated solar storage	26.1144	23.5872	26.1144	25.2720	26.1144	25.2720	26.1144	26.1144	25.2720	26.1144	25.2720	26.1144 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	199.2596	175.7969	185.9894	162.0127	155.9517	139.3600	136.8310	143.0075	145.3713	163.4705	175.4490	196.9132 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	199.2596	175.7969	185.9894	162.0127	155.9517	139.3600	136.8310	143.0075	145.3713	163.4705	175.4490	196.9132 (64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1979.4128 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	57.5708	50.6097	53.1584	45.4663	43.1709	37.9343	36.8133	38.8670	39.9330	45.6709	49.9338	56.7906 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101	112.9101 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.0853	118.5588	107.0853	110.6549	107.0853	110.6549	107.0853	107.0853	110.6549	107.0853	110.6549	107.0853 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	198.4612	200.5206	195.3310	184.2829	170.3366	157.2291	148.4724	146.4130	151.6026	162.6508	176.5970	189.7046 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910	34.2910 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281	-90.3281 (71)
Water heating gains (Table 5)	77.3801	75.3121	71.4495	63.1476	58.0254	52.6865	49.4802	52.2405	55.4625	61.3856	69.3526	76.3314 (72)
Total internal gains	439.7997	451.2645	430.7389	414.9584	392.3204	377.4434	361.9110	362.6119	374.5931	387.9948	413.4775	429.9944 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
Northeast	1.8200	11.2829	0.5200	0.7000	0.7700	5.1800 (75)						
Southeast	2.7700	36.7938	0.5200	0.7000	0.7700	25.7093 (77)						
Northwest	5.4100	11.2829	0.5200	0.7000	0.7700	15.3976 (81)						
Solar gains	46.2869	85.6787	135.3845	198.1787	249.7525	260.1641	245.7415	205.3973	156.8356	99.5883	56.6857	38.8065 (83)
Total gains	486.0865	536.9432	566.1234	613.1371	642.0729	637.6075	607.6525	568.0092	531.4286	487.5831	470.1632	468.8009 (84)

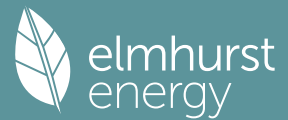
7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	79.1813	79.2909	79.3987	79.9087	80.0048	80.4555	80.4555	80.5395	80.2813	80.0048	79.8106	79.6085

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alpha	6.2788	6.2861	6.2932	6.3272	6.3337	6.3637	6.3637	6.3693	6.3521	6.3337	6.3207	6.3072
util living area	0.9953	0.9903	0.9786	0.9308	0.8065	0.6002	0.4393	0.4895	0.7462	0.9496	0.9894	0.9962 (86)
Living	20.1219	20.2600	20.4556	20.7265	20.9178	20.9892	20.9987	20.9975	20.9611	20.7220	20.3792	20.0933
Non living	19.1621	19.3383	19.5854	19.9181	20.1269	20.1928	20.1985	20.1988	20.1717	19.9196	19.4945	19.1288
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	31	28	31	30	31	30	31	31	30	31	30	31
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
MIT	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000 (87)
Th 2	20.1871	20.1881	20.1891	20.1939	20.1948	20.1989	20.1989	20.1997	20.1973	20.1948	20.1930	20.1911 (88)
util rest of house	0.9939	0.9874	0.9718	0.9098	0.7582	0.5297	0.3601	0.4059	0.6763	0.9297	0.9857	0.9951 (89)
MIT 2	20.1871	20.1881	20.1891	20.1939	20.1948	20.1989	20.1989	20.1997	20.1973	20.1948	20.1930	20.1911 (90)
Living area fraction									fLA = Living area /	(4) =		0.3929 (91)
MIT	20.5065	20.5071	20.5077	20.5106	20.5112	20.5137	20.5137	20.5142	20.5127	20.5112	20.5101	20.5089 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5065	20.5071	20.5077	20.5106	20.5112	20.5137	20.5137	20.5142	20.5127	20.5112	20.5101	20.5089 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9945	0.9886	0.9747	0.9187	0.7781	0.5578	0.3913	0.4390	0.7049	0.9383	0.9873	0.9956	(94)
Useful gains	483.4071	530.8384	551.8024	563.2917	499.6083	355.6797	237.7797	249.3359	374.6206	457.5216	464.1951	466.7319	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1002.0570	963.6634	863.7355	711.3574	539.1919	359.8563	238.1534	250.0910	391.0694	606.5055	822.6156	1002.9802	(97)
Space heating kWh	385.8755	290.8584	232.0782	106.6073	29.4502	0.0000	0.0000	0.0000	0.0000	110.8440	258.0628	398.9688	(98a)
Space heating requirement - total per year (kWh/year)												1812.7452	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	385.8755	290.8584	232.0782	106.6073	29.4502	0.0000	0.0000	0.0000	0.0000	110.8440	258.0628	398.9688	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1812.7452	
Space heating per m2										(98c) / (4) =		25.7127	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												302.8997	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	385.8755	290.8584	232.0782	106.6073	29.4502	0.0000	0.0000	0.0000	0.0000	110.8440	258.0628	398.9688	(98)
Space heating efficiency (main heating system 1)	302.8997	302.8997	302.8997	302.8997	302.8997	0.0000	0.0000	0.0000	0.0000	302.8997	302.8997	302.8997	(210)
Space heating fuel (main heating system)	127.3938	96.0247	76.6188	35.1956	9.7228	0.0000	0.0000	0.0000	0.0000	36.5943	85.1975	131.7165	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	199.2596	175.7969	185.9894	162.0127	155.9517	139.3600	136.8310	143.0075	145.3713	163.4705	175.4490	196.9132	(64)
Efficiency of water heater (217)m	220.6850	220.6850	220.6850	220.6850	220.6850	220.6850	220.6850	220.6850	220.6850	220.6850	220.6850	220.6850	(216)
Fuel for water heating, kWh/month	90.2914	79.6596	84.2782	73.4136	70.6671	63.1489	62.0028	64.8016	65.8728	74.0742	79.5020	89.2282	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	22.2502	17.8500	16.0719	11.7750	9.0953	7.4310	8.2971	10.7848	14.0084	18.3798	20.7600	22.8686	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												598.4639	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												220.6850	
Water heating fuel used												896.9403	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												179.5720	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													

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Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1674.9763 (238)

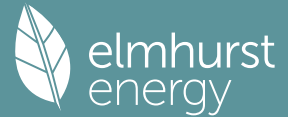
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	598.4639	0.1562	93.4796 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	896.9403	0.1411	126.5613 (264)
Space and water heating			220.0409 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	179.5720	0.1443	25.9178 (268)
Total CO2, kg/year			245.9587 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.4900 (273)

----- 13a. Primary energy - Individual heating systems including micro-CHP -----

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	598.4639	1.5783	944.5463 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	896.9403	1.5218	1364.9271 (278)
Space and water heating			2309.4733 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	179.5720	1.5338	275.4336 (282)
Total Primary energy kWh/year			2584.9069 (286)
Dwelling Primary energy Rate (DPER)			36.6700 (287)

Full SAP Calculation Printout



Property Reference	Hurst 3BH SEMI 98 ASHP				Issued on Date	07/06/2025
Assessment Reference	Hurst 3BH SEMI 98 ASHP	Prop Type Ref		Hurst 3BH SEMI 98 ASHP		
Property	Land between, School Rd & Orchard Rd, Hurst, Berkshire					
SAP Rating	82 B	DER	4.17	TER	9.69	
Environmental	96 A	% DER < TER				56.97
CO ₂ Emissions (t/year)	0.37	DFEE	31.67	TFEE	32.61	
Compliance Check	See BREL	% DFEE < TFEE				2.88
% DPER < TPER	12.86	DPER	43.88	TPER	50.36	
Assessor Details	Mr. Ivan Ball				Assessor ID	DE88-0001
Client						

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	48.9000 (1b)	x 2.4000 (2b)	= 117.3600 (1b) - (3b)
First floor	48.9000 (1c)	x 2.4000 (2c)	= 117.3600 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	97.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 234.7200 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.0852 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2852 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2424 (21)

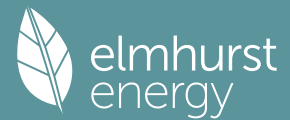
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3091	0.3030	0.2970	0.2667	0.2606	0.2303	0.2303	0.2242	0.2424	0.2606	0.2727	0.2849 (22b)
Effective ac	0.5478	0.5459	0.5441	0.5356	0.5340	0.5265	0.5265	0.5251	0.5294	0.5340	0.5372	0.5406 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows & Glazed Doors			17.4500	1.3258	23.1345		(27)
External Doors			1.8900	1.2000	2.2680		(26a)
Ground Floor			48.9000	0.1100	5.3790		(28a)
External Wall	95.0400	19.3400	75.7000	0.1800	13.6260		(29a)
External Roof	48.9000		48.9000	0.1000	4.8900		(30)
Total net area of external elements Aum(A, m ²)			192.8400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		49.2975		(33)
Main dwelling							
Party Wall			45.5000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				11.5000	0.0280		0.3220
E3 Sill				8.3000	0.0240		0.1992
E4 Jamb				27.0000	0.0190		0.5130
E5 Ground floor (normal)				19.8000	0.0460		0.9108
E16 Corner (normal)				9.6000	0.0370		0.3552
E6 Intermediate floor within a dwelling				19.8000	0.0000		0.0000

6. Solar gains												
[Jan]				Area m ²	Solar flux Table 6a W/m ²		Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W
Northeast				8.8800	11.2829		0.5200		0.7000		0.7700	25.2738 (75)
Southwest				8.5700	36.7938		0.5200		0.7000		0.7700	79.5409 (79)
Solar gains	104.8147	186.9330	278.0684	381.9158	461.8922	473.5579	450.3156	388.3555	313.6696	212.6131	127.0726	88.7103 (83)
Total gains	709.0651	805.4488	871.6623	956.4491	1008.5591	1001.8745	959.5292	898.0514	837.9439	753.2724	698.7979	680.6306 (84)

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Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	71.3120	71.4197	71.5257	72.0275	72.1221	72.5661	72.5661	72.6489	72.3944	72.1221	71.9309	71.7320
alpha	5.7541	5.7613	5.7684	5.8018	5.8081	5.8377	5.8377	5.8433	5.8263	5.8081	5.7954	5.7821
util living area												
	0.9947	0.9881	0.9725	0.9168	0.7868	0.5856	0.4274	0.4755	0.7254	0.9396	0.9877	0.9958 (86)
Living	19.9976	20.1673	20.4004	20.7004	20.9067	20.9860	20.9981	20.9965	20.9551	20.6918	20.2943	19.9651
Non living	18.9410	19.1572	19.4506	19.8163	20.0389	20.1116	20.1187	20.1190	20.0886	19.8146	19.3241	18.9033
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4872	20.1673	20.4004	20.7004	20.9067	20.9860	20.9981	20.9965	20.9551	20.6918	20.2943	20.1099 (87)
Th 2	20.1052	20.1064	20.1077	20.1133	20.1144	20.1193	20.1193	20.1203	20.1174	20.1144	20.1122	20.1100 (88)
util rest of house												
	0.9930	0.9845	0.9639	0.8921	0.7342	0.5103	0.3428	0.3863	0.6501	0.9161	0.9833	0.9944 (89)
MIT 2	19.6411	19.1572	19.4506	19.8163	20.0389	20.1116	20.1187	20.1190	20.0886	19.8146	19.3241	19.1207 (90)
Living area fraction												
MIT	19.7570	19.2956	19.5807	19.9374	20.1578	20.2314	20.2392	20.2393	20.2073	19.9348	19.4570	19.2563 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7570	19.2956	19.5807	19.9374	20.1578	20.2314	20.2392	20.2393	20.2073	19.9348	19.4570	19.2563 (93)

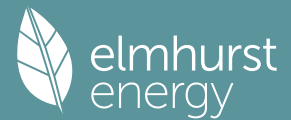
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9922	0.9801	0.9575	0.8865	0.7370	0.5201	0.3544	0.3985	0.6583	0.9103	0.9788	0.9927 (94)
Useful gains	703.5327	789.3930	834.5814	847.8591	743.2997	521.1108	340.0833	357.9023	551.5809	685.6967	683.9754	675.6478 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1472.1078	1368.9466	1242.0722	1040.7497	796.4587	527.0610	340.6037	358.9181	572.9580	879.0472	1166.7440	1425.5436 (97)
Space heating kWh	571.8199	389.4601	303.1732	138.8812	39.5503	0.0000	0.0000	0.0000	0.0000	143.8528	347.5934	557.9225 (98a)
Space heating requirement - total per year (kWh/year)												2492.2534
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	571.8199	389.4601	303.1732	138.8812	39.5503	0.0000	0.0000	0.0000	0.0000	143.8528	347.5934	557.9225 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2492.2534
Space heating per m2										(98c) / (4) =		25.4832 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												263.5763 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	571.8199	389.4601	303.1732	138.8812	39.5503	0.0000	0.0000	0.0000	0.0000	143.8528	347.5934	557.9225 (98)
Space heating efficiency (main heating system 1)	263.5763	263.5763	263.5763	263.5763	263.5763	0.0000	0.0000	0.0000	0.0000	263.5763	263.5763	263.5763 (210)
Space heating fuel (main heating system)	216.9466	147.7599	115.0229	52.6911	15.0053	0.0000	0.0000	0.0000	0.0000	54.5773	131.8758	211.6740 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	260.1698	230.2911	245.2439	217.1128	211.4584	191.6337	189.9520	196.8991	198.3951	219.9154	232.2255	257.5307 (64)
Efficiency of water heater (217)m	163.6200	163.6200	163.6200	163.6200	163.6200	163.6200	163.6200	163.6200	163.6200	163.6200	163.6200	163.6200 (216)
Fuel for water heating, kWh/month	159.0086	140.7475	149.8863	132.6933	129.2375	117.1212	116.0934	120.3393	121.2536	134.4062	141.9298	157.3956 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	27.0895	21.7322	19.5675	14.3360	11.0735	9.0472	10.1016	13.1305	17.0552	22.3773	25.2752	27.8424 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												945.5530 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												163.6200
Water heating fuel used												1620.1122 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												218.6281 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)

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Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2784.2933 (238)

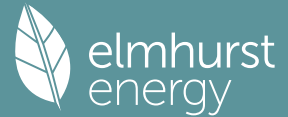
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	945.5530	0.1565	147.9565 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1620.1122	0.1407	227.9831 (264)
Space and water heating			375.9396 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	218.6281	0.1443	31.5548 (268)
Total CO2, kg/year			407.4944 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	945.5530	1.5793	1493.2881 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1620.1122	1.5203	2463.0963 (278)
Space and water heating			3956.3845 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	218.6281	1.5338	335.3391 (282)
Total Primary energy kWh/year			4291.7236 (286)
Dwelling Primary energy Rate (DPER)			43.8800 (287)

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Property Reference	Hurst 4BH DET 168 ASHP				Issued on Date	07/06/2025	
Assessment Reference	Hurst 4BH DET 168 ASHP			Prop Type Ref	Hurst 4BH DET 168 ASHP		
Property	Land between, School Rd & Orchard Rd, Hurst, Berkshire						
SAP Rating	83 B		DER	3.35		TER	8.74
Environmental	97 A		% DER < TER				61.67
CO ₂ Emissions (t/year)	0.51		DFEE	37.24		TFEE	38.24
Compliance Check	See BREL		% DFEE < TFEE				2.61
% DPER < TPER	23.86		DPER	34.90		TPER	45.83
Assessor Details	Mr. Ivan Ball					Assessor ID	DE88-0001
Client							

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	84.1500 (1b)	x 2.4000 (2b)	= 201.9600 (1b) - (3b)
First floor	84.1500 (1c)	x 2.4000 (2c)	= 201.9600 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	168.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 403.9200 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.0743 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2743 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2331 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2972	0.2914	0.2856	0.2564	0.2506	0.2215	0.2215	0.2156	0.2331	0.2506	0.2623	0.2739 (22b)
Effective ac	0.5442	0.5425	0.5408	0.5329	0.5314	0.5245	0.5245	0.5233	0.5272	0.5314	0.5344	0.5375 (25)

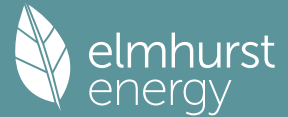
3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows & Glazed Doors			28.0800	1.3258	37.2273		(27)
External Doors			3.7800	1.2000	4.5360		(26a)
Ground Floor			84.1500	0.1100	9.2565		(28a)
External Wall	193.0100	31.8600	161.1500	0.1800	29.0070		(29a)
External Roof	84.1500		84.1500	0.1000	8.4150		(30)
Total net area of external elements Aum(A, m ²)			361.3100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	88.4418		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	18.5500	0.0280	0.5194
E2 Other lintels (including other steel lintels)	13.4000	0.0240	0.3216
E3 Sill	41.1000	0.0190	0.7809
E4 Jamb	40.2100	0.0460	1.8497
E5 Ground floor (normal)	28.8000	0.0370	1.0656
E16 Corner (normal)	9.6000	-0.0790	-0.7584
E17 Corner (inverted - internal area greater than external area)	40.2100	0.0000	0.0000
E6 Intermediate floor within a dwelling	24.6600	0.0510	1.2577
E10 Eaves (insulation at ceiling level)			

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E13 Gable (insulation at rafter level) 15.6000 0.0340 0.5304
 Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.5668 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 94.0086 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
 (38)m Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 Heat transfer coeff 72.5352 72.3066 72.0825 71.0297 70.8328 69.9159 69.9159 69.7461 70.2691 70.8328 71.2312 71.6478 (38)
 Average = Sum(39)m / 12 = 166.5438 166.3152 166.0911 165.0383 164.8414 163.9245 163.9245 163.7547 164.2777 164.8414 165.2398 165.6564 (39)
 166.5438 166.3152 166.0911 165.0383 164.8414 163.9245 163.9245 163.7547 164.2777 164.8414 165.2398 165.6564 (39)
 166.5438 166.3152 166.0911 165.0383 164.8414 163.9245 163.9245 163.7547 164.2777 164.8414 165.2398 165.6564 (39)

HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 HLP (average) 0.9896 0.9882 0.9869 0.9806 0.9794 0.9740 0.9740 0.9730 0.9761 0.9794 0.9818 0.9843 (40)
 Days in mont 31 28 31 30 31 30 31 31 30 31 30 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9603 (42)
 Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)
 Hot water usage for baths 85.1987 83.9334 82.1516 78.8662 76.4061 73.6783 72.2049 73.9743 75.9008 78.8196 82.1727 84.9107 (42b)
 Hot water usage for other uses 44.9463 43.3119 41.6775 40.0431 38.4087 36.7743 36.7743 38.4087 40.0431 41.6775 43.3119 44.9463 (42c)
 Average daily hot water use (litres/day) 119.8530 (43)
 Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 Energy conte 130.1451 127.2453 123.8291 118.9093 114.8148 110.4526 108.9792 112.3829 115.9439 120.4971 125.4846 129.8570 (44)
 Energy content (annual) 206.1180 181.1957 190.3207 162.7809 154.5628 135.8143 131.8008 139.1536 142.9704 163.5135 178.7758 203.3247 (45)
 Distribution loss (46)m = 0.15 x (45)m Total = Sum(45)m = 1990.3312
 30.9177 27.1793 28.5481 24.4171 23.1844 20.3722 19.7701 20.8730 21.4456 24.5270 26.8164 30.4987 (46)
 Water storage loss: 300.0000 (47)
 Store volume 1.6800 (48)
 a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)
 Temperature factor from Table 2b 0.9072 (55)
 Enter (49) or (54) in (55)
 Total storage loss 28.1232 25.4016 28.1232 27.2160 28.1232 27.2160 28.1232 28.1232 27.2160 28.1232 27.2160 28.1232 (56)
 If cylinder contains dedicated solar storage 28.1232 25.4016 28.1232 27.2160 28.1232 27.2160 28.1232 28.1232 27.2160 28.1232 27.2160 28.1232 (57)
 Primary loss 37.2980 33.6885 37.2980 36.0948 37.2980 36.0948 37.2980 36.0948 37.2980 36.0948 37.2980 36.0948 (59)
 Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)
 Total heat required for water heating calculated for each month 271.5391 240.2857 255.7419 226.0917 219.9840 199.1251 197.2220 204.5747 206.2812 228.9347 242.0866 268.7459 (62)
 WWHRs 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63a)
 PV diverter 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63b)
 Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63c)
 FGHRs 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63d)
 Output from w/h 271.5391 240.2857 255.7419 226.0917 219.9840 199.1251 197.2220 204.5747 206.2812 228.9347 242.0866 268.7459 (64)
 Total per year (kWh/year) = Sum(64)m = 2760.6126 (64)
 2761 (64)
 12Total per year (kWh/year)
 Electric shower(s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)
 Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
 Heat gains from water heating, kWh/month 120.8712 107.5196 115.6186 104.7733 103.7291 95.8069 96.1607 98.6055 98.1863 106.7052 110.0916 119.9424 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 (66)m 148.0146 148.0146 148.0146 148.0146 148.0146 148.0146 148.0146 148.0146 148.0146 148.0146 148.0146 148.0146 (66)
 Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 177.3812 196.3863 177.3812 183.2939 177.3812 183.2939 177.3812 177.3812 183.2939 177.3812 183.2939 177.3812 (67)
 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 339.8119 343.3381 334.4522 315.5352 291.6560 269.2128 254.2194 250.6932 259.5791 278.4961 302.3753 324.8185 (68)
 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 37.8015 37.8015 37.8015 37.8015 37.8015 37.8015 37.8015 37.8015 37.8015 37.8015 37.8015 37.8015 (69)
 Pumps, fans 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (70)
 Losses e.g. evaporation (negative values) (Table 5) -118.4116 -118.4116 -118.4116 -118.4116 -118.4116 -118.4116 -118.4116 -118.4116 -118.4116 -118.4116 -118.4116 -118.4116 (71)
 Water heating gains (Table 5) 162.4612 159.9994 155.4013 145.5184 139.4208 133.0652 129.2483 132.5343 136.3699 143.4209 152.9050 161.2129 (72)
 Total internal gains 747.0587 767.1282 734.6390 711.7519 675.8623 652.9762 628.2532 628.0130 646.6472 666.7025 705.9786 730.8169 (73)

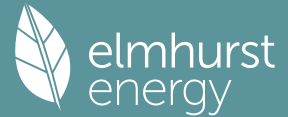
6. Solar gains

[Jan] Area m2 Solar flux Table 6a W/m2 g Specific data or Table 6b FF Specific data or Table 6c Access factor Table 6d Gains W
 Southeast 10.3800 36.7938 0.5200 0.7000 96.3401 (77)
 Southwest 5.4500 36.7938 0.5200 0.7000 50.5832 (79)
 Northwest 12.2500 11.2829 0.5200 0.7000 34.8653 (81)
 Solar gains 181.7885 321.2339 470.2871 634.2682 757.4946 772.7175 736.3675 641.2703 526.5761 363.3258 219.8497 154.2084 (83)
 Total gains 928.8472 1088.3621 1204.9261 1346.0202 1433.3569 1425.6938 1364.6207 1269.2833 1173.2233 1030.0284 925.8283 885.0254 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

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Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	70.1767	70.2732	70.3680	70.8169	70.9015	71.2981	71.2981	71.3720	71.1448	70.9015	70.7305	70.5527
alpha	5.6784	5.6849	5.6912	5.7211	5.7268	5.7532	5.7532	5.7581	5.7430	5.7268	5.7154	5.7035
util living area	0.9987	0.9964	0.9902	0.9633	0.8784	0.6978	0.5221	0.5811	0.8366	0.9777	0.9967	0.9990 (86)
Living	19.7838	19.9544	20.2023	20.5397	20.8199	20.9643	20.9942	20.9897	20.9001	20.5350	20.0971	19.7529
Non living	18.6584	18.8774	19.1939	19.6189	19.9435	20.0840	20.1031	20.1021	20.0323	19.6196	19.0645	18.6221
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.3778	19.9544	20.2023	20.5397	20.8199	20.9643	20.9942	20.9897	20.9001	20.5350	20.0971	19.9273 (87)
Th 2	20.0920	20.0932	20.0943	20.0995	20.1005	20.1051	20.1051	20.1059	20.1033	20.1005	20.0985	20.0964 (88)
util rest of house	0.9982	0.9952	0.9867	0.9498	0.8363	0.6154	0.4194	0.4745	0.7689	0.9670	0.9953	0.9987 (89)
MIT 2	19.5205	18.8774	19.1939	19.6189	19.9435	20.0840	20.1031	20.1021	20.0323	19.6196	19.0645	18.8877 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	19.6152	18.9964	19.3053	19.7206	20.0404	20.1812	20.2016	20.2002	20.1282	19.7208	19.1786	19.0026 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6152	18.9964	19.3053	19.7206	20.0404	20.1812	20.2016	20.2002	20.1282	19.7208	19.1786	19.0026 (93)

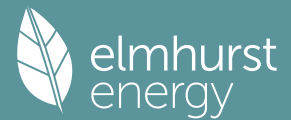
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9979	0.9931	0.9825	0.9426	0.8330	0.6229	0.4307	0.4861	0.7711	0.9608	0.9933	0.9981 (94)
Useful gains	926.9390	1080.8849	1183.8752	1268.6917	1194.0302	888.0183	587.6787	617.0167	904.6657	989.6697	919.6390	883.3324 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	2550.6590	2344.4524	2126.8470	1785.8177	1374.8401	914.9032	590.3894	622.2933	990.3058	1503.4840	1995.8735	2452.1514 (97)
Space heating kWh	1208.0477	849.1174	701.5710	372.3307	134.5225	0.0000	0.0000	0.0000	0.0000	382.2779	774.8888	1167.2013 (98a)
Space heating requirement - total per year (kWh/year)												5589.9573
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1208.0477	849.1174	701.5710	372.3307	134.5225	0.0000	0.0000	0.0000	0.0000	382.2779	774.8888	1167.2013 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5589.9573
Space heating per m2										(98c) / (4) =		33.2142 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												293.1051 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	1208.0477	849.1174	701.5710	372.3307	134.5225	0.0000	0.0000	0.0000	0.0000	382.2779	774.8888	1167.2013 (98)
Space heating efficiency (main heating system 1)	293.1051	293.1051	293.1051	293.1051	293.1051	0.0000	0.0000	0.0000	0.0000	293.1051	293.1051	293.1051 (210)
Space heating fuel (main heating system)	412.1551	289.6972	239.3582	127.0297	45.8957	0.0000	0.0000	0.0000	0.0000	130.4235	264.3723	398.2193 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	271.5391	240.2857	255.7419	226.0917	219.9840	199.1251	197.2220	204.5747	206.2812	228.9347	242.0866	268.7459 (64)
Efficiency of water heater	174.1514	174.1514	174.1514	174.1514	174.1514	174.1514	174.1514	174.1514	174.1514	174.1514	174.1514	174.1514 (216)
Fuel for water heating, kWh/month	155.9213	137.9752	146.8503	129.8247	126.3176	114.3402	113.2474	117.4694	118.4493	131.4572	139.0093	154.3174 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	36.8563	29.5675	26.6223	19.5046	15.0659	12.3090	13.7436	17.8645	23.2042	30.4452	34.3878	37.8807 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1907.1510 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												174.1514
Water heating fuel used												1585.1793 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												297.4515 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)

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Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3789.7818 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1907.1510	0.1557	296.9457 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1585.1793	0.1408	223.1191 (264)
Space and water heating			520.0648 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	297.4515	0.1443	42.9314 (268)
Total CO2, kg/year			562.9963 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3500 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1907.1510	1.5764	3006.4688 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1585.1793	1.5204	2410.1813 (278)
Space and water heating			5416.6501 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	297.4515	1.5338	456.2410 (282)
Total Primary energy kWh/year			5872.8912 (286)
Dwelling Primary energy Rate (DPER)			34.9000 (287)

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Property Reference	Hurst 5BH DET 221 ASHP			Issued on Date	07/06/2025
Assessment Reference	Hurst 5BH DET 221 ASHP	Prop Type Ref	Hurst 5BH DET 221 ASHP		
Property	Land between, School Rd & Orchard Rd, Hurst, Berkshire				
SAP Rating	84 B	DER	3.07	TER	7.92
Environmental	97 A	% DER < TER			61.24
CO ₂ Emissions (t/year)	0.61	DFEE	38.51	TFEE	38.60
Compliance Check	See BREL	% DFEE < TFEE			0.23
% DPER < TPER	23.63	DPER	31.87	TPER	41.73
Assessor Details	Mr. Ivan Ball			Assessor ID	DE88-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	110.4000 (1b)	x 2.4000 (2b)	= 264.9600 (1b) - (3b)
First floor	110.4000 (1c)	x 2.4000 (2c)	= 264.9600 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	220.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 529.9200 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.0755 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2755 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2342 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2986	0.2927	0.2868	0.2576	0.2517	0.2225	0.2225	0.2166	0.2342	0.2517	0.2634	0.2751 (22b)
Effective ac	0.5446	0.5428	0.5411	0.5332	0.5317	0.5247	0.5247	0.5235	0.5274	0.5317	0.5347	0.5379 (25)

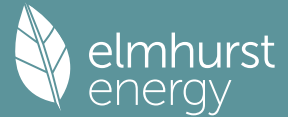
3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows & Glazed Doors			44.6900	1.3258	59.2481		(27)
External Doors			3.7800	1.2000	4.5360		(26a)
Ground Floor			110.4000	0.1100	12.1440		(28a)
External Wall	217.8200	48.4700	169.3500	0.1800	30.4830		(29a)
External Roof	110.4000		110.4000	0.1000	11.0400		(30)
Total net area of external elements Aum(A, m ²)			438.6200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	117.4511		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K

List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	28.1500	0.0280	0.7882
E3 Sill	18.9000	0.0240	0.4536
E4 Jamb	48.6000	0.0190	0.9234
E5 Ground floor (normal)	45.3800	0.0460	2.0875
E16 Corner (normal)	38.4000	0.0370	1.4208
E17 Corner (inverted - internal area greater than external area)	19.2000	-0.0790	-1.5168
E6 Intermediate floor within a dwelling	45.3800	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	45.3800	0.0510	2.3144

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Thermal bridges (Sum(L x Psi) calculated using Appendix K)

Point Thermal bridges
Total fabric heat loss

(33) + (36) + (36a) = 123.9222 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	95.2305	94.9278	94.6312	93.2379	92.9772	91.7636	91.7636	91.5389	92.2311	92.9772	93.5045	94.0559	(38)
Heat transfer coeff	219.1526	218.8500	218.5534	217.1600	216.8993	215.6858	215.6858	215.4611	216.1532	216.8993	217.4267	217.9780	(39)
Average = Sum(39)m / 12 =												217.1588	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9925	0.9912	0.9898	0.9835	0.9823	0.9768	0.9768	0.9758	0.9790	0.9823	0.9847	0.9872	(40)
HLP (average)												0.9835	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 3.0290 (42)

Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)

Hot water usage for baths 86.5319 85.2468 83.4371 80.1003 77.6017 74.8312 73.3348 75.1318 77.0885 80.0530 83.4585 86.2394 (42b)

Hot water usage for other uses 45.6497 43.9897 42.3297 40.6697 39.0097 37.3497 37.3497 39.0097 40.6697 42.3297 43.9897 45.6497 (42c)

Average daily hot water use (litres/day) 121.7284 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	132.1816	129.2365	125.7668	120.7700	116.6115	112.1810	110.6845	114.1415	117.7582	122.3827	127.4482	131.8891	(44)
Energy conte	209.3434	184.0311	193.2989	165.3281	156.9815	137.9396	133.8633	141.3311	145.2076	166.0722	181.5734	206.5064	(45)
Energy content (annual)												2021.4765	
Distribution loss (46)m = 0.15 x (45)m	31.4015	27.6047	28.9948	24.7992	23.5472	20.6909	20.0795	21.1997	21.7811	24.9108	27.2360	30.9760	(46)

Water storage loss:

Store volume 300.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.6800 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.9072 (55)

Total storage loss 28.1232 25.4016 28.1232 27.2160 28.1232 27.2160 28.1232 28.1232 27.2160 28.1232 27.2160 28.1232 (56)

If cylinder contains dedicated solar storage 28.1232 25.4016 28.1232 27.2160 28.1232 27.2160 28.1232 28.1232 27.2160 28.1232 27.2160 28.1232 (57)

Primary loss 37.2980 33.6885 37.2980 36.0948 37.2980 36.0948 37.2980 37.2980 36.0948 37.2980 36.0948 37.2980 (59)

Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)

Total heat required for water heating calculated for each month

274.7645 243.1211 258.7200 228.6389 222.4026 201.2504 199.2845 206.7522 208.5184 231.4934 244.8842 271.9276 (62)

WWHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63a)

PV diverter 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63b)

Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63c)

FGHRS 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63d)

Output from w/h 274.7645 243.1211 258.7200 228.6389 222.4026 201.2504 199.2845 206.7522 208.5184 231.4934 244.8842 271.9276 (64)

Total per year (kWh/year) = Sum(64)m = 2791.7579 (64)

2792 (64)

12Total per year (kWh/year)

Electric shower(s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month

121.9436 108.4624 116.6088 105.6202 104.5333 96.5136 96.8465 99.3295 98.9302 107.5559 111.0218 121.0003 (65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	151.4485	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	198.0658	219.2871	198.0658	204.6680	198.0658	204.6680	198.0658	198.0658	204.6680	198.0658	204.6680	198.0658	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	390.4083	394.4595	384.2506	362.5170	335.0822	309.2974	292.0715	288.0203	298.2292	319.9628	347.3976	373.1825	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	38.1448	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	-121.1588	(71)
Water heating gains (Table 5)	163.9027	161.4024	156.7323	146.6948	140.5017	134.0466	130.1700	133.5074	137.4030	144.5644	154.1969	162.6348	(72)
Total internal gains	820.8113	843.5835	807.4832	782.3142	742.0842	716.4465	688.7418	688.0280	708.7348	731.0276	774.6970	802.3176	(73)

6. Solar gains

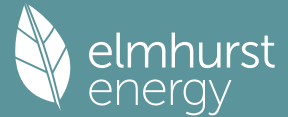
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	2.8400	11.2829	0.5200	0.7000	0.7700	8.0831	(75)
Southeast	17.3600	36.7938	0.5200	0.7000	0.7700	161.1237	(77)
Southwest	2.8400	36.7938	0.5200	0.7000	0.7700	26.3589	(79)
Northwest	21.6500	11.2829	0.5200	0.7000	0.7700	61.6190	(81)

Solar gains	257.1847	461.2329	692.5754	961.2119	1170.7217	1203.6402	1143.2152	980.5846	784.6078	526.3416	312.2642	217.3683	(83)
Total gains	1077.9960	1304.8164	1500.0586	1743.5261	1912.8059	1920.0867	1831.9570	1668.6126	1493.3425	1257.3692	1086.9613	1019.6859	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

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Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	69.9665	70.0632	70.1583	70.6085	70.6933	71.0911	71.0911	71.1652	70.9373	70.6933	70.5218	70.3435
alpha	5.6644	5.6709	5.6772	5.7072	5.7129	5.7394	5.7394	5.7443	5.7292	5.7129	5.7015	5.6896
util living area	0.9993	0.9977	0.9924	0.9654	0.8727	0.6848	0.5122	0.5815	0.8509	0.9840	0.9981	0.9995 (86)
Living	19.7091	19.8893	20.1597	20.5272	20.8258	20.9672	20.9947	20.9896	20.8893	20.4899	20.0303	19.6777
Non living	18.5610	18.7925	19.1383	19.6019	19.9471	20.0835	20.1009	20.0996	20.0211	19.5628	18.9774	18.5239
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.3396	19.8893	20.1597	20.5272	20.8258	20.9672	20.9947	20.9896	20.8893	20.4899	20.0303	19.8627 (87)
Th 2	20.0896	20.0907	20.0918	20.0971	20.0981	20.1027	20.1027	20.1035	20.1009	20.0981	20.0961	20.0940 (88)
util rest of house	0.9991	0.9970	0.9897	0.9525	0.8295	0.6026	0.4109	0.4746	0.7855	0.9759	0.9973	0.9993 (89)
MIT 2	19.4802	18.7925	19.1383	19.6019	19.9471	20.0835	20.1009	20.0996	20.0211	19.5628	18.9774	18.8069 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	19.5600	18.8943	19.2331	19.6878	20.0287	20.1655	20.1839	20.1823	20.1017	19.6488	19.0752	0.0928 (91)
Temperature adjustment												0.0000
adjusted MIT	19.5600	18.8943	19.2331	19.6878	20.0287	20.1655	20.1839	20.1823	20.1017	19.6488	19.0752	18.9049 (93)

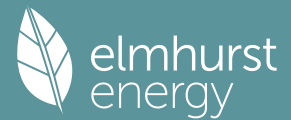
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9989	0.9954	0.9860	0.9450	0.8256	0.6087	0.4202	0.4843	0.7855	0.9703	0.9960	0.9990 (94)
Useful gains	1076.7972	1298.8658	1479.0124	1647.6847	1579.3019	1168.7071	769.8265	808.0799	1173.0540	1219.9912	1082.5985	1018.6570 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	3344.2589	3062.6535	2782.8601	2342.6718	1806.4852	1200.4083	772.9936	814.9299	1297.2837	1962.6891	2603.7205	3205.3410 (97)
Space heating kWh	1686.9916	1185.2653	970.0627	500.3907	169.0244	0.0000	0.0000	0.0000	0.0000	552.5672	1095.2079	1626.8928 (98a)
Space heating requirement - total per year (kWh/year)												7786.4027
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	1686.9916	1185.2653	970.0627	500.3907	169.0244	0.0000	0.0000	0.0000	0.0000	552.5672	1095.2079	1626.8928 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7786.4027
Space heating per m2										(98c) / (4) =		35.2645 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												300.0751 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1686.9916	1185.2653	970.0627	500.3907	169.0244	0.0000	0.0000	0.0000	0.0000	552.5672	1095.2079	1626.8928 (98)
Space heating efficiency (main heating system 1)	300.0751	300.0751	300.0751	300.0751	300.0751	0.0000	0.0000	0.0000	0.0000	300.0751	300.0751	300.0751 (210)
Space heating fuel (main heating system)	562.1897	394.9895	323.2733	166.7551	56.3274	0.0000	0.0000	0.0000	0.0000	184.1430	364.9779	542.1619 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	274.7645	243.1211	258.7200	228.6389	222.4026	201.2504	199.2845	206.7522	208.5184	231.4934	244.8842	271.9276 (64)
Efficiency of water heater												174.4118 (216)
(217)m	174.4118	174.4118	174.4118	174.4118	174.4118	174.4118	174.4118	174.4118	174.4118	174.4118	174.4118	174.4118 (217)
Fuel for water heating, kWh/month	157.5378	139.3949	148.3386	131.0914	127.5158	115.3881	114.2609	118.5426	119.5552	132.7280	140.4057	155.9112 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	41.3664	33.1857	29.8800	21.8914	16.9095	13.8152	15.4255	20.0506	26.0437	34.1708	38.5958	42.5161 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2594.8178 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												174.4118
Water heating fuel used												1600.6703 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												333.8509 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)

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Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	4529.3390 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2594.8178	0.1557	404.1048 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1600.6703	0.1408	225.3137 (264)
Space and water heating			629.4184 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	333.8509	0.1443	48.1850 (268)
Total CO2, kg/year			677.6034 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.0700 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2594.8178	1.5765	4090.8472 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1600.6703	1.5205	2433.7875 (278)
Space and water heating			6524.6347 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	333.8509	1.5338	512.0716 (282)
Total Primary energy kWh/year			7036.7063 (286)
Dwelling Primary energy Rate (DPER)			31.8700 (287)