



Project Address	45 Lashmere Cophorne, Crawley West Sussex RH10 3RR
Project Reference	#89127
Building Regulations	Retrospective Energy Statement for Single Dwelling, in compliance with Part L (2021)
Assessment Type	Energy Statement

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Executive Summary

This energy statement assesses the energy performance for the development **45 Lashmere Copthorne, Crawley West Sussex RH10 3RR**. The project aimed to reduce the overall carbon footprint by enhancing energy efficiency measures and incorporating improvements compliant with the relevant policies from the **2021 National Planning Policy Framework** and **West Sussex County Council Local Plan**.

The energy strategy utilized follows the principles of the Energy Hierarchy ("Be Lean, Be Clean, Be Green") to reduce demand, supply energy efficiently, and incorporate renewable sources where feasible.

This report assesses the predicted energy performance and carbon dioxide emissions of the proposed development, and the energy strategy outlined in this report has been developed using the SAP10 emissions factors to ensure the change of use meets the current version of the Building Regulations.



Introduction

This energy statement assesses the energy performance for the development **45 Lashmere Copthorne, Crawley West Sussex RH10 3RR**. The project aimed to reduce the overall carbon footprint by enhancing energy efficiency measures and incorporating improvements compliant with the relevant policies from the 2021 National Planning Policy Framework and West Sussex County Council Local Plan, both of which emphasize sustainable energy use, carbon reduction, and energy efficiency.

Site & Proposal

The proposed development encompasses a comprehensive suite of energy efficiency measures tailored **to a single dwelling**. These measures include the installation of modern double-glazed UPVC windows, designed to enhance thermal retention and reduce energy loss, along with a complete LED lighting overhaul to minimize electricity consumption, individual high efficiency gas combi boiler along with the potential of other renewable measures in the future such as roof mounted PV panels.

The dwelling features an efficient gas boiler, selected for its reliability and ability to deliver highly efficient heating. The thermal performance of the dwelling is further optimized with enhanced building fabric, ensuring excellent insulation and minimizing heat loss in winter while improving cooling retention during warmer months, contributing renewable energy directly to the plot.

These combined measures ensure full compliance with the 2021 National Planning Policy Framework (NPPF) and the Local Planning Framework, demonstrating a strong commitment to a reduced energy use and carbon reduction. The integration of these advanced systems and materials positions the project as a benchmark for energy-efficient residential developments, aligning with both local and national sustainability goals.

Location

The development is located at 45 Lashmere Copthorne, Crawley West Sussex RH10 3RR. The site lies within an established residential area characterised by low- to medium-density housing and benefits from good access to local services, public transport links, and the wider Crawley road network. Its suburban setting supports sustainable travel patterns and enables efficient connection to existing utilities and infrastructure, providing a suitable context for the delivery of high-quality, energy-efficient residential accommodation.



Policies & Requirements

For the development at **45 Lashmere**, the energy statement must align with both the National Planning Policy Framework (2021) and West Sussex CC Local Plan -specific policies that prioritize energy efficiency, emissions reduction, and sustainable development. Key policies are as follows:

National Planning Policy Framework (2021)

- Section 14 - Meeting the Challenge of Climate Change, Flooding, and Coastal Change: This policy mandates that new developments incorporate sustainable energy use, reduce greenhouse gas emissions, and emphasize low-carbon design principles that promote resilience to climate change.
- Building Regulations Part L (2021) - Conservation of Fuel and Power: New residential buildings are required to meet high standards of energy efficiency, with an emphasis on thermal insulation, effective ventilation, and carbon emissions reduction.
- Building Regulations Part O (2021) - Overheating: This policy requires new homes to mitigate overheating risks through design features, such as efficient ventilation, shading, and passive cooling strategies.



Local Plan

- **Policy 1.1: Delivering Sustainable Growth**
This policy prioritizes sustainable growth by ensuring that new developments contribute positively to reducing carbon emissions. For the proposed 3 plots, this includes adopting energy-efficient designs, incorporating renewable technologies such as air source heat pumps or solar panels, and enhancing insulation to achieve high environmental standards.
- **Policy 5.2: Minimizing Carbon Dioxide Emissions**
Sussex encourages minimizing carbon emissions in line with the London Plan. The development should aim to meet or exceed the required carbon reduction targets through a combination of improved building fabric performance, passive design strategies, and the integration of renewable energy technologies.
- **Policy 5.7: Renewable Energy**
This policy focuses on incorporating renewable energy systems into new developments, feasible solutions such as solar photovoltaics, ground or air source heat pumps, and on-site energy generation should be considered to promote low-carbon living and reduce reliance on non-renewable energy sources.
- **Policy 5.3: Sustainable Design and Construction**
To ensure high-quality and sustainable construction, the plots must adopt measures such as the use of sustainable materials, water-saving systems, and improved thermal efficiency. The design should reflect climate resilience while meeting the needs of future residents.

The energy statement for the development must demonstrate that the proposed energy improvements meet the sustainability objectives of both the National Planning Framework and West Sussex local policies. This includes showing evidence of reduced emissions, efficient heating and ventilation systems, and compliance with air quality, thermal comfort, and building regulations standards, particularly regarding energy conservation and overheating mitigation.

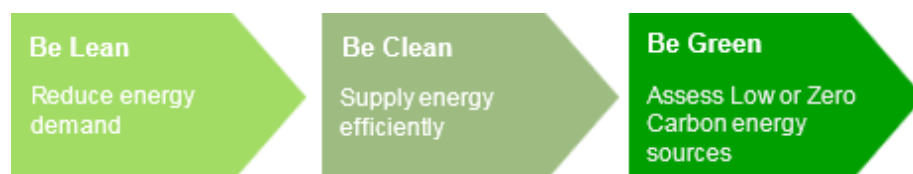
Methodology

The sections below present the methodology in determining the on-site and off-site carbon savings for the proposed scheme.

The methodology employed to develop the energy strategy for the scheme and achieve on-site Carbon savings is in line with GLA's Guidance on preparing energy assessments and is as follows:

- **Be Lean** - Whereby the demand for energy is reduced through a range of passive and active energy efficiency measures as part of this step the Cooling Hierarchy (see Policy 5.9) is implemented, and measures are proposed to reduce the demand for active cooling.
- **Be Clean** - As much of the remaining energy demand is supplied as efficiently as possible (e.g. by connecting to a district energy network or developing a site-wide CHP network)
- **Be Green** - Whereby renewable technologies are incorporated to offset part of the carbon emissions of the development. The uptake of renewable technologies is based on feasibility and viability considerations, including their compatibility with the energy system determined in the previous step.

The implementation of the Energy Hierarchy determines the total regulated carbon savings that can be feasibly and viably achieved on site.



Be Lean

The following proposals incorporate a range of passive and active design measures that will reduce the energy demand for space conditioning, hot water and lighting. The measures are as follows:

- **Enhanced U-values**

The proposed development will incorporate high levels of insulation and high-performance glazing beyond Part L where possible. Careful consideration has been made in insulating to the best possible standard for new build, as well as meeting the required u-values for any new elements.

- **Air Permeability Testing**

A high air tightness is targeted for this building to limit uncontrolled air infiltration. This will significantly reduce heat losses and provide high levels of occupant comfort (in combination with the proposed mechanical ventilation strategy) providing extract from all bathrooms. A focus on the construction details and the quality of the build is vital to deliver such air-tight buildings.

Element		
	Part L	Target
Air Permeability Testing	8 (Part L)	3

- **High Efficacy Lighting**

The development intends to incorporate low energy lighting fittings throughout the development. All light fittings will be specified as low energy lighting, and will accommodate LED, compact fluorescent (CFLs) or fluorescent luminaires only.

Element		
	Part L Limiting Factor	Conversion
Low Energy Lighting	75%	100%

Be Clean

The proposed dwelling does not have a significant thermal demand and is not within an area of which allows for a decentralized energy network to be utilized; therefore, this option will not be explored further within this energy statement. It is recommended that the site is developed in a manner that will allow connection to a district heating system in the future is one is to become feasible.

Be Green

A renewable technologies feasibility study was undertaken for the proposed development to identify the most appropriate strategy to reduce regulated energy demand and associated carbon emissions in line with the National Plan 2021 and Part L requirements. The assessment concluded that a fully electric, low-carbon approach offered the most robust and future-proofed solution for the site.

Each of the five apartments has been individually modelled with a high-efficiency Worcester Gas Combi Boiler providing space heating and domestic hot water. This approach removes the need for on-site fossil fuel combustion, significantly reducing operational carbon emissions while improving overall system efficiency and controllability at apartment level.

To further offset electrical demand, we have proposed the addition of **roof-mounted photovoltaic (PV) panels** are on the **south-facing roof elevation**, where solar access and generation potential are maximised. The PV array has been sized to provide on-site renewable electricity generation, reducing grid electricity consumption associated with the ASHP systems and general apartment electrical loads. This integrated strategy of low-carbon heating supported by on-site renewable generation enables the development to achieve the required carbon reduction targets while enhancing long-term energy resilience and minimising operational energy costs for future occupants.

SAP Modelling Results

The comparison between the SAP results for the notional dwelling and the proposed new-build dwelling demonstrates clear and consistent energy performance betterment. These gains arise from the use of modern construction methods, improved building fabric, and the integration of smart technologies, resulting in strong SAP EPC ratings and high overall energy efficiency.

This reduces grid dependency, supports lower running costs for occupants, and makes a measurable contribution to lowering overall carbon emissions. Enhanced insulation standards, high-quality double glazing, and reduced air permeability further improve thermal performance and limit heat loss throughout the properties.

When benchmarked against the notional dwelling, the proposed development demonstrates notable reductions in energy demand and carbon emissions, showcasing compliance with the National Plan 2021 standards and meeting all necessary requirements for sustainable construction. The results highlight meaningful improvements in building fabric efficiency and overall dwelling performance without reliance on fossil-fuel-based systems.

Detailed SAP outputs, including draft EPC ratings for the dwelling, are provided within the appendix. Collectively, these results confirm that the development exceeds the expected regulatory benchmarks and delivers high-quality, energy-efficient home that positively support both local and national climate objectives.

Embodied Carbon

Efforts to minimize embodied carbon have been integral to the design and construction of the dwelling. Wherever feasible, sustainable materials with low-carbon footprints have been prioritized, and the reuse of existing materials suitable for the new build was maximized. Locally sourced construction materials were selected to reduce transportation emissions, and efficient construction techniques have been employed to limit waste. These initiatives contribute to the overall reduction in lifecycle carbon emissions for the project, aligning with national sustainability objectives.

Water Usage

The proposed development incorporates water-saving measures to reduce potable water consumption across all plots. High-efficiency sanitaryware, flow restrictors, and dual-flush systems are employed to ensure water usage is limited to less than 110 liters per person per day, in line with and exceeding the requirements of Building Regulations Part G. These measures not only support compliance but also promote long-term sustainability by minimizing water demand and associated energy use for heating water.

Conclusion

The energy efficiency upgrades proposed the development align with the requirements of the **National Plan 2021** and **West Sussex CC Local Plan (2020)**, prioritizing sustainable energy use, carbon reduction, and improved thermal comfort. Through the installation of new double-glazed windows, efficient LED lighting, and roof mounted PV panels and effective fabric, the project achieves significant energy savings and lowers environmental impact. These measures collectively support and contribute to the national commitment to reducing greenhouse gas emissions and local sustainability objectives along with the borough's goals of promoting low-carbon, sustainable homes.

Appendix A.

Technology	Technology Summary	Constraints	Opportunities	Viability
Solar PV	Roof mounted PV is one of the most common, accessible and cost-effective forms of renewable energy generation technology in the UK. PV panels have increased in efficiency in recent years to between 21-23%, with new Perovskite coated PV panels achieving efficiencies of 28%. South facing, sloped roofs are ideal for maximum energy generation, however, all roof types are worth exploring.			Viable
Solar Thermal	Solar thermal panels collect heat from the sun via a series of tubes, called collectors, that are filled with a heat transfer fluid. The warm fluid is then pumped through a coil in a water cylinder, warming the water. Typically, solar thermal is used in collaboration with a secondary heat source as it cannot provide all of a developments hot water; (typically 50-60%).	Heat from solar hot water collectors can be stored in hot water cylinders during the summer, when hot water production will be at its peak, however, a high proportion of this can be wasted if there is not a dedicated heat sink. Therefore, solar thermal installations must be sized to the summer hot water demand.	Solar thermal can be integrated with ground source heat pump (GSHP) technology to improve the heating efficiency. Dual Stacked Solar PV and Solar Thermal are being considered for the development.	Not Viable
Biomass	Biomass is plant or animal material used as fuel to produce electricity or heat. Examples are wood, energy crops and waste from forests, yards, or farms. Biomass is most suitable where there is a constant heat demand. Space is required for plant, fuel storage and deliveries.	Biomass is ideal for medium to large developments, and is viable where heat demand is above 15 kW, which is much larger than the heat demand at the proposed development. Air quality impacts and security of the fuel source supply are common issues.		Not Viable
Wind	On shore wind energy is one of the most readily available and cheapest sources of renewable energy in the UK. Unlike solar PV, wind turbines have a significant impact on their local surroundings.	Key design considerations include: - Proximity to buildings - it is unlikely that the site is large enough to install a wind turbine far enough away from the proposed development. - Impact on biodiversity - Noise	Vertical wind turbines have less of a visual impact and can be positioned close to buildings but have a significantly reduced efficiency.	Not Viable
Hydro	Hydropower is the use of water flowing from a higher to a lower level to drive a turbine connected to an electrical generator, with the energy generated proportional to the volume of water and vertical drop or head.	Requires a large head or vertical drop, such as a waterfall, and a high volume of water.		Not Viable
Geothermal	Geothermal energy is the heat that comes from the sub-surface of the earth. To produce power from geothermal energy, wells are dug a mile deep into underground reservoirs to access the steam and hot water there, which can then be used to drive turbines connected to electricity generators.	Geothermal is only viable large-scale projects, due to the capital costs associated with it.		Not Viable
Air source Heat Pumps	ASHPs work by using ambient air as their heat source. The heat pump system is sited externally. As the National Grid continues to move further away from fossil fuels, and with future carbon budgets requiring an even greater contribution from the renewables sector, the changes to UK electricity grid carbon intensity will be drastic. Providing an electricity-based source of heating and hot water futureproofs the site as we move away from gas powered sources, providing a net-zero ready development	Careful siting needed to reduce aesthetic impact. Potential noise impact.	Heat Pumps are technology agnostic, meaning that various sources of electricity (including renewables such as PV) can be integrated to provide net zero heating and hot water where possible.	Viable
Ground Source Heat Pumps	GSHPs require a condenser (usually located at ground level) and associated buried pipe work; either horizontally or vertically, to extract heat from the ground. As radiation from the sun heats the earth, the earth then stores the heat and maintains a temperature of around 10°C			Not Viable
Heat Networks	Where heat demand is of suitable density, heat networks can be an efficient and cost-effective mechanism by which to decarbonize heat.			Not Viable

Appendix B.

Summary for Input Data



Plot Reference	45 Lashmere		Issued on Date	06/01/2026
Assessment Reference	Energy Statement	Plot Type Ref	1.01	
Plot Address	45 Lashmere, Copthorne, CRAWLEY, RH10 3RR		SAP Version	10.2

SAP Rating	71 C	DER	33.88	TER	
Environmental	67 D	% DER < TER			N/A
CO ₂ Emissions (t/year)	3.95	DFEE	91.98	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	184.04	TPER	

Assessor Details	Mr. Ruari Mulvenna	Assessor ID	AW51-0001
Client	45 Lashmere, Soprat Samay		

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	Northwest	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Urban	
1.0 Property Type	House, Detached	
2.0 Number of Storeys	2	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	300.13	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	No	

7.0 Measurements				
	Ground floor:	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	1st Storey:	39.90 m	81.80 m ²	2.40 m
		30.20 m	45.00 m ²	2.40 m

8.0 Living Area	32.00	m ²
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Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Facade	Cavity Wall	Cavity wall : dense plaster, dense block, filled cavity, any outside structure	0.30	190.00	164.00	136.56	0.00	None	27.44	Enter Gross Area

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Walls	Plasterboard on timber frame	9.00	62.00

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Pitch Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.21	9.00	112.00	112.00	None	0.00	Enter Gross Area	0.00

Description	Storey	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Ceiling	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	9.00	81.80

Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.25	None	0.00	110.00	81.80

Description	Storey Index	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Floor 1	+1	Plasterboard ceiling, carpeted chipboard floor	18.00	45.00

Summary for Input Data

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
New Doors	Manufacturer	Solid Door				0.00			1.00
New Glazing	Manufacturer	Window	Double glazed			0.76		0.70	1.60

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
02. Solid Door	New Doors	External Facade	North West	1.95	
03. Glazing NW	New Glazing	External Facade	North West	9.60	
04. Glazed Doors SE	New Glazing	External Facade	South East	8.80	
03. Glazing SE	New Glazing	External Facade	South East	5.20	
02. Glazing SW	New Doors	External Facade	South West	1.89	

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E5 Ground floor (normal)		35.60			Yes
E6 Intermediate floor within a dwelling		28.40			Yes
E16 Corner (normal)		2.00			No
E2 Other lintels (including other steel lintels)		12.00			No
E4 Jamb		16.00			No
E14 Flat roof		14.00			No
R1 Head of roof window		3.20			No
R3 Jamb of roof window		4.00			No
R10 All other roof or room-in-roof junctions		26.00			No

Y-value W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys

Number of open flues

Number of chimneys/flues attached to closed fire

Number of flues attached to solid fuel boiler

Number of flues attached to other heater

Number of blocked chimneys

Number of intermittent extract fans

Number of passive vents

Number of flueless gas fires

21.0 Fixed Cooling System

22.0 Pressure Testing

22.0 Lighting

Lighting Capacity Calculation

Name	Efficacy	Power	Capacity	Count
House Lighting	90.00	10.00	900.00	28

24.0 Main Heating 1

SAP table

Percentage of Heat %

Fuel Type

SAP Code

In Winter

In Summer

Controls SAP Code

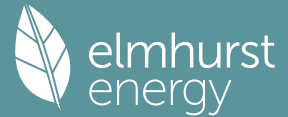
Controls description

Delayed Start Stat

Summary for Input Data

Flue Type	None or Unknown											
Fan Assisted Flue	No											
Is MHS Pumped	Pump in heated space											
Heating Pump Age	2013 or later											
Heat Emitter	Radiators											
Boiler Interlock	No											
25.0 Main Heating 2												
												None
26.0 Heat Networks												
												None
27.0 Secondary Heating												
												None
28.0 Water Heating												
Water Heating	Main Heating 1											
SAP Code	901											
Flue Gas Heat Recovery System	No											
Waste Water Heat Recovery Instantaneous System 1	No											
Waste Water Heat Recovery Instantaneous System 2	No											
Waste Water Heat Recovery Storage System	No											
Solar Panel	No											
Water use <= 125 litres/person/day	No											
Cold Water Source	From mains											
Bath Count	1											
28.3 Waste Water Heat Recovery System												
29.0 Hot Water Cylinder												
												Hot Water Cylinder
Cylinder Stat	No											
Cylinder In Heated Space	No											
Independent Time Control	No											
Insulation Type	None											
Cylinder Volume	200.00											L
Pipes insulation	First 1m from cylinder insulated											
31.0 Thermal Store												
												None
34.0 Small-scale Hydro												
												None
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recommendations												
Lower cost measures												
None												
Further measures to achieve even higher standards												
None												

Full SAP Calculation Printout



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Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	184.04	TPER	
Assessor Details	Mr. Ruari Mulvenna			Assessor ID	AW51-0001
Client	45 Lashmere, Soprat Samay				

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	81.8000 (1b)	x 2.4000 (2b)	= 196.3200 (1b) - (3b)
First floor	45.0000 (1c)	x 2.4000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	126.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 304.3200 (5)

2. Ventilation rate

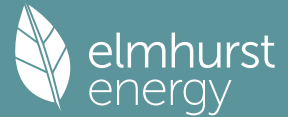
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.0657 (8)
Number of storeys in the dwelling (ns)	2 (9)
Additional infiltration	[(9) - 1] x 0.1 = 0.1000 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction	0.3500 (11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	0.0000 (12)
If no draught lobby, enter 0.05, else enter 0	0.0500 (13)
Percentage of windows and doors draught stripped	100.0000 (14)
Window infiltration	0.25 - [0.2 * (14) / 100] = 0.0500 (15)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.6157 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.5695 (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	0.7262	0.7119	0.6977	0.6265	0.6123	0.5411	0.5411	0.5268	0.5695	0.6123	0.6407	0.6692 (22b)
Effective ac	0.7637	0.7534	0.7434	0.6962	0.6874	0.6464	0.6464	0.6388	0.6622	0.6874	0.7053	0.7239 (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							
New Doors			3.8400	1.0000	3.8400		(26)
New Glazing			23.6000	1.5038	35.4887		(27)
Ground Floor			81.8000	0.2500	20.4500	110.0000	8998.0000 (28a)
External Facade	164.0000	27.4400	136.5600	0.3000	40.9680	190.0000	25946.4000 (29a)
Pitch Roof	112.0000		112.0000	0.2100	23.5200	9.0000	1008.0000 (30)
Total net area of external elements Aum(A, m ²)			357.8000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	124.2667		(33)
Main dwelling							
Internal Walls			62.0000			9.0000	558.0000 (32c)
Internal Floor 1			45.0000			18.0000	810.0000 (32d)

Full SAP Calculation Printout



Internal Ceiling	81.8000							9.0000			736.2000 (32e)	
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) =			38056.6000 (34)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K											300.1309 (35)	
Thermal bridges (Default value 0.200 * total exposed area)											71.5600 (36)	
Point Thermal bridges								(36a) =			0.0000	
Total fabric heat loss								(33) + (36) + (36a) =			195.8267 (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
	76.6908	75.6626	74.6548	69.9211	69.0355	64.9126	64.9126	64.1491	66.5007	69.0355	70.8272	72.7003 (38)
Heat transfer coeff	272.5175	271.4894	270.4815	265.7479	264.8622	260.7393	260.7393	259.9758	262.3274	264.8622	266.6539	268.5270 (39)
Average = Sum(39)m / 12 =												265.7436
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	2.1492	2.1411	2.1331	2.0958	2.0888	2.0563	2.0563	2.0503	2.0688	2.0888	2.1029	2.1177 (40)
HLP (average)	2.0958											
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.8862 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	88.1686	86.8591	85.0152	81.6153	79.0695	76.2466	74.7218	76.5528	78.5465	81.5671	85.0370	87.8705 (42b)
Hot water usage for other uses	46.5131	44.8217	43.1303	41.4389	39.7475	38.0562	38.0562	39.7475	41.4389	43.1303	44.8217	46.5131 (42c)
Average daily hot water use (litres/day)												124.0308 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	134.6816	131.6808	128.1455	123.0542	118.8170	114.3027	112.7779	116.3004	119.9854	124.6974	129.8587	134.3836 (44)
Distribution loss (46)m = 0.15 x (45)m	213.3028	187.5117	196.9548	168.4550	159.9505	140.5485	136.3951	144.0041	147.9540	169.2132	185.0076	210.4122 (45)
Water storage loss (or HIU loss):												Total = Sum(45)m = 2059.7097
Store volume	31.9954	28.1268	29.5432	25.2683	23.9926	21.0823	20.4593	21.6006	22.1931	25.3820	27.7511	31.5618 (46)
b) If manufacturer declared loss factor is not known :												200.0000 (47)
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0000 (51)
Volume factor from Table 2a												0.8434 (52)
Temperature factor from Table 2b												0.7800 (53)
Enter (49) or (54) in (55)												0.0000 (55)
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	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)
Primary loss	121.0252	109.3131	121.0252	117.1212	121.0252	39.9756	41.3081	41.3081	39.9756	121.0252	117.1212	121.0252 (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	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374 (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	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374 (64)
Electric shower(s)												Total per year (kWh/year) = Sum(64)m = 3170.9589 (64)
Heat gains from water heating, kWh/month	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)
	167.7434	149.7981	162.3077	149.7083	150.0037	78.7129	78.3979	80.9279	81.1752	153.0836	155.2120	166.7822 (65)

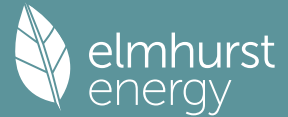
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	35.1885	31.2541	25.4176	19.2427	14.3842	12.1437	13.1217	17.0561	22.8927	29.0675	33.9261	36.1665 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	438.5387	443.0893	431.6218	407.2088	376.3918	347.4282	328.0787	323.5280	334.9956	359.4085	390.2255	419.1892 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033 (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)	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474 (71)
Water heating gains (Table 5)	225.4615	222.9139	218.1555	207.9281	201.6179	109.3234	105.3735	108.7740	112.7433	205.7575	215.5722	224.1697 (72)
Total internal gains	815.1157	813.1843	791.1218	750.3067	708.3209	581.8223	559.5009	562.2852	583.5585	710.1605	755.6508	795.4524 (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					14.0000	36.7938	0.7600		0.7000			0.7700			189.9100 (77)
Northwest					9.6000	11.2829	0.7600		0.7000			0.7700			39.9336 (81)
Solar gains	229.8436	404.7731	589.0606	788.9296	937.5695	954.4994	910.3723	795.8554	657.7055	456.8600	277.7153	195.1352 (83)			
Total gains	1044.9593	1217.9574	1380.1824	1539.2363	1645.8904	1536.3217	1469.8732	1358.1406	1241.2640	1167.0206	1033.3660	990.5876 (84)			

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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	38.7912	38.9381	39.0832	39.7794	39.9124	40.5435	40.5435	40.6625	40.2980	39.9124	39.6442	39.3677	
alpha	3.5861	3.5959	3.6055	3.6520	3.6608	3.7029	3.7029	3.7108	3.6865	3.6608	3.6429	3.6245	
util living area	0.9961	0.9927	0.9849	0.9634	0.9105	0.8186	0.6811	0.7350	0.9057	0.9747	0.9931	0.9968 (86)	
MIT	18.7863	19.0037	19.3803	19.8994	20.3866	20.7375	20.9066	20.8737	20.5627	19.9717	19.2990	18.7681 (87)	
Th 2	19.2357	19.2409	19.2461	19.2702	19.2748	19.2961	19.2961	19.3000	19.2878	19.2748	19.2656	19.2560 (88)	
util rest of house	0.9943	0.9894	0.9776	0.9436	0.8556	0.6905	0.4615	0.5255	0.8212	0.9570	0.9894	0.9954 (89)	
MIT 2	17.3241	17.5437	17.9198	18.4422	18.8945	19.1916	19.2803	19.2743	19.0701	18.5239	17.8557	17.3199 (90)	
Living area fraction	fLA = Living area / (4) =												0.2524 (91)
MIT	17.6931	17.9121	18.2884	18.8100	19.2711	19.5817	19.6907	19.6779	19.4468	18.8893	18.2199	17.6854 (92)	
Temperature adjustment													0.0000
adjusted MIT	17.6931	17.9121	18.2884	18.8100	19.2711	19.5817	19.6907	19.6779	19.4468	18.8893	18.2199	17.6854 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9919	0.9857	0.9717	0.9363	0.8555	0.7169	0.5198	0.5808	0.8319	0.9511	0.9859	0.9934 (94)
Useful gains	1036.5231	1200.4867	1341.1224	1441.1971	1407.9810	1101.4392	764.0785	788.8161	1032.5546	1109.9445	1018.7876	984.0150 (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	3649.8490	3532.6531	3188.5440	2633.5500	2005.2877	1298.9310	805.8782	852.1758	1402.6004	2195.5229	2965.1678	3621.1805 (97)
Space heating kWh	1944.3145	1567.2158	1374.4816	858.4941	444.3962	0.0000	0.0000	0.0000	0.0000	807.6703	1401.3937	1962.0512 (98a)
Space heating requirement - total per year (kWh/year)	10360.0173											
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	1944.3145	1567.2158	1374.4816	858.4941	444.3962	0.0000	0.0000	0.0000	0.0000	807.6703	1401.3937	1962.0512 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	10360.0173											
Space heating per m2	(98c) / (4) = 81.7036 (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 %)													69.0000 (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	1944.3145	1567.2158	1374.4816	858.4941	444.3962	0.0000	0.0000	0.0000	0.0000	807.6703	1401.3937	1962.0512 (98)	
Space heating efficiency (main heating system 1)	69.0000	69.0000	69.0000	69.0000	69.0000	0.0000	0.0000	0.0000	0.0000	69.0000	69.0000	69.0000 (210)	
Space heating fuel (main heating system)	2817.8470	2271.3273	1992.0023	1244.1943	644.0524	0.0000	0.0000	0.0000	0.0000	1170.5367	2031.0054	2843.5524 (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	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374 (64)	
Efficiency of water heater (217)m	67.3415	67.2035	66.8896	66.2222	64.7768	59.0000	59.0000	59.0000	59.0000	66.0646	67.0046	67.3660 (217)	
Fuel for water heating, kWh/month	496.4662	441.6805	475.3805	431.2396	433.7597	305.9731	301.1920	314.0886	318.5248	439.3250	450.9073	491.9953 (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	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)	
Lighting	30.8003	24.7091	22.2478	16.2997	12.5904	10.2864	11.4854	14.9291	19.3914	25.4426	28.7374	31.6563 (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													15014.5179 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													64.0000
Water heating fuel used													4900.5327 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
central heating pump													41.0000 (230c)
Total electricity for the above, kWh/year													41.0000 (231)
Electricity for lighting (calculated in Appendix L)													248.5760 (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)

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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	20204.6266 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	15014.5179	3.6400	546.5285 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	4900.5327	3.6400	178.3794 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	248.5760	16.4900	40.9902 (250)
Additional standing charges			92.0000 (251)
Total energy cost			864.6589 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	1.8119 (257)
SAP value	70.6298
SAP rating (Section 12)	71 (258)
SAP band	C

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	15014.5179	0.2100	3153.0488 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	4900.5327	0.2100	1029.1119 (264)
Space and water heating			4182.1606 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	248.5760	0.1443	35.8772 (268)
Total CO2, kg/year			4223.7250 (272)
CO2 emissions per m2			33.3100 (273)
EI value			67.0559
EI rating			67 (274)
EI band			D

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

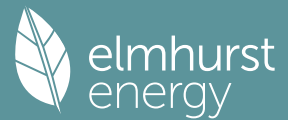
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	81.8000 (1b)	x 2.4000 (2b)	= 196.3200 (1b) - (3b)
First floor	45.0000 (1c)	x 2.4000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	126.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	304.3200 (5)

2. Ventilation rate

	m3 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) = 0.0657 (8)
Number of storeys in the dwelling (ns)	2 (9)
Additional infiltration	[(9) - 1] x 0.1 = 0.1000 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction	0.3500 (11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	0.0000 (12)
If no draught lobby, enter 0.05, else enter 0	0.0500 (13)
Percentage of windows and doors draught stripped	100.0000 (14)
Window infiltration	0.25 - [0.2 * (14) / 100] = 0.0500 (15)

Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.6157 (18)
Number of sides sheltered	1 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.9250 \quad (20)$$
$$(21) = (18) \times (20) = 0.5695 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.2000	3.9000	3.9000	3.5000	3.5000	3.3000	3.2000	3.0000	3.2000	3.4000	3.4000	3.8000	(22)
Wind factor	1.0500	0.9750	0.9750	0.8750	0.8750	0.8250	0.8000	0.7500	0.8000	0.8500	0.8500	0.9500	(22a)
Adj infilt rate													
Effective ac	0.5980	0.5553	0.5553	0.4983	0.4983	0.4699	0.4556	0.4272	0.4556	0.4841	0.4841	0.5411	(22b)
	0.6788	0.6542	0.6542	0.6242	0.6242	0.6104	0.6038	0.5912	0.6038	0.6172	0.6172	0.6464	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
New Doors			3.8400	1.0000	3.8400			(26)
New Glazing			23.6000	1.5038	35.4887			(27)
Ground Floor			81.8000	0.2500	20.4500	110.0000	8998.0000	(28a)
External Facade	164.0000	27.4400	136.5600	0.3000	40.9680	190.0000	25946.4000	(29a)
Pitch Roof	112.0000		112.0000	0.2100	23.5200	9.0000	1008.0000	(30)
Total net area of external elements Aum(A, m2)			357.8000					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	124.2667		(33)
Main dwelling								
Internal Walls			62.0000			9.0000	558.0000	(32c)
Internal Floor 1			45.0000			18.0000	810.0000	(32d)
Internal Ceiling			81.8000			9.0000	736.2000	(32e)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
Thermal bridges (Default value 0.200 * total exposed area)
Point Thermal bridges
Total fabric heat loss
(28)...(30) + (32) + (32a)...(32e) = 38056.6000 (34)
300.1309 (35)
71.5600 (36)
(36a) = 0.0000
(33) + (36) + (36a) = 195.8267 (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	68.1702	65.6965	65.6965	62.6832	62.6832	61.2987	60.6370	59.3747	60.6370	61.9808	61.9808	64.9126	(38)
Heat transfer coeff	263.9969	261.5232	261.5232	258.5099	258.5099	257.1255	256.4638	255.2015	256.4638	257.8075	257.8075	260.7393	(39)
Average = Sum(39)m / 12 =												258.8060	
HLP	2.0820	2.0625	2.0625	2.0387	2.0387	2.0278	2.0226	2.0126	2.0226	2.0332	2.0332	2.0563	(40)
HLP (average)												2.0411	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

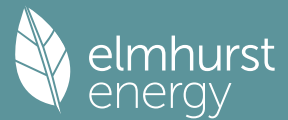
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.8862 (42)
Hot water usage for mixer showers													(42a)
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	
Hot water usage for baths	88.1686	86.8591	85.0152	81.6153	79.0695	76.2466	74.7218	76.5528	78.5465	81.5671	85.0370	87.8705	(42b)
Hot water usage for other uses	46.5131	44.8217	43.1303	41.4389	39.7475	38.0562	38.0562	39.7475	41.4389	43.1303	44.8217	46.5131	(42c)
Average daily hot water use (litres/day)													(43)
31.9954	28.1268	29.5432	25.2683	23.9926	21.0823	20.4593	21.6006	22.1931	25.3820	27.7511	31.5618		
Daily hot water use	134.6816	131.6808	128.1455	123.0542	118.8170	114.3027	112.7779	116.3004	119.9854	124.6974	129.8587	134.3836	(44)
Energy conte	213.3028	187.5117	196.9548	168.4550	159.9505	140.5485	136.3951	144.0041	147.9540	169.2132	185.0076	210.4122	(45)
Energy content (annual)										Total = Sum(45)m =		2059.7097	
Distribution loss (46)m = 0.15 x (45)m	31.9954	28.1268	29.5432	25.2683	23.9926	21.0823	20.4593	21.6006	22.1931	25.3820	27.7511	31.5618	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)													0.0000 (51)
Volume factor from Table 2a													0.8434 (52)
Temperature factor from Table 2b													0.7800 (53)
Enter (49) or (54) in (55)													0.0000 (55)
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	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)
Primary loss	121.0252	109.3131	121.0252	117.1212	121.0252	39.9756	41.3081	41.3081	39.9756	121.0252	117.1212	121.0252	(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	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374	(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	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374	(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	167.7434	149.7981	162.3077	149.7083	150.0037	78.7129	78.3979	80.9279	81.1752	153.0836	155.2120	166.7822	(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	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	35.1885	31.2541	25.4176	19.2427	14.3842	12.1437	13.1217	17.0561	22.8927	29.0675	33.9261	36.1665	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	438.5387	443.0893	431.6218	407.2088	376.3918	347.4282	328.0787	323.5280	334.9956	359.4085	390.2255	419.1892	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

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Pumps, fans	55.2033 3.0000	55.2033 3.0000	55.2033 3.0000	55.2033 3.0000	55.2033 3.0000	55.2033 0.0000	55.2033 0.0000	55.2033 0.0000	55.2033 0.0000	55.2033 3.0000	55.2033 3.0000	55.2033 (69) 3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474 (71)
Water heating gains (Table 5)	225.4615	222.9139	218.1555	207.9281	201.6179	109.3234	105.3735	108.7740	112.7433	205.7575	215.5722	224.1697 (72)
Total internal gains	815.1157	813.1843	791.1218	750.3067	708.3209	581.8223	559.5009	562.2852	583.5585	710.1605	755.6508	795.4524 (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				14.0000	41.2954	0.7600	0.7000		0.7700		213.1449 (77)	
Northwest				9.6000	13.3321	0.7600	0.7000		0.7700		47.1862 (81)	
Solar gains	260.3311	400.3995	591.1879	827.0589	963.3569	1063.3169	990.4879	870.3536	703.5760	490.1711	312.0699	220.5278 (83)
Total gains	1075.4468	1213.5838	1382.3098	1577.3656	1671.6778	1645.1392	1549.9888	1432.6388	1287.1345	1200.3316	1067.7206	1015.9801 (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	40.0432	40.4220	40.4220	40.8931	40.8931	41.1133	41.2194	41.4233	41.2194	41.0045	41.0045	40.5435
alpha	3.6695	3.6948	3.6948	3.7262	3.7262	3.7409	3.7480	3.7616	3.7480	3.7336	3.7336	3.7029
util living area	0.9956	0.9926	0.9835	0.9557	0.8903	0.7560	0.5946	0.6411	0.8820	0.9674	0.9916	0.9963 (86)
MIT	18.9090	19.0984	19.4977	20.0286	20.4964	20.8247	20.9496	20.9342	20.6423	20.1087	19.4483	18.8987 (87)
Th 2	19.2792	19.2920	19.2920	19.3076	19.3076	19.3149	19.3183	19.3249	19.3183	19.3113	19.3113	19.2961 (88)
util rest of house	0.9936	0.9894	0.9755	0.9316	0.8240	0.6040	0.3616	0.4052	0.7813	0.9441	0.9869	0.9947 (89)
MIT 2	17.4760	17.6729	18.0677	18.5921	19.0131	19.2571	19.3129	19.3167	19.1542	18.6810	18.0354	17.4774 (90)
Living area fraction	17.8377	18.0327	18.4286	18.9546	19.3875	19.6527	19.7259	19.7249	19.5298	19.0413	18.3920	0.2524 (91)
MIT	17.8377	18.0327	18.4286	18.9546	19.3875	19.6527	19.7259	19.7249	19.5298	19.0413	18.3920	17.8361 (92)
Temperature adjustment												0.0000
adjusted MIT	17.8377	18.0327	18.4286	18.9546	19.3875	19.6527	19.7259	19.7249	19.5298	19.0413	18.3920	17.8361 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9910	0.9857	0.9696	0.9248	0.8279	0.6398	0.4235	0.4684	0.7979	0.9388	0.9831	0.9925 (94)
Useful gains	1065.7892	1196.2333	1340.3329	1458.8048	1384.0575	1052.5602	656.3842	671.0158	1027.0437	1126.8187	1049.6383	1008.4031 (95)
Ext temp.	4.5000	5.0000	6.8000	9.3000	12.2000	15.1000	17.1000	17.0000	14.4000	11.1000	7.5000	4.5000 (96)
Heat loss rate W	3521.1058	3408.3509	3041.1417	2495.8226	1858.0298	1170.6222	673.4566	695.3981	1315.6046	2047.3278	2808.0270	3477.2496 (97)
Space heating kWh	1826.7556	1486.5430	1265.4017	746.6528	352.6354	0.0000	0.0000	0.0000	0.0000	684.8587	1266.0399	1836.8218 (98a)
Space heating requirement - total per year (kWh/year)												9465.7090
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	1826.7556	1486.5430	1265.4017	746.6528	352.6354	0.0000	0.0000	0.0000	0.0000	684.8587	1266.0399	1836.8218 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												9465.7090
Space heating per m ²										(98c) / (4) =		74.6507 (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 %)												69.0000 (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	1826.7556	1486.5430	1265.4017	746.6528	352.6354	0.0000	0.0000	0.0000	0.0000	684.8587	1266.0399	1836.8218 (98)
Space heating efficiency (main heating system 1)	69.0000	69.0000	69.0000	69.0000	69.0000	0.0000	0.0000	0.0000	0.0000	69.0000	69.0000	69.0000 (210)
Space heating fuel (main heating system)	2647.4718	2154.4102	1833.9156	1082.1056	511.0657	0.0000	0.0000	0.0000	0.0000	992.5489	1834.8404	2662.0606 (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	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374 (64)
Efficiency of water heater (217)m	67.2535	67.1243	66.7486	65.9337	64.2048	59.0000	59.0000	59.0000	59.0000	65.7114	66.8374	64.0000 (216)
Fuel for water heating, kWh/month	497.1165	442.2017	476.3845	433.1266	437.6239	305.9731	301.1920	314.0886	318.5248	441.6869	452.0353	492.6694 (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	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	30.8003	24.7091	22.2478	16.2997	12.5904	10.2864	11.4854	14.9291	19.3914	25.4426	28.7374	31.6563 (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)

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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												13718.4188	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												64.0000	
Water heating fuel used												4912.6232	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												248.5760	(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												18920.6180	(238)

10a. Fuel costs - using BEDF prices (587)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	13718.4188	6.5500	898.5564	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	4912.6232	6.5500	321.7768	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	41.0000	28.4300	11.6563	(249)
Energy for lighting	248.5760	28.4300	70.6702	(250)
Additional standing charges			104.0000	(251)
Total energy cost			1406.6597	(255)

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	13718.4188	0.2100	2880.8679	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	4912.6232	0.2100	1031.6509	(264)
Space and water heating			3912.5188	(265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872	(267)
Energy for lighting	248.5760	0.1443	35.8772	(268)
Total CO2, kg/year			3954.0832	(272)

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	13718.4188	1.1300	15501.8132	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	4912.6232	1.1300	5551.2642	(278)
Space and water heating			21053.0774	(279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248	(281)
Energy for lighting	248.5760	1.5338	381.2742	(282)
Total Primary energy kWh/year			21496.3765	(286)

SAP 10 EPC IMPROVEMENTS

Energy Statement

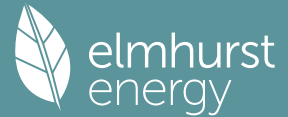
Current energy efficiency rating:	C 71
Current environmental impact rating:	D 67

N Solar water heating	SAP increase too small
U Solar photovoltaic panels	Recommended
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
U Solar photovoltaic panels	+ 4.6	-£ 241	-114 kg (2.9%)
Measures omitted - SAP change or cost saving too small:			
N Solar water heating	+ -7.4	-£-383	+ 1165 kg (29.5%)

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
Solar photovoltaic panels	£241	0.90 kg/m²	C 75 D 68
Total Savings	£241	0.90 kg/m²	

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Potential energy efficiency rating:
Potential environmental impact rating:

C 75
D 68

Fuel prices for cost data on this page from database revision number 587 TEST (28 Nov 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, South East England):

	Current	Potential	Saving
Electricity	£82	£82	£0
Mains gas	£1324	£1324	£0
Space heating	£1014	£1014	£0
Water heating	£322	£322	£0
Lighting	£71	£71	£0
Generated (PV)	-£0	-£241	£241
Total cost of fuels	£1406	£1165	£241
Total cost of uses	£1407	£1166	£241
Delivered energy	149 kWh/m ²	143 kWh/m ²	7 kWh/m ²
Carbon dioxide emissions	4.0 tonnes	3.8 tonnes	0.1 tonnes
CO2 emissions per m ²	31 kg/m ²	30 kg/m ²	1 kg/m ²
Primary energy	170 kWh/m ²	160 kWh/m ²	10 kWh/m ²

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	81.8000 (1b)	x 2.4000 (2b)	= 196.3200 (1b) - (3b)
First floor	45.0000 (1c)	x 2.4000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	126.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	304.3200 (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) = 0.0657 (8)
Number of storeys in the dwelling (ns)	2 (9)
Additional infiltration	[(9) - 1] x 0.1 = 0.1000 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction	0.3500 (11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	0.0000 (12)
If no draught lobby, enter 0.05, else enter 0	0.0500 (13)
Percentage of windows and doors draught stripped	100.0000 (14)
Window infiltration	0.25 - [0.2 * (14) / 100] = 0.0500 (15)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.6157 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.5695 (21)

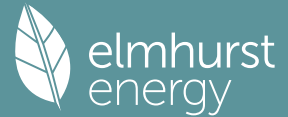
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.7262	0.7119	0.6977	0.6265	0.6123	0.5411	0.5411	0.5268	0.5695	0.6123	0.6407	0.6692 (22b)
Effective ac	0.7637	0.7534	0.7434	0.6962	0.6874	0.6464	0.6464	0.6388	0.6622	0.6874	0.7053	0.7239 (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							
New Doors			3.8400	1.0000	3.8400		(26)
New Glazing			23.6000	1.5038	35.4887		(27)
Ground Floor			81.8000	0.2500	20.4500	110.0000	8998.0000 (28a)
External Facade	164.0000	27.4400	136.5600	0.3000	40.9680	190.0000	25946.4000 (29a)
Pitch Roof	112.0000		112.0000	0.2100	23.5200	9.0000	1008.0000 (30)
Total net area of external elements Aum(A, m ²)			357.8000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		124.2667		(33)
Main dwelling							
Internal Walls			62.0000			9.0000	558.0000 (32c)

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		14.0000			36.7938		0.7600		0.7000		0.7700		189.9100 (77)	
Northwest		9.6000			11.2829		0.7600		0.7000		0.7700		39.9336 (71)	
Solar gains		229.8436	404.7731	589.0606	788.9296	937.5695	954.4994	910.3723	795.8554	657.7055	456.8600	277.7153	195.1352 (83)	
Total gains		1044.9593	1217.9574	1380.1824	1539.2363	1645.8904	1536.3217	1469.8732	1358.1406	1241.2640	1167.0206	1033.3660	990.5876 (84)	

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7. Mean internal temperature (heating season)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
tau	38.7912	38.9381	39.0832	39.7794	39.9124	40.5435	40.5435	40.6625	40.2980	39.9124	39.6442	39.3677	
alpha	3.5861	3.5959	3.6055	3.6520	3.6608	3.7029	3.7029	3.7108	3.6865	3.6608	3.6429	3.6245	
util living area	0.9961	0.9927	0.9849	0.9634	0.9105	0.8186	0.6811	0.7350	0.9057	0.9747	0.9931	0.9968	(86)
MIT	18.7863	19.0037	19.3803	19.8994	20.3866	20.7375	20.9066	20.8737	20.5627	19.9717	19.2990	18.7681	(87)
Th 2	19.2357	19.2409	19.2461	19.2702	19.2748	19.2961	19.2961	19.3000	19.2878	19.2748	19.2656	19.2560	(88)
util rest of house													
	0.9943	0.9894	0.9776	0.9436	0.8556	0.6905	0.4615	0.5255	0.8212	0.9570	0.9894	0.9954	(89)
MIT 2	17.3241	17.5437	17.9198	18.4422	18.8945	19.1916	19.2803	19.2743	19.0701	18.5239	17.8557	17.3199	(90)
Living area fraction										fLA = Living area / (4) =		0.2524	(91)
MIT	17.6931	17.9121	18.2884	18.8100	19.2711	19.5817	19.6907	19.6779	19.4468	18.8893	18.2199	17.6854	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.6931	17.9121	18.2884	18.8100	19.2711	19.5817	19.6907	19.6779	19.4468	18.8893	18.2199	17.6854	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9919	0.9857	0.9717	0.9363	0.8555	0.7169	0.5198	0.5808	0.8319	0.9511	0.9859	0.9934	(94)
Useful gains	1036.5231	1200.4867	1341.1224	1441.1971	1407.9810	1101.4392	764.0785	788.8161	1032.5546	1109.9445	1018.7876	984.0150	(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	3649.8490	3532.6531	3188.5440	2633.5500	2005.2877	1298.9310	805.8782	852.1758	1402.6004	2195.5229	2965.1678	3621.1805	(97)
Space heating kWh	1944.3145	1567.2158	1374.4816	858.4941	444.3962	0.0000	0.0000	0.0000	0.0000	807.6703	1401.3937	1962.0512	(98a)
Space heating requirement - total per year (kWh/year)												10360.0173	
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	1944.3145	1567.2158	1374.4816	858.4941	444.3962	0.0000	0.0000	0.0000	0.0000	807.6703	1401.3937	1962.0512	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												10360.0173	
Space heating per m2										(98c) / (4) =		81.7036	(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 %)													69.0000 (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	1944.3145	1567.2158	1374.4816	858.4941	444.3962	0.0000	0.0000	0.0000	0.0000	807.6703	1401.3937	1962.0512	(98)
Space heating efficiency (main heating system 1)	69.0000	69.0000	69.0000	69.0000	69.0000	0.0000	0.0000	0.0000	0.0000	69.0000	69.0000	69.0000	(210)
Space heating fuel (main heating system)	2817.8470	2271.3273	1992.0023	1244.1943	644.0524	0.0000	0.0000	0.0000	0.0000	1170.5367	2031.0054	2843.5524	(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	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374	(64)
Efficiency of water heater (217)m	67.3415	67.2035	66.8896	66.2222	64.7768	59.0000	59.0000	59.0000	59.0000	66.0646	67.0046	64.0000	(216)
Fuel for water heating, kWh/month	496.4662	441.6805	475.3805	431.2396	433.7597	305.9731	301.1920	314.0886	318.5248	439.3250	450.9073	491.9953	(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	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822	(231)
Lighting	30.8003	24.7091	22.2478	16.2997	12.5904	10.2864	11.4854	14.9291	19.3914	25.4426	28.7374	31.6563	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-34.7656	-50.7097	-75.4746	-87.8640	-97.1616	-91.4735	-90.1994	-83.8570	-73.1537	-59.1536	-38.7630	-29.8447	(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												15014.5179	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												64.0000	
Water heating fuel used												4900.5327	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												248.5760	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-812.4204	(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	19392.2062 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	15014.5179	3.6400	546.5285 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	4900.5327	3.6400	178.3794 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	248.5760	16.4900	40.9902 (250)
Additional standing charges			92.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-812.4204	16.4900	-133.9681
PV Unit electricity exported	0.0000	5.5900	0.0000
Total			-133.9681 (252)
Total energy cost			730.6908 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.5311 (257)
SAP value		75.1803
SAP rating (Section 12)		75 (258)
SAP band		C

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	15014.5179	0.2100	3153.0488 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	4900.5327	0.2100	1029.1119 (264)
Space and water heating			4182.1606 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	248.5760	0.1443	35.8772 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-812.4204	0.1339	-108.7863
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-108.7863 (269)
Total CO2, kg/year			4114.9387 (272)
CO2 emissions per m2			32.4500 (273)
EI value			67.9044
EI rating			68 (274)
EI band			D

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

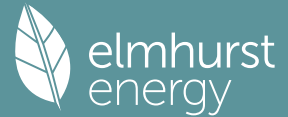
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	81.8000 (1b)	x 2.4000 (2b)	= 196.3200 (1b) - (3b)
First floor	45.0000 (1c)	x 2.4000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	126.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	304.3200 (5)

2. Ventilation rate

	m3 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)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.0657 (8)
Number of storeys in the dwelling (ns)	2 (9)
Additional infiltration	[(9) - 1] x 0.1 = 0.1000 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction	0.3500 (11)

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If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0												0.0000 (12)	
If no draught lobby, enter 0.05, else enter 0												0.0500 (13)	
Percentage of windows and doors draught stripped												100.0000 (14)	
Window infiltration												0.25 - [0.2 * (14) / 100] = 0.0500 (15)	
Pressure test												No	
Pressure Test Method												Blower Door	
Measured/design AP50												15.0000 (17)	
Infiltration rate												0.6157 (18)	
Number of sides sheltered												1 (19)	
Shelter factor												(20) = 1 - [0.075 x (19)] = 0.9250 (20)	
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) = 0.5695 (21)	
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.2000	3.9000	3.9000	3.5000	3.5000	3.3000	3.2000	3.0000	3.2000	3.4000	3.4000	3.8000	(22)
Adj infilt rate	1.0500	0.9750	0.9750	0.8750	0.8750	0.8250	0.8000	0.7500	0.8000	0.8500	0.8500	0.9500	(22a)
Effective ac	0.5980	0.5553	0.5553	0.4983	0.4983	0.4699	0.4556	0.4272	0.4556	0.4841	0.4841	0.5411	(22b)
	0.6788	0.6542	0.6542	0.6242	0.6242	0.6104	0.6038	0.5912	0.6038	0.6172	0.6172	0.6464	(25)

3. Heat losses and heat loss parameter													

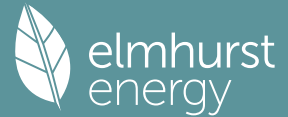
Element			Gross	Openings	NetArea	U-value	A x U		K-value	A x K			
Main dwelling			m2	m2	m2	W/m2K	W/K		kJ/m2K	kJ/K			
New Doors					3.8400	1.0000	3.8400					(26)	
New Glazing					23.6000	1.5038	35.4887					(27)	
Ground Floor					81.8000	0.2500	20.4500		110.0000	8998.0000		(28a)	
External Facade			164.0000	27.4400	136.5600	0.3000	40.9680		190.0000	25946.4000		(29a)	
Pitch Roof			112.0000		112.0000	0.2100	23.5200		9.0000	1008.0000		(30)	
Total net area of external elements Aum(A, m2)					357.8000							(31)	
Fabric heat loss, W/K = Sum (A x U)							(26)...(30) + (32) =		124.2667			(33)	
Main dwelling													
Internal Walls					62.0000				9.0000	558.0000		(32c)	
Internal Floor 1					45.0000				18.0000	810.0000		(32d)	
Internal Ceiling					81.8000				9.0000	736.2000		(32e)	
Heat capacity Cm = Sum(A x k)												(28)...(30) + (32) + (32a)...(32e) = 38056.6000 (34)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												300.1309 (35)	
Thermal bridges (Default value 0.200 * total exposed area)												71.5600 (36)	
Point Thermal bridges										(36a) =		0.0000	
Total fabric heat loss										(33) + (36) + (36a) =		195.8267 (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	68.1702	65.6965	65.6965	62.6832	62.6832	61.2987	60.6370	59.3747	60.6370	61.9808	61.9808	64.9126	(38)
Average = Sum(39)m / 12 =	263.9969	261.5232	261.5232	258.5099	258.5099	257.1255	256.4638	255.2015	256.4638	257.8075	257.8075	260.7393	(39)
												258.8060	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.0820	2.0625	2.0625	2.0387	2.0387	2.0278	2.0226	2.0126	2.0226	2.0332	2.0332	2.0563	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												2.0411	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													2.8862 (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													
	88.1686	86.8591	85.0152	81.6153	79.0695	76.2466	74.7218	76.5528	78.5465	81.5671	85.0370	87.8705	(42b)
Hot water usage for other uses													
	46.5131	44.8217	43.1303	41.4389	39.7475	38.0562	38.0562	39.7475	41.4389	43.1303	44.8217	46.5131	(42c)
Average daily hot water use (litres/day)													124.0308 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	134.6816	131.6808	128.1455	123.0542	118.8170	114.3027	112.7779	116.3004	119.9854	124.6974	129.8587	134.3836	(44)
Energy content (annual)	213.3028	187.5117	196.9548	168.4550	159.9505	140.5485	136.3951	144.0041	147.9540	169.2132	185.0076	210.4122	(45)
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m =
	31.9954	28.1268	29.5432	25.2683	23.9926	21.0823	20.4593	21.6006	22.1931	25.3820	27.7511	31.5618	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)													0.0000 (51)
Volume factor from Table 2a													0.8434 (52)
Temperature factor from Table 2b													0.7800 (53)
Enter (49) or (54) in (55)													0.0000 (55)
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													
	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)
Primary loss	121.0252	109.3131	121.0252	117.1212	121.0252	39.9756	41.3081	41.3081	39.9756	121.0252	117.1212	121.0252	(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													
	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374	(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	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374	(64)
													Total per year (kWh/year) = Sum(64)m =
													3170.9589 (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	167.7434	149.7981	162.3077	149.7083	150.0037	78.7129	78.3979	80.9279	81.1752	153.0836	155.2120	166.7822	(65)

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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	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711	173.1711 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	35.1885	31.2541	25.4176	19.2427	14.3842	12.1437	13.1217	17.0561	22.8927	29.0675	33.9261	36.1665 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	438.5387	443.0893	431.6218	407.2088	376.3918	347.4282	328.0787	323.5280	334.9956	359.4085	390.2255	419.1892 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033	55.2033 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474 (71)
Water heating gains (Table 5)	225.4615	222.9139	218.1555	207.9281	201.6179	109.3234	105.3735	108.7740	112.7433	205.7575	215.5722	224.1697 (72)
Total internal gains	815.1157	813.1843	791.1218	750.3067	708.3209	581.8223	559.5009	562.2852	583.5585	710.1605	755.6508	795.4524 (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					14.0000	41.2954		0.7600	0.7000	0.7700		213.1449 (77)	
Northwest					9.6000	13.3321		0.7600	0.7000	0.7700		47.1862 (81)	
Solar gains	260.3311	400.3995	591.1879	827.0589	963.3569	1063.3169	990.4879	870.3536	703.5760	490.1711	312.0699	220.5278	(83)
Total gains	1075.4468	1213.5838	1382.3098	1577.3656	1671.6778	1645.1392	1549.9888	1432.6388	1287.1345	1200.3316	1067.7206	1015.9801	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
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	40.0432	40.4220	40.4220	40.8931	40.8931	41.1133	41.2194	41.4233	41.2194	41.0045	41.0045	40.5435
alpha	3.6695	3.6948	3.6948	3.7262	3.7262	3.7409	3.7480	3.7616	3.7480	3.7336	3.7336	3.7029
util living area	0.9956	0.9926	0.9835	0.9557	0.8903	0.7560	0.5946	0.6411	0.8820	0.9674	0.9916	0.9963 (86)
MIT	18.9090	19.0984	19.4977	20.0286	20.4964	20.8247	20.9496	20.9342	20.6423	20.1087	19.4483	18.8987 (87)
Th 2	19.2792	19.2920	19.2920	19.3076	19.3076	19.3149	19.3183	19.3249	19.3183	19.3113	19.3113	19.2961 (88)
util rest of house	0.9936	0.9894	0.9755	0.9316	0.8240	0.6040	0.3616	0.4052	0.7813	0.9441	0.9869	0.9947 (89)
MIT 2	17.4760	17.6729	18.0677	18.5921	19.0131	19.2571	19.3129	19.3167	19.1542	18.6810	18.0354	17.4774 (90)
Living area fraction	17.8377	18.0327	18.4286	18.9546	19.3875	19.6527	19.7259	19.7249	19.5298	19.0413	18.3920	17.8361 (92)
MIT	17.8377	18.0327	18.4286	18.9546	19.3875	19.6527	19.7259	19.7249	19.5298	19.0413	18.3920	17.8361 (93)
Temperature adjustment												0.0000
adjusted MIT	17.8377	18.0327	18.4286	18.9546	19.3875	19.6527	19.7259	19.7249	19.5298	19.0413	18.3920	17.8361 (93)

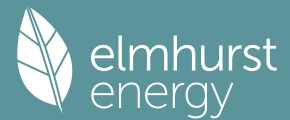
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9910	0.9857	0.9696	0.9248	0.8279	0.6398	0.4235	0.4684	0.7979	0.9388	0.9831	0.9925 (94)
Useful gains	1065.7892	1196.2333	1340.3329	1458.8048	1384.0575	1052.5602	656.3842	671.0158	1027.0437	1126.8187	1049.6383	1008.4031 (95)
Ext temp.	4.5000	5.0000	6.8000	9.3000	12.2000	15.1000	17.1000	17.0000	14.4000	11.1000	7.5000	4.5000 (96)
Heat loss rate W	3521.1058	3408.3509	3041.1417	2495.8226	1858.0298	1170.6222	673.4566	695.3981	1315.6046	2047.3278	2808.0270	3477.2496 (97)
Space heating kWh	1826.7556	1486.5430	1265.4017	746.6528	352.6354	0.0000	0.0000	0.0000	0.0000	684.8587	1266.0399	1836.8218 (98a)
Space heating requirement - total per year (kWh/year)												9465.7090
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	1826.7556	1486.5430	1265.4017	746.6528	352.6354	0.0000	0.0000	0.0000	0.0000	684.8587	1266.0399	1836.8218 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												9465.7090
Space heating per m2										(98c) / (4) =		74.6507 (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 %)												69.0000 (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	1826.7556	1486.5430	1265.4017	746.6528	352.6354	0.0000	0.0000	0.0000	0.0000	684.8587	1266.0399	1836.8218 (98)
Space heating efficiency (main heating system 1)	69.0000	69.0000	69.0000	69.0000	69.0000	0.0000	0.0000	0.0000	0.0000	69.0000	69.0000	69.0000 (210)
Space heating fuel (main heating system)	2647.4718	2154.4102	1833.9156	1082.1056	511.0657	0.0000	0.0000	0.0000	0.0000	992.5489	1834.8404	2662.0606 (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	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374 (64)
Efficiency of water heater												64.0000 (216)

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(217)m	67.2535	67.1243	66.7486	65.9337	64.2048	59.0000	59.0000	59.0000	59.0000	65.7114	66.8374	67.2738	(217)
Fuel for water heating, kWh/month	497.1165	442.2017	476.3845	433.1266	437.6239	305.9731	301.1920	314.0886	318.5248	441.6869	452.0353	492.6694	(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	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.3699	3.4822	3.3699	3.4822	3.3699	(231)
Lighting	30.8003	24.7091	22.2478	16.2997	12.5904	10.2864	11.4854	14.9291	19.3914	25.4426	28.7374	31.6563	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.9052	-50.8116	-76.1357	-90.5555	-98.5611	-96.5652	-94.1203	-88.1165	-76.5124	-62.6327	-42.9113	-33.4046	(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												13718.4188	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												64.0000	
Water heating fuel used												4912.6232	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												248.5760	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-849.2321	(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												18071.3859	(238)

10a. Fuel costs - using BEDF prices (587)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	13718.4188	6.5500	898.5564	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	4912.6232	6.5500	321.7768	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	41.0000	28.4300	11.6563	(249)
Energy for lighting	248.5760	28.4300	70.6702	(250)
Additional standing charges			104.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-849.2321	28.4300	-241.4367	
PV Unit electricity exported	0.0000	5.8100	0.0000	
Total			-241.4367	(252)
Total energy cost			1165.2230	(255)

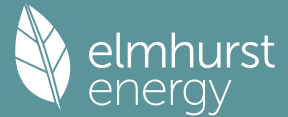
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	13718.4188	0.2100	2880.8679	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	4912.6232	0.2100	1031.6509	(264)
Space and water heating			3912.5188	(265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872	(267)
Energy for lighting	248.5760	0.1443	35.8772	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-849.2321	0.1340	-113.7610	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-113.7610	(269)
Total CO2, kg/year			3840.3222	(272)

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	13718.4188	1.1300	15501.8132	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	4912.6232	1.1300	5551.2642	(278)
Space and water heating			21053.0774	(279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248	(281)
Energy for lighting	248.5760	1.5338	381.2742	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-849.2321	1.4950	-1269.6316	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-1269.6316	(283)
Total Primary energy kWh/year			20226.7449	(286)

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Plot Reference	45 Lashmere			Issued on Date	06/01/2026
Assessment Reference	Energy Statement	Plot Type Ref	1.01		
Plot Address	45 Lashmere, Copthorne, CRAWLEY, RH10 3RR			SAP Version	10.2
SAP Rating	71 C	DER	33.88	TER	
Environmental	67 D	% DER < TER			N/A
CO ₂ Emissions (t/year)	3.95	DFEE	91.98	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	184.04	TPER	
Assessor Details	Mr. Ruari Mulvenna			Assessor ID	AW51-0001
Client	45 Lashmere, Soprat Samay				

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (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	81.8000 (1b)	x 2.4000 (2b)	= 196.3200 (1b) - (3b)
First floor	45.0000 (1c)	x 2.4000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	126.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 304.3200 (5)

2. Ventilation rate

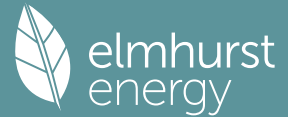
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.0657 (8)
Number of storeys in the dwelling (ns)	2 (9)
Additional infiltration	[(9) - 1] x 0.1 = 0.1000 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction	0.3500 (11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	0.0000 (12)
If no draught lobby, enter 0.05, else enter 0	0.0500 (13)
Percentage of windows and doors draught stripped	100.0000 (14)
Window infiltration	0.25 - [0.2 * (14) / 100] = 0.0500 (15)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.6157 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.5695 (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	0.7262	0.7119	0.6977	0.6265	0.6123	0.5411	0.5411	0.5268	0.5695	0.6123	0.6407	0.6692 (22b)
Effective ac	0.7637	0.7534	0.7434	0.6962	0.6874	0.6464	0.6464	0.6388	0.6622	0.6874	0.7053	0.7239 (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							
New Doors			3.8400	1.0000	3.8400		(26)
New Glazing			23.6000	1.5038	35.4887		(27)
Ground Floor			81.8000	0.2500	20.4500	110.0000	8998.0000 (28a)
External Facade	164.0000	27.4400	136.5600	0.3000	40.9680	190.0000	25946.4000 (29a)
Pitch Roof	112.0000		112.0000	0.2100	23.5200	9.0000	1008.0000 (30)
Total net area of external elements Aum(A, m ²)			357.8000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	124.2667		(33)
Main dwelling							
Internal Walls			62.0000			9.0000	558.0000 (32c)
Internal Floor 1			45.0000			18.0000	810.0000 (32d)

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Internal Ceiling	81.8000								9.0000		736.2000 (32e)		
Heat capacity Cm = Sum(A x k)									(28)...(30) + (32) + (32a)...(32e) =		38056.6000 (34)		
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K											300.1309 (35)		
Thermal bridges (Default value 0.200 * total exposed area)											71.5600 (36)		
Point Thermal bridges									(36a) =		0.0000		
Total fabric heat loss									(33) + (36) + (36a) =		195.8267 (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	(38)
Heat transfer coeff	76.6908	75.6626	74.6548	69.9211	69.0355	64.9126	64.9126	64.1491	66.5007	69.0355	70.8272	72.7003	(38)
Average = Sum(39)m / 12 =	272.5175	271.4894	270.4815	265.7479	264.8622	260.7393	260.7393	259.9758	262.3274	264.8622	266.6539	268.5270	(39)
												265.7436	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.1492	2.1411	2.1331	2.0958	2.0888	2.0563	2.0563	2.0503	2.0688	2.0888	2.1029	2.1177	(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												2.8862 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	88.1686	86.8591	85.0152	81.6153	79.0695	76.2466	74.7218	76.5528	78.5465	81.5671	85.0370	87.8705 (42b)
Hot water usage for other uses	46.5131	44.8217	43.1303	41.4389	39.7475	38.0562	38.0562	39.7475	41.4389	43.1303	44.8217	46.5131 (42c)
Average daily hot water use (litres/day)												124.0308 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	134.6816	131.6808	128.1455	123.0542	118.8170	114.3027	112.7779	116.3004	119.9854	124.6974	129.8587	134.3836 (44)
Energy content (annual)	213.3028	187.5117	196.9548	168.4550	159.9505	140.5485	136.3951	144.0041	147.9540	169.2132	185.0076	210.4122 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 2059.7097
Water storage loss (or HIU loss):	31.9954	28.1268	29.5432	25.2683	23.9926	21.0823	20.4593	21.6006	22.1931	25.3820	27.7511	31.5618 (46)
Store volume												200.0000 (47)
b) If manufacturer declared loss factor is not known :												0.0000 (51)
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.8434 (52)
Volume factor from Table 2a												0.7800 (53)
Temperature factor from Table 2b												0.0000 (55)
Enter (49) or (54) in (55)												0.0000 (55)
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	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)
Primary loss	121.0252	109.3131	121.0252	117.1212	121.0252	39.9756	41.3081	41.3081	39.9756	121.0252	117.1212	121.0252 (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	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374 (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	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 3170.9589 (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	167.7434	149.7981	162.3077	149.7083	150.0037	78.7129	78.3979	80.9279	81.1752	153.0836	155.2120	166.7822 (65)

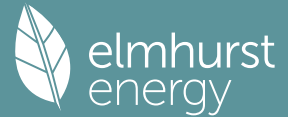
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	144.3092	144.3092	144.3092	144.3092	144.3092	144.3092	144.3092	144.3092	144.3092	144.3092	144.3092	144.3092 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	150.5950	166.7302	150.5950	155.6149	150.5950	155.6149	150.5950	150.5950	155.6149	150.5950	155.6149	150.5950 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	293.8209	296.8698	289.1866	272.8299	252.1825	232.7769	219.8127	216.7638	224.4470	240.8037	261.4511	280.8567 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.4309	37.4309	37.4309	37.4309	37.4309	37.4309	37.4309	37.4309	37.4309	37.4309	37.4309	37.4309 (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)	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474	-115.4474 (71)
Water heating gains (Table 5)	225.4615	222.9139	218.1555	207.9281	201.6179	109.3234	105.3735	108.7740	112.7433	205.7575	215.5722	224.1697 (72)
Total internal gains	739.1702	755.8067	727.2299	705.6657	673.6883	564.0079	542.0740	542.4256	559.0980	666.4490	701.9309	724.9142 (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						14.0000	36.7938	0.7600	0.7000	0.7700	189.9100 (77)	
Northwest						9.6000	11.2829	0.7600	0.7000	0.7700	39.9336 (81)	
Solar gains	229.8436	404.7731	589.0606	788.9296	937.5695	954.4994	910.3723	795.8554	657.7055	456.8600	277.7153	195.1352 (83)
Total gains	969.0139	1160.5798	1316.2905	1494.5953	1611.2577	1518.5074	1452.4463	1338.2811	1216.8035	1123.3091	979.6462	920.0494 (84)

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7. Mean internal temperature (heating season)

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

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	38.7912	38.9381	39.0832	39.7794	39.9124	40.5435	40.5435	40.6625	40.2980	39.9124	39.6442	39.3677	21.0000 (85)
alpha	3.5861	3.5959	3.6055	3.6520	3.6608	3.7029	3.7029	3.7108	3.6865	3.6608	3.6429	3.6245	
util living area	0.9969	0.9937	0.9869	0.9664	0.9151	0.8228	0.6865	0.7414	0.9102	0.9775	0.9942	0.9975	(86)
MIT	18.7391	18.9685	19.3423	19.8749	20.3713	20.7322	20.9041	20.8698	20.5521	19.9466	19.2658	18.7240	(87)
Th 2	19.2357	19.2409	19.2461	19.2702	19.2748	19.2961	19.2961	19.3000	19.2878	19.2748	19.2656	18.7240	(88)
util rest of house	0.9956	0.9909	0.9806	0.9480	0.8622	0.6958	0.4664	0.5320	0.8283	0.9614	0.9911	0.9964	(89)
MIT 2	17.2772	17.5089	17.8828	18.4196	18.8824	19.1888	19.2798	19.2732	19.0627	18.5005	17.8230	17.2760	(90)
Living area fraction									fLA = Living area /	(4) =		0.2524	(91)
MIT	17.6461	17.8773	18.2511	18.7869	19.2581	19.5783	19.6897	19.6761	19.4386	18.8655	18.1871	17.6414	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.6461	17.8773	18.2511	18.7869	19.2581	19.5783	19.6897	19.6761	19.4386	18.8655	18.1871	17.6414	(93)

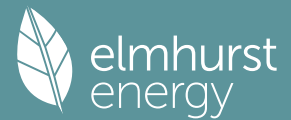
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	962.8071	1146.1378	1283.6115	1406.0660	1388.0874	1096.0097	762.4488	786.0009	1019.8476	1073.5488	967.8611	915.2053	(94)
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	(95)
Heat loss rate W	3637.0561	3523.1907	3178.4684	2627.4143	2001.8641	1298.0485	805.6006	851.7114	1400.4591	2189.2058	2956.4184	3609.3804	(96)
Space heating kWh	1989.6412	1597.3795	1409.7736	879.3708	456.6498	0.0000	0.0000	0.0000	0.0000	830.0488	1431.7612	2004.4663	(98a)
Space heating requirement - total per year (kWh/year)												10599.0913	
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	1989.6412	1597.3795	1409.7736	879.3708	456.6498	0.0000	0.0000	0.0000	0.0000	830.0488	1431.7612	2004.4663	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												10599.0913	
Space heating per m2										(98c) / (4) =		83.5890	(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 %)													69.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	1989.6412	1597.3795	1409.7736	879.3708	456.6498	0.0000	0.0000	0.0000	0.0000	830.0488	1431.7612	2004.4663	(98)
Space heating efficiency (main heating system 1)	69.0000	69.0000	69.0000	69.0000	69.0000	0.0000	0.0000	0.0000	0.0000	69.0000	69.0000	69.0000	(210)
Space heating fuel (main heating system)	2883.5380	2315.0428	2043.1501	1274.4504	661.8114	0.0000	0.0000	0.0000	0.0000	1202.9693	2075.0163	2905.0236	(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	334.3280	296.8249	317.9801	285.5762	280.9758	180.5241	177.7033	185.3123	187.9296	290.2384	302.1288	331.4374	(64)
Efficiency of water heater (217)m	67.3732	67.2314	66.9315	66.2701	64.8430	59.0000	59.0000	59.0000	59.0000	66.1210	67.0386	64.0000	(216)
Fuel for water heating, kWh/month	496.2331	441.4971	475.0829	430.9276	433.3168	305.9731	301.1920	314.0886	318.5248	438.9506	450.6785	491.7834	(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	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822	(231)
Lighting	30.8003	24.7091	22.2478	16.2997	12.5904	10.2864	11.4854	14.9291	19.3914	25.4426	28.7374	31.6563	(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												15361.0019	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												64.0000	
Water heating fuel used												4898.2484	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												248.5760	(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	20548.8264 (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	15361.0019	0.2100	3225.8104 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	4898.2484	0.2100	1028.6322 (264)
Space and water heating			4254.4426 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	248.5760	0.1443	35.8772 (268)
Total CO2, kg/year			4296.0070 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			33.8800 (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	15361.0019	1.1300	17357.9321 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	4898.2484	1.1300	5535.0207 (278)
Space and water heating			22892.9529 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	248.5760	1.5338	381.2742 (282)
Total Primary energy kWh/year			23336.2519 (286)
Dwelling Primary energy Rate (DPER)			184.0400 (287)