
164 Harefield Road, Uxbridge

Sustainability statement

Sept 2025

Revision Schedule

Sustainability statement
Sept 2025

Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	July 2025	First Issue	P. Giesberg	Dr S Bamford	Dr S Bamford
02	Sept 2025	Errata	P Giesberg	Dr S Bamford	Dr. S Bamford

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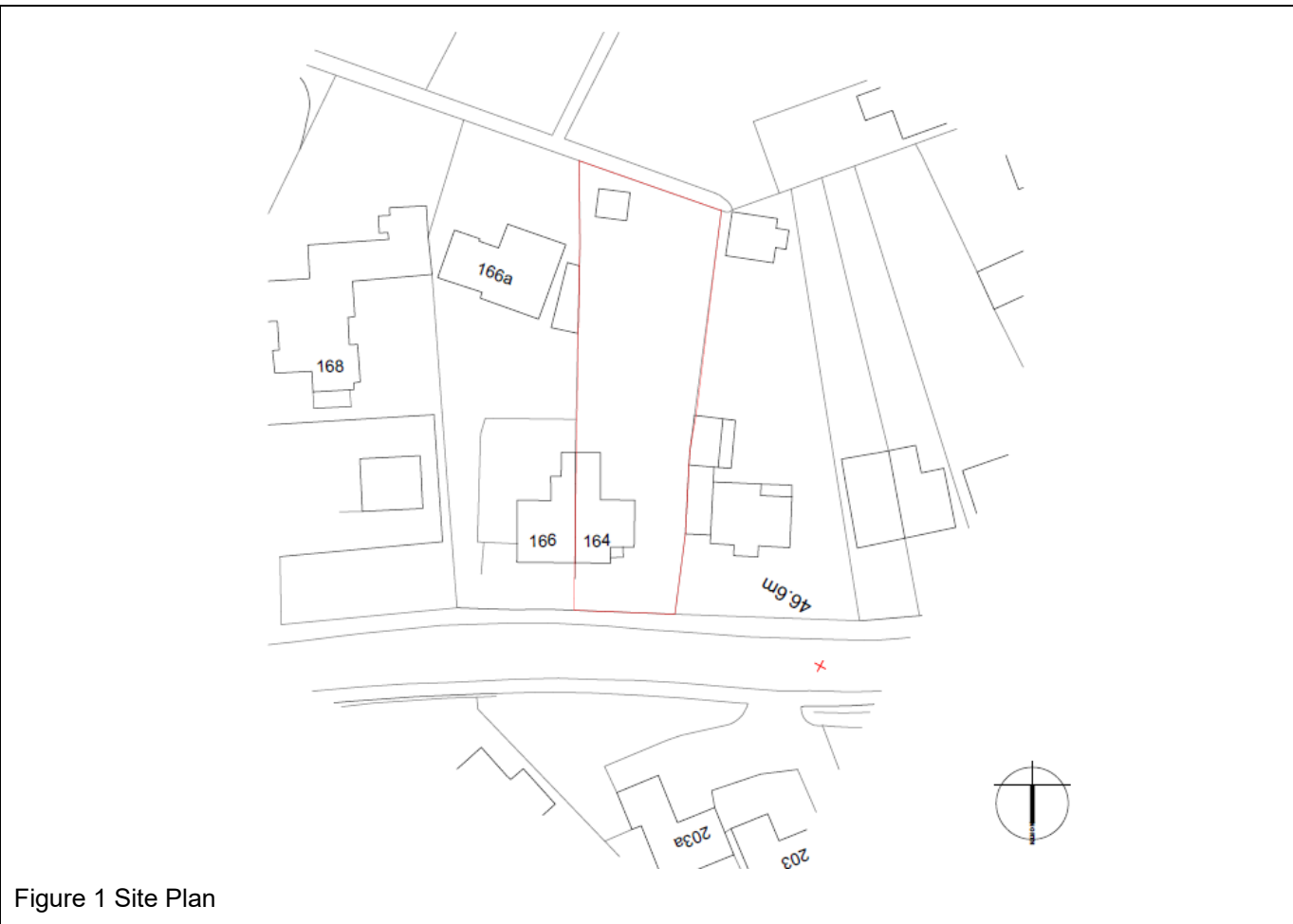
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1 Introduction

Planning for Sustainability has been appointed to provide a sustainability statement to support the planning application for the construction of a pair of new three bedroom semi-detached houses in the existing garden of 164 Harfield Road, Uxbridge, London.

1.1 Site and development

The site is located in the rear garden of an existing semi-detached house. The area is a residential area on the edge of Uxbridge. The surrounding properties are all residential semi-detached and detached houses with ample garden space. Figure 1 shows the site plan.



It is proposed to erect a new pair of semi-detached houses to the rear of the semi-detached house at 164 Harefield Road. An overview of the design proposal is provided in Appendix 1.

1.2 Sustainability Statement

The formulation of the Sustainability Strategy for the proposal redevelopment has taken into account several important priorities, including:

- Climate change mitigation
 - Reducing emissions of greenhouse gasses
 - Reduction of Urban Heat Island Effect
- Climate change adaptation
 - Overheating
 - Flood Risk
 - Sustainable Drainage
- Resource Management
 - Water use
 - Waste Management
- Pollution control
 - Air Quality
 - Noise
 - Water pollution
- Biodiversity
 - Biodiversity Net Gain

The development is classed as a minor development and is of a residential nature and the strategy that is adopted is appropriate for the scale of the proposed development. Chapter 2 will describe the general sustainability topics and compliance of the proposed development.

2 Requirements and compliance

2.1 Climate Change Mitigation

Reduction of Greenhouse Gas Emissions

The main source of greenhouse gas emissions when considering a small-scale residential development project relates to the energy used as part of the operational phase of the building during its occupancy. There are five elements to this:

1. Space heating
2. Domestic hot water
3. Cooling
4. Cooking
5. Power use of equipment in the house (White Goods, TVs, Computers etc)

The first four elements are included in Approved Document Part L of the Building Regulations and the Hillingdon's local plan.¹ includes a policy on these elements:

Policy DMEI 2: Reducing Carbon Emissions

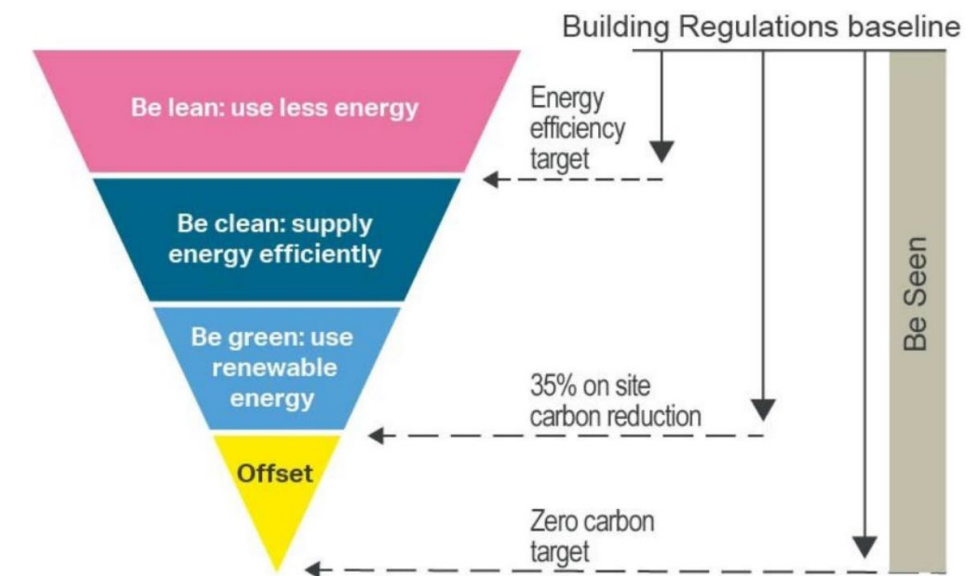
A) All developments are required to make the fullest contribution to minimising carbon dioxide emissions in accordance with London Plan targets.

B) All major development proposals must be accompanied by an energy assessment showing how these reductions will be achieved.

C) Proposals that fail to take reasonable steps to achieve the required savings will be resisted. However, where it is clearly demonstrated that the targets for carbon emissions cannot be met onsite, the Council may approve the application and seek an off-site contribution to make up for the shortfall.

Regulated Carbon Emissions

The London Plan has a minimum target of 35% reduction of carbon emissions of new residential development compared to the Part L (2021) requirements. It is considered that this is easily achieved and therefore a benchmark has been introduced that is currently at 50% reduction but a periodic review is likely to increase the reduction aim. In order to reduce regulated carbon emissions the London Plan considers an Energy Hierarchy (see diagram below)



In the context of the energy hierarchy, energy efficiency is the first stage. Energy demand should be reduced as far as possible before the heating strategy and installation of low carbon and renewable technologies is considered. This has the benefit of reducing the ongoing costs of purchasing energy during its time of occupancy. (Be lean). The next stage (Be Clean) requires the consideration of connecting to heat networks and finally (Be Green), consideration should be given to the installation of low or zero carbon technologies on the development site.

In addressing the changing climate in London, the need for cooling has become an important element to consider. A cooling hierarchy exists, where active mechanically cooled buildings (air conditioning) are only acceptable as a last resort. We carried out an initial assessment using the early stage overheating risk tool published by the Good Homes Alliance. As a detached house in a suburban residential setting with large gardens, the risk of overheating is very low. It is highly likely that natural ventilation will be sufficient to keep the house comfortable during warm summer periods.

Table 1 gives an overview of the measures that are implemented to reduce the carbon emissions associated with the regulated energy use of the proposed development. It follows the steps from nominal baseline through energy efficient building envelope ("Be Lean") to the final proposed measures ("Be Green").

In summary it is proposed to provide space heating and domestic hot water with an air source heat pump, mechanical ventilation with heat recovery and double glazed windows. There is also a photovoltaic array proposed on the rear roof. An integrated 4 kWp system is proposed for each of the two units. There are some mature trees nearby and a shading analysis was carried out based on the estimated height of the trees. There is likely some limited shading loss, but not to the extent that the viability of a PV array would be affected.

The specification was used to undertake an energy performance assessment using the standard SAP methodology for residential buildings for the three scenarios. (Appendix 3 contains the SAP worksheets).

¹ London Borough of Hillingdon Local Plan Part 2 – Development Management Policies, adopted 16 January 2020

	Carbon Dioxide Emissions for residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	2.3	1.0
After energy demand reduction (be lean)	1.9	1.0
After heat network connection (be clean)	1.9	1.0
After renewable energy (be green)	-0.1	1.0

The carbon emissions associated with each scenario is shown in table 1 and table 2 shows the relative improvement made in carbon emission reduction for each of the scenarios.

	Regulated residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.4	17%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	2.0	89%
Cumulative on site savings	2.4	106%

With the proposed measures the carbon reduction will be 106% of the current Part L requirements, which meets the requirements set out in Hillingdon’s local plan. No cash in-lieu payments are required as there are no regulated CO₂ emissions.

Reduction of Urban Heat Island Effect

The temperature in build-up areas is generally higher than in nearby rural areas. This phenomenon is referred to as the Urban Heat Island Effect. Buildings and pavements absorb more of the solar energy than vegetated areas. The proposed development is located in a suburban area, and has a large garden around it. Soft landscaping will be the main finishing form. There are a number of trees in site that will be retained and extended hedging will be provided along part of the boundary.

Table 1 Building Specification SAP assessment

Specification	Notional Baseline	Efficient Baseline (Be Lean)	Proposed Development (Be Green)
Ground floor U-value (W/m2K)	0.13	0.13	0.13
External Wall U-value (W/m2K)	0.18	0.18	0.18
Roof U-value (W/m2K)	0.11	0.11	0.11
Windows U-value (W/m2K)	1.20	1.2	1.2
New dwellings Windows g-value	0.63	0.63	0.63
External doors U-value	1.00	1.00	1.00
Air Permeability	5.00	4.00	4.00
Thermal bridging standalone and 5th floor	Thermal bridging y-value 0.05 W/m2K - equivalent to Part L1 notional dwelling. Detailed thermal bridging calculation has to be carried out at detailed design stage	Thermal bridging y-value 0.05 W/m2K - equivalent to Part L1 notional dwelling. Detailed thermal bridging calculation has to be carried out at detailed design stage	Thermal bridging y-value 0.05 W/m2K - equivalent to Part L1 notional dwelling. Detailed thermal bridging calculation has to be carried out at detailed design stage
Space Heating System and hot water	Gas boiler, SEDBUK(2009) 89.5% efficiency; radiators, time and temperature zone control, delayed start thermostat; Indirect cylinder 150L, standing loss 1.4 kWh/day ; showers flow rate 8 l/min	Gas boiler, SEDBUK(2009) 89.5% efficiency; radiators, time and temperature zone control, delayed start thermostat; Indirect cylinder 150L, standing loss 1.4 kWh/day; showers flow rate 8 l/min	MCS certified ASHP Daikin Altherma EDLA08EV3 or equivalent approved by SAP assessor; underfloor heating, flow temperature 45°C or lower, time and temperature zone control, weather compensator; Indirect cylinder Daikin EKHWS200 or equivalent, standing loss 1.3 kWh/day
Ventilation System	Natural ventilation with intermittent mechanical extracts	MVHR Nuaire MRXBOXAB-Eco3 or equivalent approved by SAP assessor Supply and extract duct to and from exterior has to be insulated with 25mm insulation if less than 2m long or 50mm thickness for ducts over 2m long	MVHR Nuaire MRXBOXAB-Eco3 or equivalent approved by SAP assessor Supply and extract duct to and from exterior has to be insulated with 25mm insulation if less than 2m long or 50mm thickness for ducts over 2m long
Lighting	Lighting power 2.3 W/m2; Efficacy of all fixed lighting = 80 lm/W	Lighting power 2.3 W/m2; Efficacy of all fixed lighting = 80 lm/W	Lighting power 2.3 W/m2 or less; Efficacy of all fixed lighting = 80 lm/W or higher
New dwellings Solar Photovoltaic			Solar PV system with a peak output of 4kWp on the SE facing pitched roof on each house
% Improvement in CO2 over Building regulations compliant baseline	0.00%		

2.2 Climate Change Adaptation

Overheating

Climate change prediction models have shown that London and the south-east of England in general will see a higher average summer temperature, more heat waves and higher extreme temperatures compared to the baseline of the 30 year period between 1970 and 2000. This means that overheating of residential buildings becomes a matter of concern. Not all types of dwellings have the same sensitivity to overheating and particularly single aspects flats in city centres in the south of England have the highest risk of overheating. The Good Homes alliance has published an early stage risk assessment tool to identify the need for a details overheating analysis. Table 2 shows the completed stage risk assessment tool for the proposed development. With a final score of just 3, the proposed development is of low risk to overheating and natural ventilation is likely to be sufficient to keep the houses comfortable during the warm summer months.

The site is located in the South East, where properties are at a higher risk of overheating than any other region. The location in a low density suburban neighbourhood is a protective factor for overheating. There are no particular concerns that would prevent people from opening their windows when they are present in the house, either during the day or at night. Glazing is less than 20% of the area and there is ample opportunity to allow cross ventilation to occur and cool the house.

The surrounding area is made up predominantly of houses and large gardens. Although there are some tall trees, they are not particularly close to the building to provide significant shading. The building is made of standard construction methods and the dimension are also standard. There would be an opportunity to provide additional shading as a structural element, as well as increase the large ventilation rates, if the risks were higher. These measures have not been assumed to be implemented.

Sustainable drainage

A separate sustainable drainage report has been prepared and it includes a provision to adapt to increase in short lived rainfall intensities and measures to reduce the immediate release of rainwater runoff from the site to the public sewer system.

Flood Risk

The site is located in Flood Risk Zone 1, low risk, (Appendix 2). It is not within 20 meters of a main river or flood defence. As the site is less than 1 ha and there are no known other flood risk factors to the site. Therefore no detailed Flood Risk Assessment has been carried out.

KEY FACTORS INCREASING THE LIKELIHOOD OF OVERHEATING				KEY FACTORS REDUCING THE LIKELIHOOD OF OVERHEATING			
Geographical and local context							
#1 Where is the scheme in the UK? See guidance for map	South east Northern England, Scotland & NI Rest of England and Wales	4 0 2	4	#8 Do the site surroundings feature significant blue/green infrastructure? Proximity to green spaces and large water bodies has beneficial effects on local temperatures; as guidance, this would require at least 50% of surroundings within a 100m radius to be blue/green, or a rural context	1	1	
#2 Is the site likely to see an Urban Heat Island effect? See guidance for details	Central London (see guidance) Grtr London, Manchester, B'ham Other cities, towns & dense sub-urban areas	3 2 1	0				
Site characteristics							
#3 Does the site have barriers to windows opening? - Noise/Acoustic risks - Poor air quality/smells e.g. near factory or car park or very busy road - Security risks/crime - Adjacent to heat rejection plant	Day - reasons to keep all windows closed Day - barriers some of the time, or for some windows e.g. on quiet side Night - reasons to keep all windows closed Night - bedroom windows OK to open, but other windows are likely to stay closed	8 4 8 4	0	#9 Are immediate surrounding surfaces in majority pale in colour, or blue/green? Lighter surfaces reflect more heat and absorb less so their temperatures remain lower; consider horizontal and vertical surfaces within 10m of the scheme	1	-	
				#10 Does the site have existing tall trees or buildings that will shade solar-exposed glazed areas? Shading onto east, south and west facing areas can reduce solar gains, but may also reduce daylight levels	1	-	
Scheme characteristics and dwelling design							
#4 Are the dwellings flats? Flats often combine a number of factors contributing to overheating risk e.g. dwelling size, heat gains from surrounding areas; other dense and enclosed dwellings may be similarly affected - see guidance for examples		3	0	#11 Do dwellings have high exposed thermal mass AND a means for secure and quiet night ventilation? Thermal mass can help slow down temperature rises, but it can also cause properties to be slower to cool, so needs to be used with care - see guidance	1	-	
#5 Does the scheme have community heating? i.e. with hot pipework operating during summer, especially in internal areas, leading to heat gains and higher temperatures		3	0	#12 Do floor-to-ceiling heights allow ceiling fans, now or in the future? Higher ceilings increase stratification and air movement, and offer the potential for ceiling fans	>2.8m and fan installed > 2.8m	2 1	-
Solar heat gains and ventilation							
#6 What is the estimated average glazing ratio for the dwellings? (as a proportion of the facade on solar-exposed areas i.e. orientations facing east, south, west, and anything in between). Higher proportions of glazing allow higher heat gains into the space	>65% >50% >35%	12 7 4	0	#13 Is there useful external shading? Shading should apply to solar exposed (E/S/W) glazing. It may include shading devices, balconies above, facade articulation etc. See guidance on "full" and "part". Scoring depends on glazing proportions as per #6	Full Part >65% >50% >35%	6 3 4 2 2 1	-
#7 Are the dwellings single aspect? Single aspect dwellings have all openings on the same facade. This reduces the potential for ventilation	Single-aspect Dual aspect	3 0	0	#14 Do windows & openings support effective ventilation? Larger, effective and secure openings will help dissipate heat - see guidance	Openings compared to Part F purge rates = Part F Single-aspect Dual aspect	+50% minimum required +100% 3 2	4 4 3
TOTAL SCORE 3 = Sum of contributing factors: 4 minus Sum of mitigating factors: 1							
High 12 Medium 8 Low							
score >12: Incorporate design changes to reduce risk factors and increase mitigation factors AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59) score between 8 and 12: Seek design changes to reduce risk factors and/or increase mitigation factors AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59) score <8: Ensure the mitigating measures are retained, and that risk factors do not increase (e.g. in planning conditions)							

2.3 Resource Management

Internal water consumption

In accordance with Part G (2010) Building Regulations, internal potable water consumption will be designed to meet the 125 litres/person/day target using practical and hygienic water saving measures.

It also allows the planning authority to set the lower standard of 110 litres/person/day. In the Government's Environmental Improvement Plan 2023 an action is included to lower this standard to 105 l/d/p and, where there is a local need, to 100 l/d/p.

On this topic the Hillingdon's local plan includes a specific policy DMEI 10 on Water management, efficiency and

Policy DMEI 10: Water Management, Efficiency, and Quality

Water Efficiency

G) All new development proposals (including refurbishments and conversions) will be required to include water efficiency measures, including the collection and reuse of rain water and grey water.

H) All new residential development should demonstrate water usage rates of no more than 105 litres/person/day.

quality.

The 105 litres/person/day target may be achieved by installing the following suggested fixtures and fittings:

Water fitting	Maximum consumption
WCs	4/2.6 litres
Wash basin taps	5 litres/min
Showers	8 litres/min
Bath volumes	170 litres
Kitchen taps	6 litres/min
Dishwasher	0.73 l/place setting
Washing machine	8.17 l/kg

This will achieve an internal potable water consumption of 104.6 l/d/p.

External water consumption

To offset the standardised external water 5 l/d/p use rainwater will be collected in rainwater butt for use in the garden.

Waste management

In Hillingdon, household waste is collected in three fractions: recyclable waste (plastics, paper, cardboard and glass), food waste and rest waste. A waste drawer with two compartments (recyclables and rest waste) will be installed in the kitchen and the new house will be signed up for the food waste collection scheme.

2.4 Pollution Control

Water pollution

During the construction stage, United House will adopt best practice policies to prevent water pollution incidents from occurring. These practices can include the following:

- Storing any diesel in tanks/drums and strictly containing them within suitably bunded areas;
- Supervising the deliveries of diesel and liquid chemicals;
- Using drip trays and containers during plant repairs;
- Drawing up plans to deal with any accidental contamination;
- Disposing of any contaminated water and materials using a registered waste management company;
- Carrying out regular checks to ensure sewerage from temporary facilities is discharged into the mains sewage system and not any surface water system;
- Where a suitable sewerage system is unavailable, installing a storage tank to collect sewage from temporary facilities and regularly draining it to prevent overflow into the surface water system; and
- Training site operatives and sub-contractors to adopt the above practices.

Noise

It is intended to provide an air source heat pump to provide space heating for the new houses. The external units of Air Source Heat Pumps can emit some level of noise. A combination of selecting a low-noise unit, careful placement and if needed noise insulation around the unit will ensure that no nuisance to neighbours will be caused.

During construction, the construction contractor will aim to protect the neighbourhood's quiet areas and quiet times of day for residents.

- This will involve implementing and maintaining the following noise control measures:
- Adhering to agreed hours of working and delivery arrangements;
- Carefully selecting plant to minimise the potential for noise generation;
- Ensuring plant is inspected and maintained at regular intervals;
- Ensuring that each potential noise generating activity is carried out with appropriate noise reduction equipment (i.e. ensuring baffles and silencers are used);
- Preparing method statements with focus to minimise noisy activities;
- Prohibit the use of transistor radios on site;
- Keeping noise, vibration and dust monitoring results up to date; and
- Establishing a clear point of contact should any issues arise.

Air Quality

The development will reduce emissions through the incorporation of energy efficient design, full electric heating system (air source heat pump), using insulation with a Global Warming Potential of less than 5 and by encouraging sustainable transport behaviour such as cycling.

During the construction stage the construction contractor will be required to adopt best practice policies to prevent air/dust pollution incidents from occurring. These practices can include the following:

- Keeping roads clean using dust suppression systems;
- Ensuring all machinery is subjected to regular inspections and maintenance to maintain operational efficiency and to minimise emissions;
- Minimising dust arising from cutting operations by having pre-cut materials delivered to the site;
- Removing spoil from the site during dry weather and covering it with sheeting or dampening it down; and
- Training site operatives and sub-contractors to adopt the above practices.

2.5 Biodiversity

The proposed development site is located on a domestic garden. The garden mainly comprises lawn with some flower borders. There is a Leylandii hedge and two trees. Although there is some ecological value associated with a domestic garden, it is considered to be low. The Leylandii hedge may provide some shelter for birds and other animals but is considered of low value in itself. The trees provide some additional value.

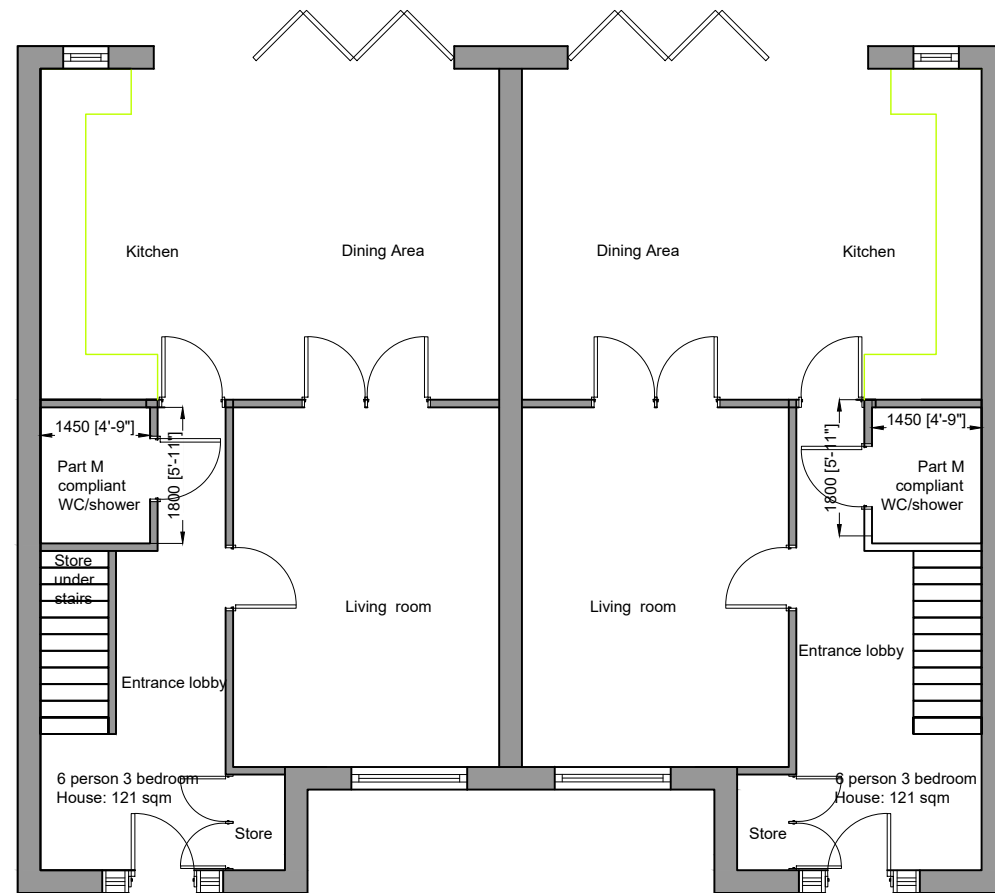
The new houses will reduce the area of lawn, but the trees will be retained. In addition, it is proposed to remove the leylandii hedge and replace it with a hedge that contains more native species.

A Biodiversity Net Gain assessment was carried out using the Small Sites Methodology. To ensure the required replacement of lost habitat and the additional 10% new habitat an off-site habitat creation solution is being sought.

3 Conclusion

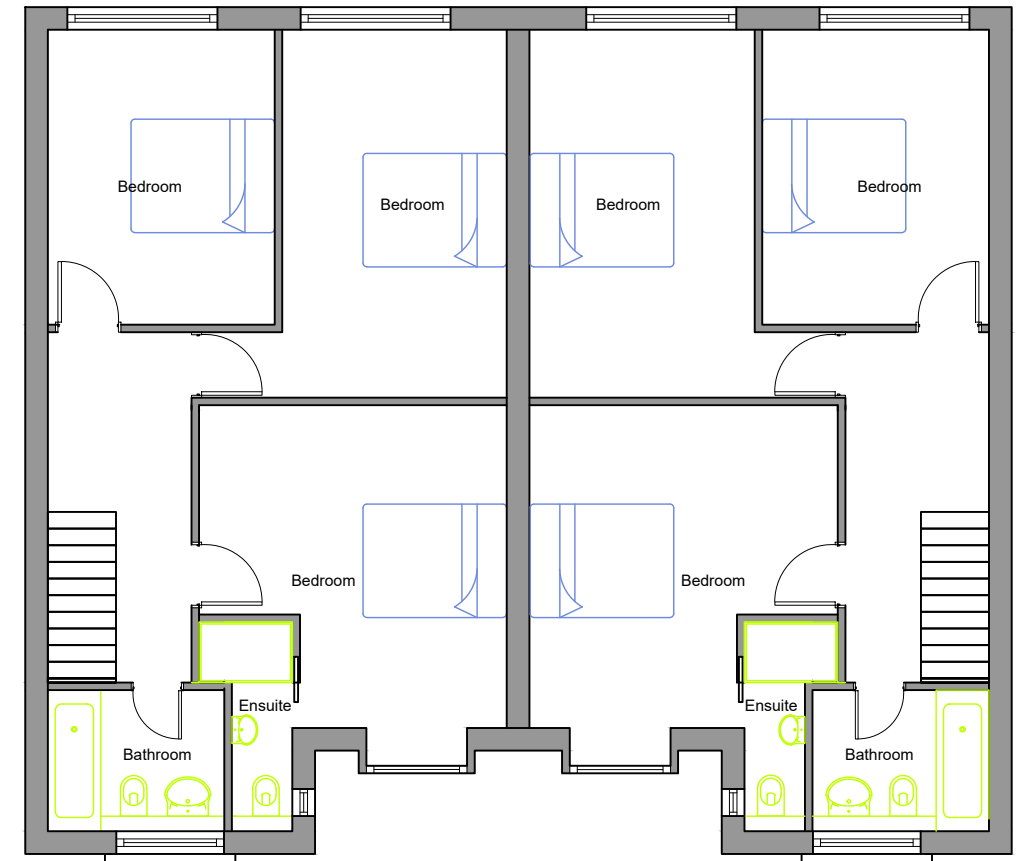
A range of measures has been included in the design of the building to enhance the sustainability of the proposed development. Implementation of these measures and the additional construction management principles set out here will ensure that the proposed development complies with national, regional and local requirements.

Appendix 1 Proposed development



Proposed Ground Floor

Proposed plans to be in accordance with M4(2) as set out in Approved Document M to the Building Regulations (2015 edition)



Proposed First Floor

Client	
Project	Rear of 164 Harefield Rd, UB8 1PP
Drawing title	Proposed Ground & First Floor

Revisions	
1:500 scale	0 5 10
1:200 scale	0 1 2 3 4 5 6 7 8 9 10
1:100 scale	0 1 2 3 4 5 6 7 8 9 10
1:50 scale	0 1 2 3 4 5 6 7 8 9 10

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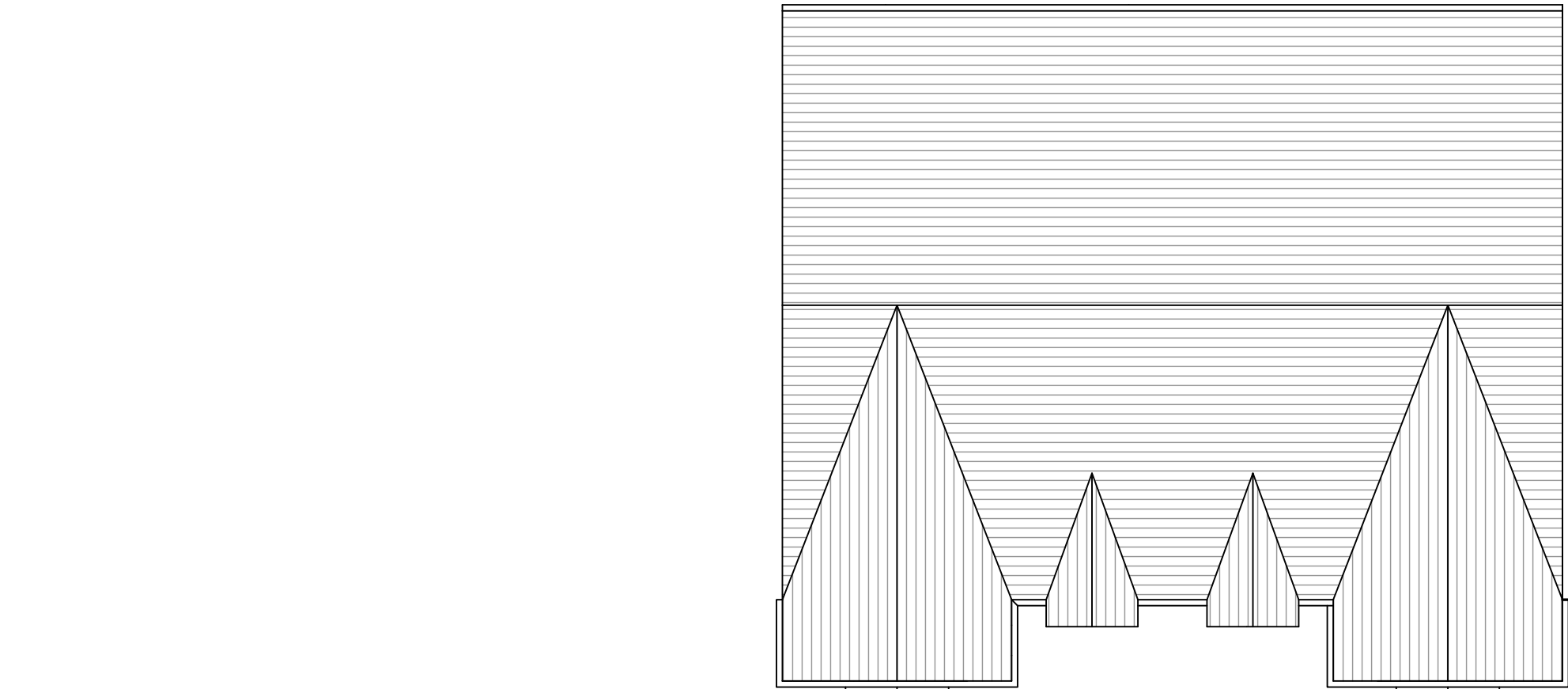
Date drawn

May 2025

Date checked

14/5/25

Revision



Proposed Roof Plan

Client
Project
Rear of 164 Harefield Rd, UB8 1PP
Drawing title
Proposed Roof Plan

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London Fields Studios
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Planning



Proposed Front Elevation

Client
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Rear of 164 Harefield Rd, UB8 1PP
Drawing title
Proposed front elevation

Revisions

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Planning



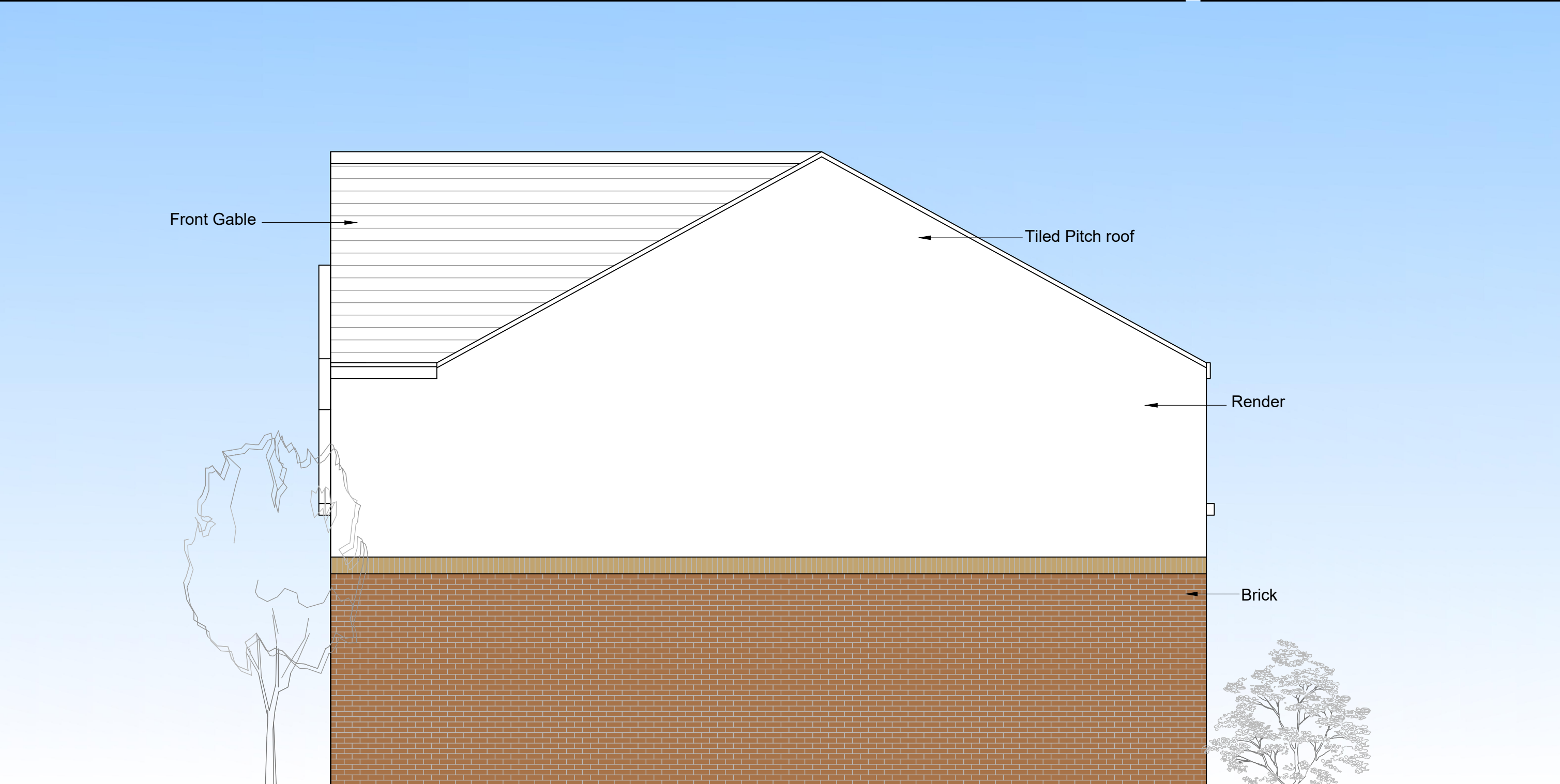
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Revisions

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London Fields Studios
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Planning
FDR
File reference
23777 - F00
Drawn by
FN
Checked by
RP
Scale at A3
1:50
Project number
23777
Drawing number
201
Date drawn
May 2025
Date checked
14/5/25
Revision



Proposed Side Elevation

Client
Project
Rear of 164 Harefield Rd, UB8 1PP
Drawing title
Proposed side elevation

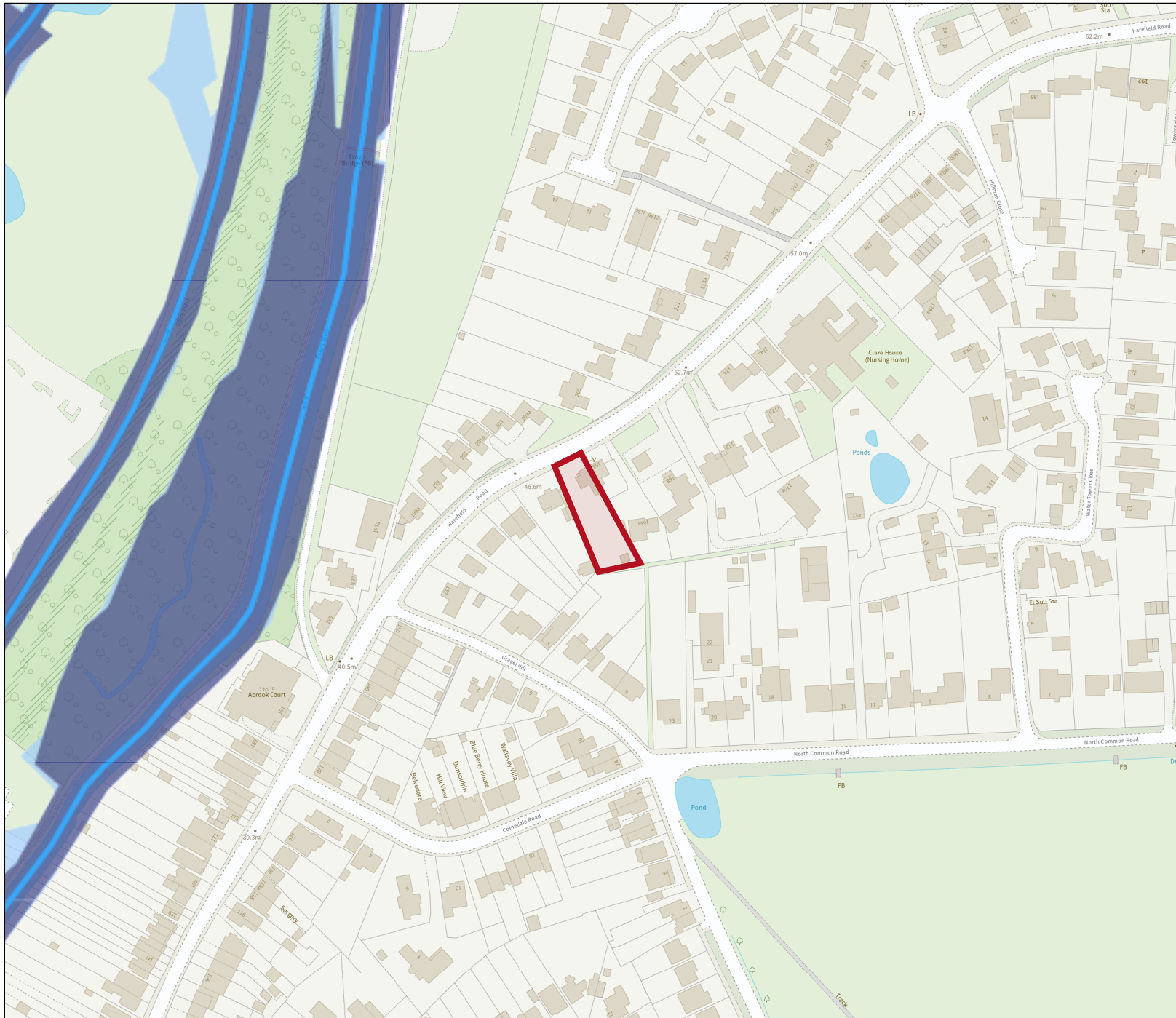
Revisions
1:500 scale
1:200 scale
1:100 scale
1:50 scale

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Planning

File reference
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1:50
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Drawing number
202
Date drawn
May 2025
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Revision

Appendix 2 Flood Risk Map



Flood map for planning

Your reference
164 Harefield

Location (easting/northing)
505844/185176

Scale
1:2500

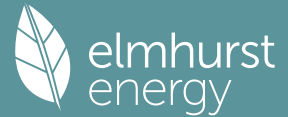
Created
25 Jun 2024 16:01

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area

0 20 40 60m

Appendix 3 SAP worksheets

Full SAP Calculation Printout



Property Reference	House 2			Issued on Date	03/07/2025
Assessment Reference	001	Prop Type Ref	House 2		
Property	Rear of 164 Harefield Rd, UXBRIDGE, UB8 1PP				
SAP Rating	98 A	DER	-0.52	TER	9.61
Environmental	101 A	% DER < TER			105.41
CO ₂ Emissions (t/year)	-0.14	DFEE	36.55	TFEE	37.33
Compliance Check	See BREL	% DFEE < TFEE			2.11
% DPER < TPER	85.62	DPER	7.20	TPER	50.07
Assessor Details	Mr. Ondrej Gajdos			Assessor ID	W452-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 314.6000 (5)

2. Ventilation rate

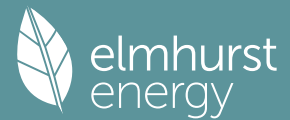
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (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) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1700 (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	0.2167	0.2125	0.2083	0.1870	0.1827	0.1615	0.1615	0.1573	0.1700	0.1827	0.1913	0.1998 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.3162	0.3120	0.3077	0.2865	0.2823	0.2610	0.2610	0.2568	0.2695	0.2823	0.2907	0.2993 (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							
1			3.3600	1.0000	3.3600		(26a)
1			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650	110.0000	6655.0000 (28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724	60.0000	6190.8003 (29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550	9.0000	544.5000 (30)
Total net area of external elements Aum(A, m ²)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	61.0478	(33)
Main dwelling							
pw			47.8400	0.0000	0.0000	110.0000	5262.4000 (32)
iw			216.2000			9.0000	1945.8000 (32c)
if			60.5000			18.0000	1089.0000 (32d)
ic			60.5000			9.0000	544.5000 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 22232.0002 (34)

Full SAP Calculation Printout



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	58.0785	58.3205	58.5645	59.8159	60.0726	61.3901	61.3901	61.6605	60.8562	60.0726	59.5614	59.0587
alpha	4.8719	4.8880	4.9043	4.9877	5.0048	5.0927	5.0927	5.1107	5.0571	5.0048	4.9708	4.9372
util living area	0.9862	0.9689	0.9336	0.8387	0.6830	0.4898	0.3555	0.3952	0.6222	0.8807	0.9704	0.9889 (86)
Living	19.8661	20.1122	20.4060	20.7403	20.9237	20.9887	20.9982	20.9970	20.9638	20.7139	20.2469	19.8380
Non living	18.8595	19.1714	19.5375	19.9454	20.1447	20.2189	20.2254	20.2280	20.1939	19.9266	19.3556	18.8330
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4200	20.1122	20.4060	20.7403	20.9237	20.9887	20.9982	20.9970	20.9638	20.7139	20.2469	20.0005 (87)
Th 2	20.1856	20.1887	20.1918	20.2074	20.2106	20.2262	20.2262	20.2294	20.2200	20.2106	20.2043	20.1980 (88)
util rest of house	0.9831	0.9623	0.9200	0.8098	0.6368	0.4333	0.2936	0.3300	0.5609	0.8518	0.9630	0.9864 (89)
MIT 2	19.6569	19.1714	19.5375	19.9454	20.1447	20.2189	20.2254	20.2280	20.1939	19.9266	19.3556	19.0790 (90)
Living area fraction												0.1388 (91)
MIT	19.7629	19.3020	19.6581	20.0558	20.2529	20.3258	20.3327	20.3347	20.3008	20.0359	19.4794	19.2069 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7629	19.3020	19.6581	20.0558	20.2529	20.3258	20.3327	20.3347	20.3008	20.0359	19.4794	19.2069 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9812	0.9533	0.9094	0.8037	0.6393	0.4407	0.3021	0.3390	0.5675	0.8445	0.9545	0.9823 (94)
Useful gains	823.1013	947.3919	1006.3318	990.2233	835.6502	570.7890	374.9008	393.0327	611.2860	797.3488	801.2750	782.9685 (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	1644.1864	1525.0300	1387.5069	1151.7509	879.2463	575.9857	375.4959	394.0810	629.2407	970.0249	1283.5417	1569.2184 (97)
Space heating kWh	610.8873	388.1728	283.5942	116.2999	32.4355	0.0000	0.0000	0.0000	0.0000	128.4710	347.2320	584.9700 (98a)
Space heating requirement - total per year (kWh/year)												2492.0628
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	610.8873	388.1728	283.5942	116.2999	32.4355	0.0000	0.0000	0.0000	0.0000	128.4710	347.2320	584.9700 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2492.0628
Space heating per m2										(98c) / (4) =		20.5956 (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 %)												292.1052 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	610.8873	388.1728	283.5942	116.2999	32.4355	0.0000	0.0000	0.0000	0.0000	128.4710	347.2320	584.9700 (98)
Space heating efficiency (main heating system 1)	292.1052	292.1052	292.1052	292.1052	292.1052	0.0000	0.0000	0.0000	0.0000	292.1052	292.1052	292.1052 (210)
Space heating fuel (main heating system)	209.1326	132.8880	97.0863	39.8144	11.1041	0.0000	0.0000	0.0000	0.0000	43.9811	118.8722	200.2600 (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	278.6197	246.2124	260.9820	227.9382	219.9498	197.0885	193.6522	201.9196	204.7864	229.6899	245.8866	275.3663 (64)
Efficiency of water heater												270.4650 (216)
(217)m	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650 (217)
Fuel for water heating, kWh/month	103.0151	91.0330	96.4938	84.2764	81.3228	72.8703	71.5997	74.6565	75.7164	84.9241	90.9125	101.8122 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	27.3821	24.7322	27.3821	26.4988	27.3821	26.4988	27.3821	27.3821	26.4988	27.3821	26.4988	27.3821 (231)
Pumps and Fa	30.7370	24.6584	22.2021	16.2662	12.5645	10.2653	11.4618	14.8984	19.3516	25.3903	28.6783	31.5913 (232)
Lighting												
Electricity generated by PVs (Appendix M) (negative quantity)	-61.8468	-90.1726	-133.1508	-148.5547	-157.6758	-145.5749	-143.6234	-135.3482	-119.1715	-100.8811	-67.9689	-52.7286 (233a)
(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 (234a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
(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 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
(235c)m	-26.3162	-60.9653	-133.1910	-218.5305	-302.5317	-309.1087	-304.1492	-251.8068	-177.2708	-94.9276	-37.4392	-20.4630 (233b)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
(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 (235b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
(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 (235e)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235f)
(235f)m												
Annual totals kWh/year												
Space heating fuel - main system 1												853.1387 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												270.4650
Water heating fuel used												1028.6328 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												322.4021 (230a)
Total electricity for the above, kWh/year												322.4021 (231)

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Electricity for lighting (calculated in Appendix L)	248.0651 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3293.3975 (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	-841.1588 (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	853.1387	0.1570	133.9376 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1028.6328	0.1410	145.0702 (264)
Space and water heating			279.0078 (265)
Pumps, fans and electric keep-hot	322.4021	0.1387	44.7211 (267)
Energy for lighting	248.0651	0.1443	35.8035 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1356.6974	0.1346	-182.6243
PV Unit electricity exported	-1936.7001	0.1237	-239.6351
Total			-422.2594 (269)
Total CO2, kg/year			-62.7269 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			-0.5200 (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	853.1387	1.5812	1348.9477 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1028.6328	1.5215	1565.0566 (278)
Space and water heating			2914.0043 (279)
Pumps, fans and electric keep-hot	322.4021	1.5128	487.7299 (281)
Energy for lighting	248.0651	1.5338	380.4905 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1356.6974	1.4975	-2031.6631
PV Unit electricity exported	-1936.7001	0.4541	-879.4633
Total			-2911.1264 (283)
Total Primary energy kWh/year			871.0983 (286)
Dwelling Primary energy Rate (DPER)			7.2000 (287)

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

1. Overall dwelling characteristics

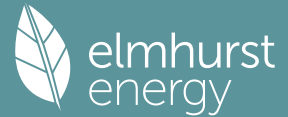
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	314.6000 (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	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1271 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3771 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3206 (21)

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

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Effective ac	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767 (22b)
	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709 (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							
TER Semi-glazed door			3.3600	1.0000	3.3600		(26a)
TER Opening Type			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650		(28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724		(29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550		(30)
Total net area of external elements Aum (A, m2)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)					61.0478		(33)
Main dwelling							
pw			47.8400	0.0000	0.0000		(32)

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

183.7355 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	249.0200	0.0500	12.4510
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			12.4510 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	73.4988 (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	60.5810	60.2442	59.9142	58.3638	58.0738	56.7234	56.7234	56.4734	57.2436	58.0738	58.6606	59.2740 (38)
Average = Sum(39)m / 12 =	134.0798	133.7431	133.4130	131.8626	131.5726	130.2223	130.2223	129.9722	130.7424	131.5726	132.1594	132.7728 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1081	1.1053	1.1026	1.0898	1.0874	1.0762	1.0762	1.0742	1.0805	1.0874	1.0922	1.0973 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

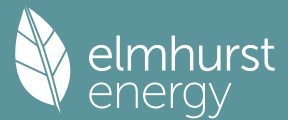
Assumed occupancy												2.8671 (42)
Hot water usage for mixer showers												
72.2916	71.2052	69.6221	66.5931	64.3578	61.8650	60.4481	62.0192	63.7415	66.4180	69.5120	72.0146 (42a)	
Hot water usage for baths												
31.2110	30.7475	30.0947	28.8912	27.9900	26.9907	26.4509	27.0991	27.8048	28.8741	30.1024	31.1055 (42b)	
Hot water usage for other uses												
43.9919	42.3922	40.7925	39.1928	37.5931	35.9934	35.9934	37.5931	39.1928	40.7925	42.3922	43.9919 (42c)	
Average daily hot water use (litres/day)												135.5806 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	147.4945	144.3449	140.5093	134.6771	129.9409	124.8491	122.8924	126.7114	130.7391	136.0846	142.0067	147.1120 (44)
Energy conte	233.5953	205.5452	215.9576	184.3662	174.9254	153.5165	148.6278	156.8952	161.2144	184.6655	202.3146	230.3419 (45)
Energy content (annual)										Total = Sum(45)m =		2251.9657
Distribution loss (46)m = 0.15 x (45)m	35.0393	30.8318	32.3936	27.6549	26.2388	23.0275	22.2942	23.5343	24.1822	27.6998	30.3472	34.5513 (46)
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (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	284.5213	251.5429	266.8837	233.6495	225.8515	202.7998	199.5538	207.8213	210.4977	235.5916	251.5979	281.2680 (62)
WWHRS	-33.0487	-29.2285	-30.6064	-25.3433	-23.6191	-20.2110	-18.9446	-20.1457	-20.9111	-24.6519	-27.9276	-32.4367 (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	251.4726	222.3144	236.2772	208.3062	202.2324	182.5888	180.6092	187.6756	189.5866	210.9397	223.6703	248.8313 (64)
12Total per year (kWh/year)												2544.5044 (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	118.4113	105.1420	112.5468	100.7284	98.9036	90.4709	90.1596	92.9085	93.0304	102.1422	106.6962	117.3295 (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	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	147.9303	163.7799	147.9303	152.8613	147.9303	152.8613	147.9303	147.9303	152.8613	147.9303	152.8613	147.9303 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	286.5094	289.4824	281.9904	266.0407	245.9071	226.9844	214.3428	211.3698	218.8618	234.8115	254.9451	273.8678 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355 (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)	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839 (71)
Water heating gains (Table 5)	159.1550	156.4613	151.2725	139.9006	132.9349	125.6540	121.1822	124.8770	129.2089	137.2878	148.1892	157.7010 (72)
Total internal gains	662.6010	678.7301	650.1996	627.8090	595.7787	571.5061	549.4618	550.1835	566.9385	589.0360	625.0020	648.5055 (73)

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6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Southeast				13.8800	36.7938	0.6300		0.7000		0.7700	156.0761 (77)
Southwest				0.4300	36.7938	0.6300		0.7000		0.7700	4.8352 (79)
Northwest				7.1700	11.2829	0.6300		0.7000		0.7700	24.7237 (81)
Solar gains	185.6350	324.4172	465.6949	613.5807	720.6337	730.1017	697.7871	615.6766	516.5556	364.4315	157.8971 (83)
Total gains	848.2360	1003.1473	1115.8946	1241.3897	1316.4124	1301.6079	1247.2489	1165.8601	1083.4941	953.4675	806.4026 (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	46.0588	46.1748	46.2890	46.8332	46.9365	47.4232	47.4232	47.5144	47.2345	46.9365	46.7281	46.5122
alpha	4.0706	4.0783	4.0859	4.1222	4.1291	4.1615	4.1615	4.1676	4.1490	4.1291	4.1152	4.1008
util living area	0.9880	0.9758	0.9524	0.8910	0.7745	0.6003	0.4495	0.4969	0.7259	0.9191	0.9771	0.9901 (86)
MIT	19.4144	19.6701	20.0122	20.4437	20.7680	20.9406	20.9859	20.9788	20.8683	20.4405	19.8555	19.3751 (87)
Th 2	19.9942	19.9965	19.9987	20.0092	20.0112	20.0203	20.0203	20.0220	20.0168	20.0112	20.0072	20.0030 (88)
util rest of house	0.9851	0.9701	0.9410	0.8651	0.7242	0.5220	0.3539	0.3982	0.6527	0.8941	0.9708	0.9877 (89)
MIT 2	18.1518	18.4767	18.9070	19.4391	19.8065	19.9816	20.0145	20.0125	19.9197	19.4483	18.7219	18.1079 (90)
Living area fraction	18.3271	18.6424	19.0604	19.5786	19.9400	20.1148	20.1494	20.1467	20.0514	19.5860	18.8793	18.2839 (92)
MIT	18.3271	18.6424	19.0604	19.5786	19.9400	20.1148	20.1494	20.1467	20.0514	19.5860	18.8793	18.2839 (93)
Temperature adjustment												0.0000
adjusted MIT	18.3271	18.6424	19.0604	19.5786	19.9400	20.1148	20.1494	20.1467	20.0514	19.5860	18.8793	18.2839 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9781	0.9597	0.9274	0.8519	0.7202	0.5299	0.3668	0.4112	0.6555	0.8808	0.9608	0.9817 (94)
Useful gains	829.6947	962.7193	1034.8550	1057.5546	948.0468	689.7276	457.5057	479.4266	710.2406	839.8610	815.5293	791.6276 (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	1880.7552	1837.9505	1675.7262	1408.1021	1084.1627	718.1467	462.2074	486.9653	778.1051	1182.3167	1556.7467	1869.9575 (97)
Space heating kWh	781.9890	588.1554	476.8082	252.3942	101.2702	0.0000	0.0000	0.0000	0.0000	254.7870	533.6766	802.2774 (98a)
Space heating requirement - total per year (kWh/year)												3791.3579
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	781.9890	588.1554	476.8082	252.3942	101.2702	0.0000	0.0000	0.0000	0.0000	254.7870	533.6766	802.2774 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3791.3579
Space heating per m2										(98c) / (4) =		31.3335 (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 %)												92.3000 (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	781.9890	588.1554	476.8082	252.3942	101.2702	0.0000	0.0000	0.0000	0.0000	254.7870	533.6766	802.2774 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	847.2253	637.2214	516.5853	273.4498	109.7185	0.0000	0.0000	0.0000	0.0000	276.0423	578.1978	869.2063 (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	251.4726	222.3144	236.2772	208.3062	202.2324	182.5888	180.6092	187.6756	189.5866	210.9397	223.6703	248.8313 (64)
Efficiency of water heater	86.4281	86.1353	85.6011	84.4914	82.5931	79.8000	79.8000	79.8000	79.8000	84.4844	85.9376	79.8000 (216)
Fuel for water heating, kWh/month	290.9616	258.0991	276.0212	246.5413	244.8538	228.8080	226.3273	235.1825	237.5772	249.6790	260.2707	287.6969 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	30.7370	24.6584	22.2021	16.2662	12.5645	10.2653	11.4618	14.8984	19.3516	25.3903	28.6783	31.5913 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-54.1844	-75.1814	-106.3543	-117.5847	-125.0754	-116.0542	-114.5256	-108.8926	-98.7880	-84.9288	-59.1003	-46.9806 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-34.3995	-71.8968	-142.0823	-212.2631	-279.6299	-280.6644	-277.4471	-235.4602	-173.2554	-102.5411	-45.8283	-27.2456 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

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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	(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	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1											4107.6467	(211)
Space heating fuel - main system 2											0.0000	(213)
Space heating fuel - secondary											0.0000	(215)
Efficiency of water heater											79.8000	
Water heating fuel used											3042.0185	(219)
Space cooling fuel											0.0000	(221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year											86.0000	(231)
Electricity for lighting (calculated in Appendix L)											248.0651	(232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation											-2990.3641	(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											4493.3663	(238)

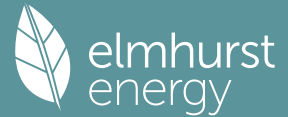
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4107.6467	0.2100	862.6058 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3042.0185	0.2100	638.8239 (264)
Space and water heating			1501.4297 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	248.0651	0.1443	35.8035 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1107.6504	0.1349	-149.4771
PV Unit electricity exported	-1882.7137	0.1260	-237.3101
Total			-386.7872 (269)
Total CO2, kg/year			1162.3752 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.6100 (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	4107.6467	1.1300	4641.6408 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3042.0185	1.1300	3437.4809 (278)
Space and water heating			8079.1218 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	248.0651	1.5338	380.4905 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1107.6504	1.4988	-1660.1151
PV Unit electricity exported	-1882.7137	0.4627	-871.1031
Total			-2531.2182 (283)
Total Primary energy kWh/year			6058.4949 (286)
Target Primary Energy Rate (TPER)			50.0700 (287)

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Property Reference	House 2			Issued on Date	03/07/2025
Assessment Reference	001	Prop Type Ref	House 2		
Property	Rear of 164 Harefield Rd, UXBRIDGE, UB8 1PP				
SAP Rating	98 A	DER	-0.52	TER	9.61
Environmental	101 A	% DER < TER			105.41
CO ₂ Emissions (t/year)	-0.14	DFEE	36.55	TFEE	37.33
Compliance Check	See BREL	% DFEE < TFEE			2.11
% DPER < TPER	85.62	DPER	7.20	TPER	50.07
Assessor Details	Mr. Ondrej Gajdos			Assessor ID	W452-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 314.6000 (5)

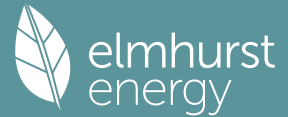
2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1271 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3271 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2781 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 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	0.3545 0.3476 0.3406 0.3059 0.2989 0.2642 0.2642 0.2572 0.2781 0.2989 0.3128 0.3267 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0.0000 (23c)
Effective ac	0.5629 0.5604 0.5580 0.5468 0.5447 0.5349 0.5349 0.5331 0.5387 0.5447 0.5489 0.5534 (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							
1			3.3600	1.0000	3.3600		(26a)
1			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650	110.0000	6655.0000 (28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724	60.0000	6190.8003 (29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550	9.0000	544.5000 (30)
Total net area of external elements A _{um} (A, m ²)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	61.0478		(33)
Main dwelling							
pw			47.8400	0.0000	0.0000	110.0000	5262.4000 (32)
iw			216.2000			9.0000	1945.8000 (32c)
if			60.5000			18.0000	1089.0000 (32d)
ic			60.5000			9.0000	544.5000 (32e)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22232.0002 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							183.7355 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E2 Other lintels (including other steel lintels) 249.0200 0.0500 12.4510
 Thermal bridges (Sum(L x Psi) calculated using Appendix K) 12.4510 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 73.4988 (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 58.4340 58.1807 57.9323 56.7658 56.5475 55.5315 55.5315 55.3434 55.9229 56.5475 56.9890 57.4506 (38)
 131.9329 131.6795 131.4311 130.2646 130.0463 129.0303 129.0303 128.8422 129.4217 130.0463 130.4879 130.9495 (39)
 Average = Sum(39)m / 12 = 130.2636

HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 HLP (average) 1.0904 1.0883 1.0862 1.0766 1.0748 1.0664 1.0664 1.0648 1.0696 1.0748 1.0784 1.0822 (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 2.8671 (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 31.2110 30.7475 30.0947 28.8912 27.9900 26.9907 26.4509 27.0991 27.8048 28.8741 30.1024 31.1055 (42b)
 Hot water usage for other uses 43.9919 42.3922 40.7925 39.1928 37.5931 35.9934 35.9934 37.5931 39.1928 40.7925 42.3922 43.9919 (42c)
 Average daily hot water use (litres/day) 68.9302 (43)
 Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 75.2029 73.1397 70.8872 68.0840 65.5831 62.9841 62.4443 64.6922 66.9977 69.6666 72.4947 75.0974 (44)
 Energy conte 119.1030 104.1499 108.9510 93.2036 88.2874 77.4463 75.5210 80.1025 82.6148 94.5370 103.2819 117.5844 (45)
 Energy content (annual) Total = Sum(45)m = 1144.7829
 Distribution loss (46)m = 0.15 x (45)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 (46)
 Water storage loss:
 Total storage loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (56)
 If cylinder contains dedicated solar storage 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 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)
 Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)
 Total heat required for water heating calculated for each month
 WWHRS 101.2376 88.5274 92.6084 79.2230 75.0443 65.8293 64.1928 68.0871 70.2226 80.3564 87.7897 99.9467 (62)
 PV diverter 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63a)
 Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63b)
 FGHR 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63c)
 Output from w/h 101.2376 88.5274 92.6084 79.2230 75.0443 65.8293 64.1928 68.0871 70.2226 80.3564 87.7897 99.9467 (64)
 Total per year (kWh/year) = Sum(64)m = 973.0654 (64)
 12Total per year (kWh/year) 973 (64)
 Electric shower(s) 57.8935 51.5836 56.3273 53.7525 54.7611 52.2368 53.9780 54.7611 53.7525 56.3273 55.2682 57.8935 (64a)
 Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 658.5355 (64a)
 Heat gains from water heating, kWh/month 39.7828 35.0278 37.2339 33.2439 32.4514 29.5165 29.5427 30.7121 30.9938 34.1709 35.7645 39.4601 (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 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 (66)
 Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 147.9303 163.7799 147.9303 152.8613 147.9303 152.8613 147.9303 147.9303 152.8613 147.9303 152.8613 147.9303 (67)
 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 286.5094 289.4824 281.9904 266.0407 245.9071 226.9844 214.3428 211.3698 218.8618 234.8115 254.9451 273.8678 (68)
 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 (69)
 Pumps, fans 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (70)
 Losses e.g. evaporation (negative values) (Table 5) -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 (71)
 Water heating gains (Table 5) 53.4715 52.1246 50.0456 46.1721 43.6174 40.9952 39.7080 41.2796 43.0469 45.9287 49.6729 53.0377 (72)
 Total internal gains 553.9175 571.3935 545.9727 531.0805 503.4613 486.8473 467.9875 466.5861 480.7764 494.6769 523.4856 540.8422 (73)

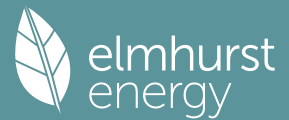
6. Solar gains

[Jan] Area Solar flux g Specific data FF Access Gains
 m2 Table 6a W/m2 or Table 6b Specific data or Table 6c factor Table 6d W
 Southeast 13.8800 36.7938 0.6300 0.7000 0.7700 156.0761 (77)
 Southwest 0.4300 36.7938 0.6300 0.7000 0.7700 4.8352 (79)
 Northwest 7.1700 11.2829 0.6300 0.7000 0.7700 24.7237 (81)
 Solar gains 185.6350 324.4172 465.6949 613.5807 720.6337 730.1017 697.7871 615.6766 516.5556 364.4315 223.8434 157.8971 (83)
 Total gains 739.5525 895.8107 1011.6676 1144.6612 1224.0949 1216.9490 1165.7746 1082.2627 997.3320 859.1084 747.3291 698.7394 (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 46.8083 46.8984 46.9870 47.4078 47.4873 47.8613 47.8613 47.9312 47.7165 47.4873 47.3267 47.1598
 alpha 4.1206 4.1266 4.1325 4.1605 4.1658 4.1908 4.1908 4.1954 4.1811 4.1658 4.1551 4.1440

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util living area	0.9926	0.9833	0.9644	0.9105	0.8015	0.6290	0.4745	0.5269	0.7600	0.9391	0.9851	0.9941 (86)
MIT	19.3304	19.5911	19.9420	20.3912	20.7396	20.9311	20.9833	20.9744	20.8458	20.3776	19.7720	19.2861 (87)
Th 2	20.0087	20.0104	20.0121	20.0200	20.0215	20.0284	20.0284	20.0297	20.0257	20.0215	20.0185	20.0154 (88)
util rest of house	0.9907	0.9792	0.9555	0.8880	0.7538	0.5500	0.3754	0.4248	0.6893	0.9189	0.9808	0.9926 (89)
MIT 2	18.4862	18.7456	19.0915	19.5274	19.8396	19.9928	20.0230	20.0206	19.9350	19.5245	18.9328	18.4471 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	18.6034	18.8630	19.2096	19.6473	19.9646	20.1231	20.1563	20.1530	20.0615	19.6429	19.0493	18.5636 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6034	18.8630	19.2096	19.6473	19.9646	20.1231	20.1563	20.1530	20.0615	19.6429	19.0493	18.5636 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9871	0.9729	0.9463	0.8779	0.7507	0.5581	0.3888	0.4382	0.6922	0.9092	0.9749	0.9896	(94)
Useful gains	729.9981	871.5704	957.2973	1004.8861	918.9426	679.2069	453.2334	474.2974	690.3491	781.1142	728.5845	691.4419	(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	1887.0895	1838.6342	1670.4384	1399.9991	1074.7788	712.6457	458.8690	483.5449	771.5444	1176.0014	1559.2369	1880.9049	(97)
Space heating kWh	860.8760	649.8669	530.5770	284.4814	115.9421	0.0000	0.0000	0.0000	0.0000	293.7960	598.0698	884.9604	(98a)
Space heating requirement - total per year (kWh/year)												4218.5696	
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	860.8760	649.8669	530.5770	284.4814	115.9421	0.0000	0.0000	0.0000	0.0000	293.7960	598.0698	884.9604	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4218.5696	
Space heating per m2											(98c) / (4) =	34.8642	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	
Heat loss rate W													
	0.0000	0.0000	0.0000	0.0000	0.0000	1212.8851	954.8245	979.2006	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8502	0.9091	0.8816	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1031.1674	868.0001	863.2259	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1358.4984	1301.6153	1206.9696	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	235.6784	322.6097	255.7454	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =				
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(105)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	58.9196	80.6524	63.9363	0.0000	0.0000	0.0000	0.0000	(106)
Space cooling requirement												203.5084	(107)
Energy for space heating												34.8642	(99)
Energy for space cooling												1.6819	(108)
Total												36.5461	(109)
Fabric Energy Efficiency (DFEE)												36.5	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

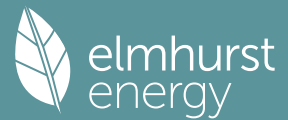
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	60.5000 (1b)	x	2.5000 (2b)	=
Ground floor	60.5000 (1c)	x	2.7000 (2c)	=
First floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	314.6000 (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	4 * 10 =	40.0000 (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	40.0000 / (5) =	0.1271 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3771 (18)
Number of sides sheltered		2 (19)

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Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3206 (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	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													0.0000 (23c)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709	(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								
TER Semi-glazed door			3.3600	1.0000	3.3600			(26a)
TER Opening Type			21.4800	1.1450	24.5954			(27)
ground floor			60.5000	0.1300	7.8650			(28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724			(29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550			(30)
Total net area of external elements Aum(A, m2)			249.0200					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	61.0478			(33)
Main dwelling								
pw			47.8400	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								183.7355 (35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				249.0200	0.0500		12.4510	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								12.4510 (36)
Point Thermal bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	73.4988 (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	60.5810	60.2442	59.9142	58.3638	58.0738	56.7234	56.7234	56.4734	57.2436	58.0738	58.6606	59.2740	(38)
Heat transfer coeff	134.0798	133.7431	133.4130	131.8626	131.5726	130.2223	130.2223	129.9722	130.7424	131.5726	132.1594	132.7728	(39)
Average = Sum(39)m / 12 =												131.8612	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1081	1.1053	1.1026	1.0898	1.0874	1.0762	1.0762	1.0742	1.0805	1.0874	1.0922	1.0973	(40)
HLP (average)												1.0898	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

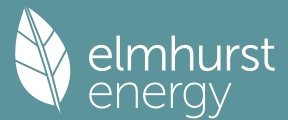
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.8671 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
31.2110	30.7475	30.0947	28.8912	27.9900	26.9907	26.4509	27.0991	27.8048	28.8741	30.1024	31.1055	31.1055	(42b)
Hot water usage for other uses													
43.9919	42.3922	40.7925	39.1928	37.5931	35.9934	35.9934	37.5931	39.1928	40.7925	42.3922	43.9919	43.9919	(42c)
Average daily hot water use (litres/day)													68.9302 (43)
Daily hot water use													
75.2029	73.1397	70.8872	68.0840	65.5831	62.9841	62.4443	64.6922	66.9977	69.6666	72.4947	75.0974	75.0974	(44)
Energy conte	119.1030	104.1499	108.9510	93.2036	88.2874	77.4463	75.5210	80.1025	82.6148	94.5370	103.2819	117.5844	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)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	0.0000	(46)
Water storage loss:													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
101.2376	88.5274	92.6084	79.2230	75.0443	65.8293	64.1928	68.0871	70.2226	80.3564	87.7897	99.9467	99.9467	(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													
101.2376	88.5274	92.6084	79.2230	75.0443	65.8293	64.1928	68.0871	70.2226	80.3564	87.7897	99.9467	99.9467	(64)
12Total per year (kWh/year)													
Electric shower(s)	57.8935	51.5836	56.3273	53.7525	54.7611	52.2368	53.9780	54.7611	53.7525	56.3273	55.2682	57.8935	(64a)
													658.5355 (64a)
Heat gains from water heating, kWh/month													
39.7828	35.0278	37.2339	33.2439	32.4514	29.5165	29.5427	30.7121	30.9938	34.1709	35.7645	39.4601	39.4601	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
147.9303	163.7799	147.9303	152.8613	147.9303	152.8613	147.9303	147.9303	147.9303	152.8613	147.9303	152.8613	147.9303	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
286.5094	289.4824	281.9904	266.0407	245.9071	226.9844	214.3428	211.3698	218.8618	234.8115	254.9451	273.8678	273.8678	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													

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	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839 (71)
Water heating gains (Table 5)	53.4715	52.1246	50.0456	46.1721	43.6174	40.9952	39.7080	41.2796	43.0469	45.9287	49.6729	53.0377 (72)
Total internal gains	553.9175	571.3935	545.9727	531.0805	503.4613	486.8473	467.9875	466.5861	480.7764	494.6769	523.4856	540.8422 (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					13.8800	36.7938	0.6300	0.7000			0.7700	156.0761 (77)	
Southwest					0.4300	36.7938	0.6300	0.7000			0.7700	4.8352 (79)	
Northwest					7.1700	11.2829	0.6300	0.7000			0.7700	24.7237 (81)	
Solar gains	185.6350	324.4172	465.6949	613.5807	720.6337	730.1017	697.7871	615.6766	516.5556	364.4315	223.8434	157.8971	(83)
Total gains	739.5525	895.8107	1011.6676	1144.6612	1224.0949	1216.9490	1165.7746	1082.2627	997.3321	859.1084	747.3291	698.7394	(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	46.0588	46.1748	46.2890	46.8332	46.9365	47.4232	47.4232	47.5144	47.2345	46.9365	46.7281	46.5122
alpha	4.0706	4.0783	4.0859	4.1222	4.1291	4.1615	4.1615	4.1676	4.1490	4.1291	4.1152	4.1008
util living area	0.9926	0.9835	0.9650	0.9121	0.8049	0.6328	0.4782	0.5306	0.7634	0.9400	0.9852	0.9941 (86)
MIT	19.2967	19.5593	19.9141	20.3732	20.7289	20.9278	20.9823	20.9730	20.8397	20.3623	19.7497	19.2574 (87)
Th 2	19.9942	19.9965	19.9987	20.0092	20.0112	20.0203	20.0203	20.0220	20.0168	20.0112	20.0072	20.0030 (88)
util rest of house	0.9908	0.9794	0.9561	0.8898	0.7572	0.5531	0.3777	0.4272	0.6925	0.9201	0.9809	0.9926 (89)
MIT 2	18.4420	18.7036	19.0541	19.5018	19.8216	19.9830	20.0145	20.0124	19.9224	19.5019	18.9022	18.4094 (90)
Living area fraction	18.5607	18.8224	19.1735	19.6228	19.9476	20.1142	20.1489	20.1458	20.0497	19.6214	19.0199	18.5272 (92)
MIT	18.5607	18.8224	19.1735	19.6228	19.9476	20.1142	20.1489	20.1458	20.0497	19.6214	19.0199	18.5272 (93)
Temperature adjustment	18.5607	18.8224	19.1735	19.6228	19.9476	20.1142	20.1489	20.1458	20.0497	19.6214	19.0199	18.5272 (93)
adjusted MIT	18.5607	18.8224	19.1735	19.6228	19.9476	20.1142	20.1489	20.1458	20.0497	19.6214	19.0199	18.5272 (93)

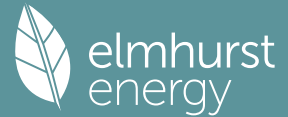
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9871	0.9731	0.9468	0.8794	0.7538	0.5612	0.3913	0.4408	0.6952	0.9102	0.9750	0.9895 (94)
Ext temp.	729.9838	871.7096	957.8899	1006.6468	922.6762	682.9999	456.1627	477.0985	693.3172	781.9469	728.6606	691.4201 (95)
Heat loss rate W	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)
Space heating kWh	1912.0729	1862.0301	1690.8118	1413.9378	1085.1582	718.0725	462.1459	486.8490	777.8808	1186.9646	1575.3270	1902.2575 (97)
Space heating requirement - total per year (kWh/year)	879.4743	665.4953	545.2939	293.2495	120.8866	0.0000	0.0000	0.0000	0.0000	301.3332	609.5998	900.8630 (98a)
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)	879.4743	665.4953	545.2939	293.2495	120.8866	0.0000	0.0000	0.0000	0.0000	301.3332	609.5998	900.8630 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98c) / (4) =
Space heating per m2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (101)
Useful 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 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	232.6670	319.0484	252.8294	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	58.1668	79.7621	63.2073	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (108)
Energy for space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (109)
Total	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (109)
Fabric Energy Efficiency (TFEE)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (109)

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Property Reference	House 1				Issued on Date	03/07/2025	
Assessment Reference	001			Prop Type Ref	House 1		
Property	Rear of 164 Harefield Rd, UXBRIDGE, UB8 1PP						
SAP Rating	99 A		DER	-0.64		TER	9.49
Environmental	101 A		% DER < TER				106.74
CO ₂ Emissions (t/year)	-0.15		DFEE	36.14		TFEE	36.80
Compliance Check	See BREL		% DFEE < TFEE				1.78
% DPER < TPER	87.87		DPER	6.00		TPER	49.45
Assessor Details	Mr. Ondrej Gajdos					Assessor ID	W452-0001
Client							

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 314.6000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1271 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3271 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2535 (21)

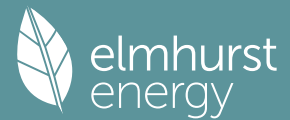
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3233	0.3169	0.3106	0.2789	0.2726	0.2409	0.2409	0.2345	0.2535	0.2726	0.2852	0.2979 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5522	0.5502	0.5482	0.5389	0.5371	0.5290	0.5290	0.5275	0.5321	0.5371	0.5407	0.5444 (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							
1			3.3600	1.0000	3.3600		(26a)
1			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650	110.0000	6655.0000 (28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724	60.0000	6190.8003 (29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550	9.0000	544.5000 (30)
Total net area of external elements A _{um} (A, m ²)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	61.0478		(33)
Main dwelling							
pw			47.8400	0.0000	0.0000	110.0000	5262.4000 (32)
iw			216.2000			9.0000	1945.8000 (32c)
if			60.5000			18.0000	1089.0000 (32d)
ic			60.5000			9.0000	544.5000 (32e)

Heat capacity C_m = Sum(A x k)
Thermal mass parameter (TMP = C_m / TFA) in kJ/m²K
List of Thermal Bridges
K1 Element Length Psi-value Total

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E2 Other lintels (including other steel lintels) 249.0200 0.0500 12.4510
 Thermal bridges (Sum(L x Psi) calculated using Appendix K) 12.4510 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 73.4988 (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 57.3334 57.1227 56.9163 55.9465 55.7651 54.9204 54.9204 54.7640 55.2458 55.7651 56.1321 56.5158 (38)
 Average = Sum(39)m / 12 = 130.8322 130.6215 130.4151 129.4453 129.2639 128.4193 128.4193 128.2629 128.7446 129.2639 129.6309 130.0147 (39)
 129.4445

HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 HLP (average) 1.0813 1.0795 1.0778 1.0698 1.0683 1.0613 1.0613 1.0600 1.0640 1.0683 1.0713 1.0745 (40)
 Days in mont 31 28 31 30 31 30 31 31 30 31 30 31
 1.0698
 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.8671 (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 31.2110 30.7475 30.0947 28.8912 27.9900 26.9907 26.4509 27.0991 27.8048 28.8741 30.1024 31.1055 (42b)
 Hot water usage for other uses 43.9919 42.3922 40.7925 39.1928 37.5931 35.9934 35.9934 37.5931 39.1928 40.7925 42.3922 43.9919 (42c)
 Average daily hot water use (litres/day) 68.9302 (43)
 Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 Energy conte 75.2029 73.1397 70.8872 68.0840 65.5831 62.9841 62.4443 64.6922 66.9977 69.6666 72.4947 75.0974 (44)
 Energy content (annual) 119.1030 104.1499 108.9510 93.2036 88.2874 77.4463 75.5210 80.1025 82.6148 94.5370 103.2819 117.5844 (45)
 Distribution loss (46)m = 0.15 x (45)m Total = Sum(45)m = 1144.7829
 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (46)
 Water storage loss:
 Total storage loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (56)
 If cylinder contains dedicated solar storage 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 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)
 Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)
 Total heat required for water heating calculated for each month
 WWHRs 101.2376 88.5274 92.6084 79.2230 75.0443 65.8293 64.1928 68.0871 70.2226 80.3564 87.7897 99.9467 (62)
 PV diverter 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63a)
 Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63b)
 FGHRs 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63c)
 Output from w/h 101.2376 88.5274 92.6084 79.2230 75.0443 65.8293 64.1928 68.0871 70.2226 80.3564 87.7897 99.9467 (64)
 12Total per year (kWh/year) Total per year (kWh/year) = Sum(64)m = 973.0654 (64)
 Electric shower(s) 57.8935 51.5836 56.3273 53.7525 54.7611 52.2368 53.9780 54.7611 53.7525 56.3273 55.2682 57.8935 (64a)
 Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 658.5355 (64a)
 Heat gains from water heating, kWh/month 39.7828 35.0278 37.2339 33.2439 32.4514 29.5165 29.5427 30.7121 30.9938 34.1709 35.7645 39.4601 (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 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 143.3548 (66)
 Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 147.9303 163.7799 147.9303 152.8613 147.9303 152.8613 147.9303 147.9303 152.8613 147.9303 152.8613 147.9303 (67)
 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 286.5094 289.4824 281.9904 266.0407 245.9071 226.9844 214.3428 211.3698 218.8618 234.8115 254.9451 273.8678 (68)
 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 37.3355 (69)
 Pumps, fans 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (70)
 Losses e.g. evaporation (negative values) (Table 5) -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 -114.6839 (71)
 Water heating gains (Table 5) 53.4715 52.1246 50.0456 46.1721 43.6174 40.9952 39.7080 41.2796 43.0469 45.9287 49.6729 53.0377 (72)
 Total internal gains 553.9175 571.3935 545.9727 531.0805 503.4613 486.8473 467.9875 466.5861 480.7764 494.6769 523.4856 540.8422 (73)

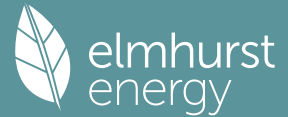
6. Solar gains

[Jan] Area Solar flux g Specific data FF Access Gains
 m2 Table 6a W/m2 or Table 6b Specific data or Table 6c factor Table 6d W
 Southeast 13.8800 36.7938 0.6300 0.7000 0.7700 156.0761 (77)
 Southwest 0.4300 36.7938 0.6300 0.7000 0.7700 4.8352 (79)
 Northwest 7.1700 11.2829 0.6300 0.7000 0.7700 24.7237 (81)
 Solar gains 185.6350 324.4172 465.6949 613.5807 720.6337 730.1017 697.7871 615.6766 516.5556 364.4315 223.8434 157.8971 (83)
 Total gains 739.5525 895.8107 1011.6676 1144.6612 1224.0949 1216.9490 1165.7746 1082.2627 997.3320 859.1084 747.3291 698.7394 (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 47.2021 47.2782 47.3531 47.7078 47.7748 48.0890 48.0890 48.1477 47.9675 47.7748 47.6395 47.4989
 alpha 4.1468 4.1519 4.1569 4.1805 4.1850 4.2059 4.2059 4.2098 4.1978 4.1850 4.1760 4.1666

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util living area	0.9926	0.9832	0.9640	0.9096	0.7998	0.6270	0.4725	0.5250	0.7582	0.9386	0.9850	0.9941 (86)
MIT	19.3478	19.6075	19.9563	20.4005	20.7451	20.9327	20.9838	20.9751	20.8489	20.3854	19.7835	19.3009 (87)
Th 2	20.0162	20.0176	20.0190	20.0256	20.0268	20.0325	20.0325	20.0336	20.0303	20.0268	20.0243	20.0217 (88)
util rest of house	0.9907	0.9791	0.9551	0.8871	0.7520	0.5483	0.3742	0.4235	0.6876	0.9184	0.9807	0.9926 (89)
MIT 2	18.5090	18.7672	19.1108	19.5406	19.8488	19.9978	20.0273	20.0248	19.9415	19.5361	18.9485	18.4665 (90)
Living area fraction									FLA = Living area / (4) =			0.1388 (91)
MIT	18.6254	18.8838	19.2282	19.6599	19.9733	20.1276	20.1601	20.1567	20.0675	19.6540	19.0644	18.5824 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6254	18.8838	19.2282	19.6599	19.9733	20.1276	20.1601	20.1567	20.0675	19.6540	19.0644	18.5824 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9871	0.9729	0.9459	0.8771	0.7491	0.5565	0.3875	0.4369	0.6906	0.9087	0.9749	0.9896	(94)
Useful gains	730.0036	871.4927	956.9764	1003.9503	916.9768	677.2376	451.7197	472.8487	688.7958	780.6710	728.5423	691.4522	(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	1874.2277	1826.5903	1659.9494	1392.8250	1069.4346	709.8539	457.1821	481.8445	768.2822	1170.3591	1550.9590	1869.9193	(97)
Space heating kWh	851.3028	641.8256	523.0119	279.9898	113.4286	0.0000	0.0000	0.0000	0.0000	289.9279	592.1400	876.7795	(98a)
Space heating requirement - total per year (kWh/year)												4168.4061	
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	851.3028	641.8256	523.0119	279.9898	113.4286	0.0000	0.0000	0.0000	0.0000	289.9279	592.1400	876.7795	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4168.4061	
Space heating per m2											(98c) / (4) =	34.4496	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	
Heat loss rate W													
	0.0000	0.0000	0.0000	0.0000	0.0000	1207.1411	950.3026	974.7977	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8524	0.9108	0.8835	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1028.9830	865.5112	861.1851	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1358.4984	1301.6153	1206.9696	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	237.2511	324.4614	257.2637	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	59.3128	81.1154	64.3159	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement													204.7441 (107)
Energy for space heating													34.4496 (99)
Energy for space cooling													1.6921 (108)
Total													36.1417 (109)
Fabric Energy Efficiency (DFEE)													36.1 (109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)	
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	314.6000 (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	4 * 10 =	40.0000 (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)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1271 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3771	(18)
Number of sides sheltered	3	(19)

$$\begin{aligned}(20) &= 1 - [0.075 \times (19)] = 0.7750 \quad (20) \\(21) &= (18) \times (20) = 0.2923 \quad (21)\end{aligned}$$

	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												
	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (25)

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							
TER Semi-glazed door			3.3600	1.0000	3.3600		(26a)
TER Opening Type			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650		(28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724		(29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550		(30)
Total net area of external elements Aum(A, m2)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	61.0478		(33)
Main dwelling							
pw			47.8400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							183.7355 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				249.0200	0.0500	12.4510	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.4510 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		73.4988 (37)

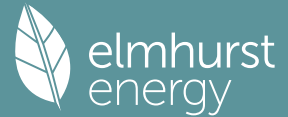
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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0960	1.0937	1.0914	1.0808	1.0788	1.0695	1.0695	1.0678	1.0731	1.0788	1.0828	1.0870 (40)
HLP (average)												1.0808
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy											2.8671 (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 (42a)	
Hot water usage for baths	31.2110	30.7475	30.0947	28.8912	27.9900	26.9907	26.4509	27.0991	27.8048	28.8741	30.1024	31.1055 (42b)
Hot water usage for other uses	43.9919	42.3922	40.7925	39.1928	37.5931	35.9934	35.9934	37.5931	39.1928	40.7925	42.3922	43.9919 (42c)
Average daily hot water use (litres/day)											68.9302 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	75.2029	73.1397	70.8872	68.0840	65.5831	62.9841	62.4443	64.6922	66.9977	69.6666	72.4947	75.0974 (44)
Energy content (annual)	119.1030	104.1499	108.9510	93.2036	88.2874	77.4463	75.5210	80.1025	82.6148	94.5370	103.2819	117.5844 (45)
Distribution loss (46)m = 0.15 x (45)m											Total = Sum(45)m = 1144.7829	
Water 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 (46)
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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	101.2376	88.5274	92.6084	79.2230	75.0443	65.8293	64.1928	68.0871	70.2226	80.3564	87.7897	99.9467 (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	101.2376	88.5274	92.6084	79.2230	75.0443	65.8293	64.1928	68.0871	70.2226	80.3564	87.7897	99.9467 (64)
12Total per year (kWh/year)											Total per year (kWh/year) = Sum(64a)m = 973.0654 (64)	
Electric shower(s)	57.8935	51.5836	56.3273	53.7525	54.7611	52.2368	53.9780	54.7611	53.7525	56.3273	55.2682	57.8935 (64a)
Total Energy used by instantaneous electric shower(s) = Sum(64a)m =											658.5355 (64a)	
Heat gains from water heating, kWh/month	39.7828	35.0278	37.2339	33.2439	32.4514	29.5165	29.5427	30.7121	30.9938	34.1709	35.7645	39.4601 (65)

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	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839 (71)
Water heating gains (Table 5)	53.4715	52.1246	50.0456	46.1721	43.6174	40.9952	39.7080	41.2796	43.0469	45.9287	49.6729	53.0377 (72)
Total internal gains	553.9175	571.3935	545.9727	531.0805	503.4613	486.8473	467.9875	466.5861	480.7764	494.6769	523.4856	540.8422 (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					13.8800	36.7938	0.6300	0.7000			0.7700	156.0761 (77)	
Southwest					0.4300	36.7938	0.6300	0.7000			0.7700	4.8352 (79)	
Northwest					7.1700	11.2829	0.6300	0.7000			0.7700	24.7237 (81)	

Solar gains	185.6350	324.4172	465.6949	613.5807	720.6337	730.1017	697.7871	615.6766	516.5556	364.4315	223.8434	157.8971 (83)	
Total gains	739.5525	895.8107	1011.6676	1144.6612	1224.0949	1216.9490	1165.7746	1082.2627	997.3321	859.1084	747.3291	698.7394 (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	46.5669	46.6654	46.7623	47.2232	47.3104	47.7208	47.7208	47.7976	47.5619	47.3104	47.1343	46.9515
alpha	4.1045	4.1110	4.1175	4.1482	4.1540	4.1814	4.1814	4.1865	4.1708	4.1540	4.1423	4.1301
util living area	0.9926	0.9834	0.9646	0.9110	0.8026	0.6302	0.4756	0.5281	0.7611	0.9394	0.9851	0.9941 (86)
MIT	19.3196	19.5809	19.9331	20.3855	20.7362	20.9300	20.9830	20.9739	20.8439	20.3727	19.7649	19.2769 (87)
Th 2	20.0041	20.0060	20.0078	20.0166	20.0182	20.0258	20.0258	20.0272	20.0229	20.0182	20.0149	20.0114 (88)
util rest of house	0.9907	0.9793	0.9557	0.8886	0.7549	0.5510	0.3761	0.4255	0.6903	0.9193	0.9808	0.9926 (89)
MIT 2	18.4721	18.7322	19.0796	19.5193	19.8339	19.9897	20.0203	20.0180	19.9310	19.5173	18.9230	18.4351 (90)
Living area fraction	fLA = Living area / (4) = 0.1388 (91)											
MIT	18.5898	18.8500	19.1981	19.6395	19.9592	20.1203	20.1539	20.1507	20.0577	19.6361	19.0399	18.5520 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.5898	18.8500	19.1981	19.6395	19.9592	20.1203	20.1539	20.1507	20.0577	19.6361	19.0399	18.5520 (93)

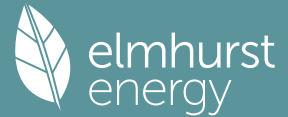
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9871	0.9730	0.9464	0.8784	0.7517	0.5591	0.3896	0.4391	0.6932	0.9095	0.9750	0.9895 (94)
Ext temp.	729.9940	871.6165	957.4908	1005.4562	920.1466	680.4225	454.1701	475.1935	691.3037	781.3841	728.6096	691.4352 (95)
Heat loss rate W	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)
Space heating kWh	1895.0653	1846.1030	1676.9427	1404.4485	1078.0925	714.3776	459.9151	484.5996	773.5673	1179.5009	1564.3721	1887.7197 (97)
Space heating requirement - total per year (kWh/year)	866.8130	654.8549	535.2722	287.2744	117.5118	0.0000	0.0000	0.0000	0.0000	296.1989	601.7490	890.0356 (98a)
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)
Space heating contribution - total per year (kWh/year)	866.8130	654.8549	535.2722	287.2744	117.5118	0.0000	0.0000	0.0000	0.0000	296.1989	601.7490	890.0356 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	(98c) / (4) = 35.1216 (99)											

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1216.4553	957.6350	981.9372	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8488	0.9080	0.8804	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1032.5113	869.5351	864.4835	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1358.4984	1301.6153	1206.9696	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	234.7108	321.4677	254.8097	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) = 1.0000 (105)											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	58.6777	80.3669	63.7024	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	202.7470 (107)											
Energy for space heating	35.1216 (99)											
Energy for space cooling	1.6756 (108)											
Total	36.7972 (109)											
Fabric Energy Efficiency (TFEE)	36.8 (109)											

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Property Reference	House 2			Issued on Date	03/07/2025
Assessment Reference	001	Prop Type Ref	House 2		
Property	Rear of 164 Harefield Rd, UXBRIDGE, UB8 1PP				
SAP Rating	98 A	DER	-0.52	TER	9.61
Environmental	101 A	% DER < TER			105.41
CO ₂ Emissions (t/year)	-0.14	DFEE	36.55	TFEE	37.33
Compliance Check	See BREL	% DFEE < TFEE			2.11
% DPER < TPER	85.62	DPER	7.20	TPER	50.07
Assessor Details	Mr. Ondrej Gajdos			Assessor ID	W452-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 314.6000 (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	0 * 10 = 0.0000 (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) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1700 (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	0.2167	0.2125	0.2083	0.1870	0.1827	0.1615	0.1615	0.1573	0.1700	0.1827	0.1913	0.1998 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.3162	0.3120	0.3077	0.2865	0.2823	0.2610	0.2610	0.2568	0.2695	0.2823	0.2907	0.2993 (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							
1			3.3600	1.0000	3.3600		(26a)
1			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650	110.0000	6655.0000 (28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724	60.0000	6190.8003 (29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550	9.0000	544.5000 (30)
Total net area of external elements Aum(A, m ²)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	61.0478	(33)
Main dwelling							
pw			47.8400	0.0000	0.0000	110.0000	5262.4000 (32)
iw			216.2000			9.0000	1945.8000 (32c)
if			60.5000			18.0000	1089.0000 (32d)
ic			60.5000			9.0000	544.5000 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 22232.0002 (34)

elmhurst
energy

183.7355 (35)

$$(33) + (36) + (36a) = 73.4888 \quad (37)$$

Average = Sum(39)m / 12 = 103.1324

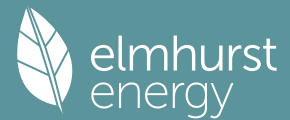
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
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113.6899	100.8775	107.8254	96.1594	94.1822	85.9019	85.4382	88.1872	88.4614	97.4208	102.1272	112.6082	(65)
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655.2531	665.3842	646.6537	616.4631	566.4526	565.1662	545.1135	545.6576	566.5526	575.6561	615.6561	655.1556	(75)
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Solar gains	185.6350	324.4172	465.6949	613.5807	720.6337	730.1017	697.7871	615.6766	516.5556	364.4315	223.8434	157.8971 (83)
Total gains	938.9301	903.8014	1106.5487	1232.0438	1267.6665	1205.2620	1240.0030	1150.5142	1073.1482	944.1317	830.4005	707.0568 (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	58.0785	58.3205	58.5645	59.8159	60.0726	61.3901	61.3901	61.6605	60.8562	60.0726	59.5614	59.0587
alpha	4.8719	4.8880	4.9043	4.9877	5.0048	5.0927	5.0927	5.1107	5.0571	5.0048	4.9708	4.9372
util living area	0.9862	0.9689	0.9336	0.8387	0.6830	0.4898	0.3555	0.3952	0.6222	0.8807	0.9704	0.9889 (86)
Living	19.8661	20.1122	20.4060	20.7403	20.9237	20.9887	20.9982	20.9970	20.9638	20.7139	20.2469	19.8380
Non living	18.8595	19.1714	19.5375	19.9454	20.1447	20.2189	20.2254	20.2280	20.1939	19.9266	19.3556	18.8330
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4200	20.1122	20.4060	20.7403	20.9237	20.9887	20.9982	20.9970	20.9638	20.7139	20.2469	20.0005 (87)
Th 2	20.1856	20.1887	20.1918	20.2074	20.2106	20.2262	20.2262	20.2294	20.2200	20.2106	20.2043	20.1980 (88)
util rest of house	0.9831	0.9623	0.9200	0.8098	0.6368	0.4333	0.2936	0.3300	0.5609	0.8518	0.9630	0.9864 (89)
MIT 2	19.6569	19.1714	19.5375	19.9454	20.1447	20.2189	20.2254	20.2280	20.1939	19.9266	19.3556	19.0790 (90)
Living area fraction												0.1388 (91)
MIT	19.7629	19.3020	19.6581	20.0558	20.2529	20.3258	20.3327	20.3347	20.3008	20.0359	19.4794	19.2069 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7629	19.3020	19.6581	20.0558	20.2529	20.3258	20.3327	20.3347	20.3008	20.0359	19.4794	19.2069 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9812	0.9533	0.9094	0.8037	0.6393	0.4407	0.3021	0.3390	0.5675	0.8445	0.9545	0.9823 (94)
Useful gains	823.1013	947.3919	1006.3318	990.2233	835.6502	570.7890	374.9008	393.0327	611.2860	797.3488	801.2750	782.9685 (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	1644.1864	1525.0300	1387.5069	1151.7509	879.2463	575.9857	375.4959	394.0810	629.2407	970.0249	1283.5417	1569.2184 (97)
Space heating kWh	610.8873	388.1728	283.5942	116.2999	32.4355	0.0000	0.0000	0.0000	0.0000	128.4710	347.2320	584.9700 (98a)
Space heating requirement - total per year (kWh/year)												2492.0628
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	610.8873	388.1728	283.5942	116.2999	32.4355	0.0000	0.0000	0.0000	0.0000	128.4710	347.2320	584.9700 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2492.0628
Space heating per m2										(98c) / (4) =		20.5956 (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 %)												292.1052 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	610.8873	388.1728	283.5942	116.2999	32.4355	0.0000	0.0000	0.0000	0.0000	128.4710	347.2320	584.9700 (98)
Space heating efficiency (main heating system 1)	292.1052	292.1052	292.1052	292.1052	292.1052	0.0000	0.0000	0.0000	0.0000	292.1052	292.1052	292.1052 (210)
Space heating fuel (main heating system)	209.1326	132.8880	97.0863	39.8144	11.1041	0.0000	0.0000	0.0000	0.0000	43.9811	118.8722	200.2600 (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	278.6197	246.2124	260.9820	227.9382	219.9498	197.0885	193.6522	201.9196	204.7864	229.6899	245.8866	275.3663 (64)
Efficiency of water heater												270.4650 (216)
(217)m	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650 (217)
Fuel for water heating, kWh/month	103.0151	91.0330	96.4938	84.2764	81.3228	72.8703	71.5997	74.6565	75.7164	84.9241	90.9125	101.8122 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
(221)m	27.3821	24.7322	27.3821	26.4988	27.3821	26.4988	27.3821	27.3821	26.4988	27.3821	26.4988	27.3821 (231)
Pumps and Fa	30.7370	24.6584	22.2021	16.2662	12.5645	10.2653	11.4618	14.8984	19.3516	25.3903	28.6783	31.5913 (232)
Lighting												
Electricity generated by PVs (Appendix M) (negative quantity)	-61.8468	-90.1726	-133.1508	-148.5547	-157.6758	-145.5749	-143.6234	-135.3482	-119.1715	-100.8811	-67.9689	-52.7286 (233a)
(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 (234a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
(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 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
(235c)m	-26.3162	-60.9653	-133.1910	-218.5305	-302.5317	-309.1087	-304.1492	-251.8068	-177.2708	-94.9276	-37.4392	-20.4630 (233b)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
(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 (235b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
(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 (235e)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235f)
(235f)m												
Annual totals kWh/year												
Space heating fuel - main system 1												853.1387 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												270.4650
Water heating fuel used												1028.6328 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)												
mechanical ventilation fans (SFP = 0.8400)												322.4021 (230a)
Total electricity for the above, kWh/year												322.4021 (231)

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Electricity for lighting (calculated in Appendix L)	248.0651 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3293.3975 (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	-841.1588 (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	853.1387	0.1570	133.9376 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1028.6328	0.1410	145.0702 (264)
Space and water heating			279.0078 (265)
Pumps, fans and electric keep-hot	322.4021	0.1387	44.7211 (267)
Energy for lighting	248.0651	0.1443	35.8035 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1356.6974	0.1346	-182.6243
PV Unit electricity exported	-1936.7001	0.1237	-239.6351
Total			-422.2594 (269)
Total CO2, kg/year			-62.7269 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			-0.5200 (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	853.1387	1.5812	1348.9477 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1028.6328	1.5215	1565.0566 (278)
Space and water heating			2914.0043 (279)
Pumps, fans and electric keep-hot	322.4021	1.5128	487.7299 (281)
Energy for lighting	248.0651	1.5338	380.4905 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1356.6974	1.4975	-2031.6631
PV Unit electricity exported	-1936.7001	0.4541	-879.4633
Total			-2911.1264 (283)
Total Primary energy kWh/year			871.0983 (286)
Dwelling Primary energy Rate (DPER)			7.2000 (287)

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

1. Overall dwelling characteristics

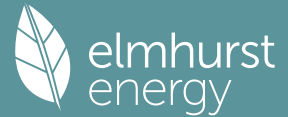
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	314.6000 (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	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1271 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3771 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3206 (21)

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

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Effective ac	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767 (22b)
	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709 (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							
TER Semi-glazed door			3.3600	1.0000	3.3600		(26a)
TER Opening Type			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650		(28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724		(29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550		(30)
Total net area of external elements Aum (A, m2)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)					61.0478		(33)
Main dwelling							
pw			47.8400	0.0000	0.0000		(32)

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

183.7355 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	249.0200	0.0500	12.4510
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			12.4510 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	73.4988 (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	60.5810	60.2442	59.9142	58.3638	58.0738	56.7234	56.7234	56.4734	57.2436	58.0738	58.6606	59.2740 (38)
Average = Sum(39)m / 12 =	134.0798	133.7431	133.4130	131.8626	131.5726	130.2223	130.2223	129.9722	130.7424	131.5726	132.1594	132.7728 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1081	1.1053	1.1026	1.0898	1.0874	1.0762	1.0762	1.0742	1.0805	1.0874	1.0922	1.0973 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

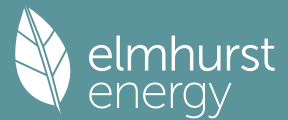
Assumed occupancy												2.8671 (42)
Hot water usage for mixer showers												
72.2916	71.2052	69.6221	66.5931	64.3578	61.8650	60.4481	62.0192	63.7415	66.4180	69.5120	72.0146 (42a)	
Hot water usage for baths												
31.2110	30.7475	30.0947	28.8912	27.9900	26.9907	26.4509	27.0991	27.8048	28.8741	30.1024	31.1055 (42b)	
Hot water usage for other uses												
43.9919	42.3922	40.7925	39.1928	37.5931	35.9934	35.9934	37.5931	39.1928	40.7925	42.3922	43.9919 (42c)	
Average daily hot water use (litres/day)												135.5806 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	147.4945	144.3449	140.5093	134.6771	129.9409	124.8491	122.8924	126.7114	130.7391	136.0846	142.0067	147.1120 (44)
Energy conte	233.5953	205.5452	215.9576	184.3662	174.9254	153.5165	148.6278	156.8952	161.2144	184.6655	202.3146	230.3419 (45)
Energy content (annual)										Total = Sum(45)m =		2251.9657
Distribution loss (46)m = 0.15 x (45)m	35.0393	30.8318	32.3936	27.6549	26.2388	23.0275	22.2942	23.5343	24.1822	27.6998	30.3472	34.5513 (46)
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (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	284.5213	251.5429	266.8837	233.6495	225.8515	202.7998	199.5538	207.8213	210.4977	235.5916	251.5979	281.2680 (62)
WWHRS	-33.0487	-29.2285	-30.6064	-25.3433	-23.6191	-20.2110	-18.9446	-20.1457	-20.9111	-24.6519	-27.9276	-32.4367 (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	251.4726	222.3144	236.2772	208.3062	202.2324	182.5888	180.6092	187.6756	189.5866	210.9397	223.6703	248.8313 (64)
12Total per year (kWh/year)												2544.5044 (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	118.4113	105.1420	112.5468	100.7284	98.9036	90.4709	90.1596	92.9085	93.0304	102.1422	106.6962	117.3295 (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	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	147.9303	163.7799	147.9303	152.8613	147.9303	152.8613	147.9303	147.9303	152.8613	147.9303	152.8613	147.9303 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	286.5094	289.4824	281.9904	266.0407	245.9071	226.9844	214.3428	211.3698	218.8618	234.8115	254.9451	273.8678 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355 (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)	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839 (71)
Water heating gains (Table 5)	159.1550	156.4613	151.2725	139.9006	132.9349	125.6540	121.1822	124.8770	129.2089	137.2878	148.1892	157.7010 (72)
Total internal gains	662.6010	678.7301	650.1996	627.8090	595.7787	571.5061	549.4618	550.1835	566.9385	589.0360	625.0020	648.5055 (73)

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6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Southeast				13.8800	36.7938	0.6300		0.7000		0.7700	156.0761 (77)
Southwest				0.4300	36.7938	0.6300		0.7000		0.7700	4.8352 (79)
Northwest				7.1700	11.2829	0.6300		0.7000		0.7700	24.7237 (81)
Solar gains	185.6350	324.4172	465.6949	613.5807	720.6337	730.1017	697.7871	615.6766	516.5556	364.4315	157.8971 (83)
Total gains	848.2360	1003.1473	1115.8946	1241.3897	1316.4124	1301.6079	1247.2489	1165.8601	1083.4941	953.4675	806.4026 (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	46.0588	46.1748	46.2890	46.8332	46.9365	47.4232	47.4232	47.5144	47.2345	46.9365	46.7281	46.5122
alpha	4.0706	4.0783	4.0859	4.1222	4.1291	4.1615	4.1615	4.1676	4.1490	4.1291	4.1152	4.1008
util living area	0.9880	0.9758	0.9524	0.8910	0.7745	0.6003	0.4495	0.4969	0.7259	0.9191	0.9771	0.9901 (86)
MIT	19.4144	19.6701	20.0122	20.4437	20.7680	20.9406	20.9859	20.9788	20.8683	20.4405	19.8555	19.3751 (87)
Th 2	19.9942	19.9965	19.9987	20.0092	20.0112	20.0203	20.0203	20.0220	20.0168	20.0112	20.0072	20.0030 (88)
util rest of house	0.9851	0.9701	0.9410	0.8651	0.7242	0.5220	0.3539	0.3982	0.6527	0.8941	0.9708	0.9877 (89)
MIT 2	18.1518	18.4767	18.9070	19.4391	19.8065	19.9816	20.0145	20.0125	19.9197	19.4483	18.7219	18.1079 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.3271	18.6424	19.0604	19.5786	19.9400	20.1148	20.1494	20.1467	20.0514	19.5860	18.8793	0.1388 (91)
Temperature adjustment	adjusted MIT											
adjusted MIT	18.3271	18.6424	19.0604	19.5786	19.9400	20.1148	20.1494	20.1467	20.0514	19.5860	18.8793	18.2839 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9781	0.9597	0.9274	0.8519	0.7202	0.5299	0.3668	0.4112	0.6555	0.8808	0.9608	0.9817 (94)
Useful gains	829.6947	962.7193	1034.8550	1057.5546	948.0468	689.7276	457.5057	479.4266	710.2406	839.8610	815.5293	791.6276 (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	1880.7552	1837.9505	1675.7262	1408.1021	1084.1627	718.1467	462.2074	486.9653	778.1051	1182.3167	1556.7467	1869.9575 (97)
Space heating kWh	781.9890	588.1554	476.8082	252.3942	101.2702	0.0000	0.0000	0.0000	0.0000	254.7870	533.6766	802.2774 (98a)
Space heating requirement - total per year (kWh/year)												3791.3579
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	781.9890	588.1554	476.8082	252.3942	101.2702	0.0000	0.0000	0.0000	0.0000	254.7870	533.6766	802.2774 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3791.3579
Space heating per m2										(98c) / (4) =		31.3335 (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 %)												92.3000 (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	781.9890	588.1554	476.8082	252.3942	101.2702	0.0000	0.0000	0.0000	0.0000	254.7870	533.6766	802.2774 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	847.2253	637.2214	516.5853	273.4498	109.7185	0.0000	0.0000	0.0000	0.0000	276.0423	578.1978	869.2063 (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	251.4726	222.3144	236.2772	208.3062	202.2324	182.5888	180.6092	187.6756	189.5866	210.9397	223.6703	248.8313 (64)
Efficiency of water heater	86.4281	86.1353	85.6011	84.4914	82.5931	79.8000	79.8000	79.8000	79.8000	84.4844	85.9376	79.8000 (216)
Fuel for water heating, kWh/month	290.9616	258.0991	276.0212	246.5413	244.8538	228.8080	226.3273	235.1825	237.5772	249.6790	260.2707	287.6969 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	30.7370	24.6584	22.2021	16.2662	12.5645	10.2653	11.4618	14.8984	19.3516	25.3903	28.6783	31.5913 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-54.1844	-75.1814	-106.3543	-117.5847	-125.0754	-116.0542	-114.5256	-108.8926	-98.7880	-84.9288	-59.1003	-46.9806 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-34.3995	-71.8968	-142.0823	-212.2631	-279.6299	-280.6644	-277.4471	-235.4602	-173.2554	-102.5411	-45.8283	-27.2456 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)

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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	(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	(235d)
Annual totals kWh/year										
Space heating fuel - main system 1									4107.6467	(211)
Space heating fuel - main system 2									0.0000	(213)
Space heating fuel - secondary									0.0000	(215)
Efficiency of water heater									79.8000	
Water heating fuel used									3042.0185	(219)
Space cooling fuel									0.0000	(221)
Electricity for pumps and fans:										
Total electricity for the above, kWh/year									86.0000	(231)
Electricity for lighting (calculated in Appendix L)									248.0651	(232)
Energy saving/generation technologies (Appendices M ,N and Q)										
PV generation									-2990.3641	(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									4493.3663	(238)

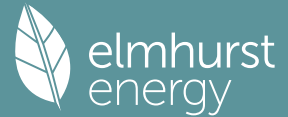
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4107.6467	0.2100	862.6058 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3042.0185	0.2100	638.8239 (264)
Space and water heating			1501.4297 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	248.0651	0.1443	35.8035 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1107.6504	0.1349	-149.4771
PV Unit electricity exported	-1882.7137	0.1260	-237.3101
Total			-386.7872 (269)
Total CO2, kg/year			1162.3752 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.6100 (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	4107.6467	1.1300	4641.6408 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3042.0185	1.1300	3437.4809 (278)
Space and water heating			8079.1218 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	248.0651	1.5338	380.4905 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1107.6504	1.4988	-1660.1151
PV Unit electricity exported	-1882.7137	0.4627	-871.1031
Total			-2531.2182 (283)
Total Primary energy kWh/year			6058.4949 (286)
Target Primary Energy Rate (TPER)			50.0700 (287)

Full SAP Calculation Printout



Property Reference	House 1				Issued on Date	03/07/2025	
Assessment Reference	001			Prop Type Ref	House 1		
Property	Rear of 164 Harefield Rd, UXBRIDGE, UB8 1PP						
SAP Rating	99 A		DER	-0.64		TER	9.49
Environmental	101 A		% DER < TER				106.74
CO ₂ Emissions (t/year)	-0.15		DFEE	36.14		TFEE	36.80
Compliance Check	See BREL		% DFEE < TFEE				1.78
% DPER < TPER	87.87		DPER	6.00		TPER	49.45
Assessor Details	Mr. Ondrej Gajdos					Assessor ID	W452-0001
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 314.6000 (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	0 * 10 = 0.0000 (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) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1550 (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	0.1976	0.1938	0.1899	0.1705	0.1666	0.1473	0.1473	0.1434	0.1550	0.1666	0.1744	0.1821 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.2971	0.2933	0.2894	0.2700	0.2661	0.2467	0.2467	0.2429	0.2545	0.2661	0.2739	0.2816 (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							
1			3.3600	1.0000	3.3600		(26a)
1			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650	110.0000	6655.0000 (28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724	60.0000	6190.8003 (29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550	9.0000	544.5000 (30)
Total net area of external elements Aum(A, m ²)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	61.0478	(33)
Main dwelling							
pw			47.8400	0.0000	0.0000	110.0000	5262.4000 (32)
iw			216.2000			9.0000	1945.8000 (32c)
if			60.5000			18.0000	1089.0000 (32d)
ic			60.5000			9.0000	544.5000 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 22232.0002 (34)

183.7355 (35)

12.4510

12.4510 (36)

(36a) = 0.0000

104.3457 103.9435 103.5412 101.5297 101.1274 99.1159 99.1159 98.7136 99.9205 101.1274 101.9320 102.7366 (39)

Average = $\text{Sum}(39)m / 12 = 101.4291$

[illegible]

Assumed occupancy	2.8671 (42)
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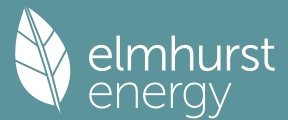
Average daily hot water use (litres/day)	135.5806 (43)
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[illegible]

653.2331	669.3842	640.8537	618.4631	586.4328	565.1602	543.1139	543.8376	560.3926	579.6901	615.6361	639.1396 (75)
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Solar gains	185.6350	324.4172	465.6949	613.5807	720.6337	730.1017	697.7871	615.6766	516.5556	364.4315	223.8434	157.8971 (83)
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Full SAP Calculation Printout



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	59.1836	59.4126	59.6435	60.8251	61.0671	62.3064	62.3064	62.5603	61.8047	61.0671	60.5851	60.1106	
alpha	4.9456	4.9608	4.9762	5.0550	5.0711	5.1538	5.1538	5.1707	5.1203	5.0711	5.0390	5.0074	
util living area	0.9859	0.9680	0.9313	0.8336	0.6756	0.4834	0.3504	0.3897	0.6150	0.8769	0.9696	0.9887 (86)	
Living	19.9010	20.1452	20.4339	20.7568	20.9305	20.9900	20.9984	20.9974	20.9673	20.7295	20.2727	19.8704	
Non living	18.9141	19.2232	19.5823	19.9747	20.1626	20.2302	20.2361	20.2384	20.2075	19.9545	19.3973	18.8837	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.4378	20.1452	20.4339	20.7568	20.9305	20.9900	20.9984	20.9974	20.9673	20.7295	20.2727	20.0284 (87)	
Th 2	20.1996	20.2025	20.2053	20.2196	20.2224	20.2368	20.2368	20.2396	20.2310	20.2224	20.2167	20.2110 (88)	
util rest of house	0.9827	0.9613	0.9175	0.8045	0.6298	0.4281	0.2901	0.3262	0.5547	0.8476	0.9621	0.9861 (89)	
MIT 2	19.6871	19.2232	19.5823	19.9747	20.1626	20.2302	20.2361	20.2384	20.2075	19.9545	19.3973	19.1229 (90)	
Living area fraction									fLA = Living area / (4) =				0.1388 (91)
MIT	19.7913	19.3512	19.7005	20.0833	20.2692	20.3357	20.3419	20.3438	20.3130	20.0621	19.5189	19.2486 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.7913	19.3512	19.7005	20.0833	20.2692	20.3357	20.3419	20.3438	20.3130	20.0621	19.5189	19.2486 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9808	0.9523	0.9072	0.7990	0.6327	0.4354	0.2985	0.3350	0.5613	0.8408	0.9536	0.9821 (94)
Useful gains	822.8217	946.4390	1003.8310	984.3869	826.9827	563.8954	370.3704	388.3893	604.5938	793.8558	800.5433	782.7958 (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	1616.4551	1502.1059	1366.7973	1135.4370	866.5825	568.5022	370.8858	389.3062	620.8015	956.8795	1265.8806	1546.0438 (97)
Space heating kWh	590.4632	373.4081	270.0469	108.7561	29.4622	0.0000	0.0000	0.0000	0.0000	121.2896	335.0428	567.8565 (98a)
Space heating requirement - total per year (kWh/year)												2396.3256
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	590.4632	373.4081	270.0469	108.7561	29.4622	0.0000	0.0000	0.0000	0.0000	121.2896	335.0428	567.8565 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2396.3256
Space heating per m2										(98c) / (4) =		19.8043 (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 %)												291.9047 (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	590.4632	373.4081	270.0469	108.7561	29.4622	0.0000	0.0000	0.0000	0.0000	121.2896	335.0428	567.8565 (98)
Space heating efficiency (main heating system 1)	291.9047	291.9047	291.9047	291.9047	291.9047	0.0000	0.0000	0.0000	0.0000	291.9047	291.9047	291.9047 (210)
Space heating fuel (main heating system)	202.2794	127.9212	92.5120	37.2574	10.0931	0.0000	0.0000	0.0000	0.0000	41.5511	114.7781	194.5349 (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	278.6197	246.2124	260.9820	227.9382	219.9498	197.0885	193.6522	201.9196	204.7864	229.6899	245.8866	275.3663 (64)
Efficiency of water heater	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650 (216)
Fuel for water heating, kWh/month	103.0151	91.0330	96.4938	84.2764	81.3228	72.8703	71.5997	74.6565	75.7164	84.9241	90.9125	101.8122 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	21.5145	19.4325	21.5145	20.8205	21.5145	20.8205	21.5145	21.5145	20.8205	21.5145	20.8205	21.5145 (231)
Lighting	30.7370	24.6584	22.2021	16.2662	12.5645	10.2653	11.4618	14.8984	19.3516	25.3903	28.6783	31.5913 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-61.6427	-89.7470	-132.2849	-147.3420	-156.2646	-144.2707	-142.2791	-134.1871	-118.3238	-100.2591	-67.6984	-52.5771 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-26.5202	-61.3910	-134.0570	-219.7432	-303.9429	-310.4130	-305.4934	-252.9679	-178.1185	-95.5496	-37.7097	-20.6146 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												820.9273 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												270.4650
Water heating fuel used												1028.6328 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.1000, SFP = 0.6600)												
mechanical ventilation fans (SFP = 0.6600)												253.3159 (230a)
Total electricity for the above, kWh/year												253.3159 (231)

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Electricity for lighting (calculated in Appendix L)	248.0651 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3293.3975 (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	-942.4564 (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	820.9273	0.1571	128.9450 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1028.6328	0.1410	145.0702 (264)
Space and water heating			274.0152 (265)
Pumps, fans and electric keep-hot	253.3159	0.1387	35.1380 (267)
Energy for lighting	248.0651	0.1443	35.8035 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1346.8765	0.1346	-181.3414
PV Unit electricity exported	-1946.5210	0.1238	-240.8996
Total			-422.2410 (269)
Total CO2, kg/year			-77.2843 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			-0.6400 (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	820.9273	1.5814	1298.2524 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1028.6328	1.5215	1565.0566 (278)
Space and water heating			2863.3090 (279)
Pumps, fans and electric keep-hot	253.3159	1.5128	383.2163 (281)
Energy for lighting	248.0651	1.5338	380.4905 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1346.8765	1.4976	-2017.1027
PV Unit electricity exported	-1946.5210	0.4542	-884.1074
Total			-2901.2100 (283)
Total Primary energy kWh/year			725.8058 (286)
Dwelling Primary energy Rate (DPER)			6.0000 (287)

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

1. Overall dwelling characteristics

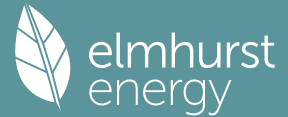
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	314.6000 (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	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1271 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3771 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2923 (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												

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Effective ac	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (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							
TER Semi-glazed door			3.3600	1.0000	3.3600		(26a)
TER Opening Type			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650		(28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724		(29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550		(30)
Total net area of external elements Aum (A, m2)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		61.0478		(33)
Main dwelling							
pw			47.8400	0.0000	0.0000		(32)

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

183.7355 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	249.0200	0.0500	12.4510
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			12.4510 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	73.4988 (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	59.1182	58.8382	58.5638	57.2750	57.0338	55.9113	55.9113	55.7034	56.3437	57.0338	57.5217	58.0317 (38)
Average = Sum(39)m / 12 =	132.6170	132.3370	132.0626	130.7738	130.5327	129.4101	129.4101	129.2023	129.8425	130.5327	131.0205	131.5305 (39)
												130.7727

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0960	1.0937	1.0914	1.0808	1.0788	1.0695	1.0695	1.0678	1.0731	1.0788	1.0828	1.0870 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

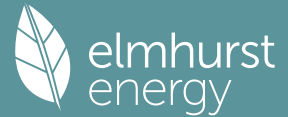
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.8671 (42)
Hot water usage for mixer showers												
72.2916	71.2052	69.6221	66.5931	64.3578	61.8650	60.4481	62.0192	63.7415	66.4180	69.5120	72.0146 (42a)	
Hot water usage for baths												
31.2110	30.7475	30.0947	28.8912	27.9900	26.9907	26.4509	27.0991	27.8048	28.8741	30.1024	31.1055 (42b)	
Hot water usage for other uses												
43.9919	42.3922	40.7925	39.1928	37.5931	35.9934	35.9934	37.5931	39.1928	40.7925	42.3922	43.9919 (42c)	
Average daily hot water use (litres/day)												135.5806 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
147.4945	144.3449	140.5093	134.6771	129.9409	124.8491	122.8924	126.7114	130.7391	136.0846	142.0067	147.1120 (44)	
Energy content (annual)	233.5953	205.5452	215.9576	184.3662	174.9254	153.5165	148.6278	156.8952	161.2144	184.6655	202.3146	230.3419 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2251.9657
35.0393	30.8318	32.3936	27.6549	26.2388	23.0275	22.2942	23.5343	24.1822	27.6998	30.3472	34.5513 (46)	
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8924 (55)
Total storage loss												
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (56)	
If cylinder contains dedicated solar storage												
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624 (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 (61)	
Total heat required for water heating calculated for each month												
284.5213	251.5429	266.8837	233.6495	225.8515	202.7998	199.5538	207.8213	210.4977	235.5916	251.5979	281.2680 (62)	
WWHRS	-33.0487	-29.2285	-30.6064	-25.3433	-23.6191	-20.2110	-18.9446	-20.1457	-20.9111	-24.6519	-27.9276	-32.4367 (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												
251.4726	222.3144	236.2772	208.3062	202.2324	182.5888	180.6092	187.6756	189.5866	210.9397	223.6703	248.8313 (64)	
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				2544.5044 (64)
Electric shower(s)												2545 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
118.4113	105.1420	112.5468	100.7284	98.9036	90.4709	90.1596	92.9085	93.0304	102.1422	106.6962	117.3295 (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	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	147.9303	163.7799	147.9303	152.8613	147.9303	152.8613	147.9303	147.9303	152.8613	147.9303	152.8613	147.9303 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	286.5094	289.4824	281.9904	266.0407	245.9071	226.9844	214.3428	211.3698	218.8618	234.8115	254.9451	273.8678 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355 (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)	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839 (71)
Water heating gains (Table 5)	159.1550	156.4613	151.2725	139.9006	132.9349	125.6540	121.1822	124.8770	129.2089	137.2878	148.1892	157.7010 (72)
Total internal gains	662.6010	678.7301	650.1996	627.8090	595.7787	571.5061	549.4618	550.1835	566.9385	589.0360	625.0020	648.5055 (73)

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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					13.8800	36.7938	0.6300	0.7000	0.7700	156.0761 (77)		
Southwest					0.4300	36.7938	0.6300	0.7000	0.7700	4.8352 (79)		
Northwest					7.1700	11.2829	0.6300	0.7000	0.7700	24.7237 (81)		
Solar gains	185.6350	324.4172	465.6949	613.5807	720.6337	730.1017	697.7871	615.6766	516.5556	364.4315	223.8434	157.8971 (83)
Total gains	848.2360	1003.1473	1115.8946	1241.3897	1316.4124	1301.6079	1247.2489	1165.8601	1083.4941	953.4675	848.8454	806.4026 (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	46.5669	46.6654	46.7623	47.2232	47.3104	47.7208	47.7208	47.7976	47.5619	47.3104	47.1343	46.9515	
alpha	4.1045	4.1110	4.1175	4.1482	4.1540	4.1814	4.1814	4.1865	4.1708	4.1540	4.1423	4.1301	
util living area	0.9879	0.9756	0.9518	0.8896	0.7720	0.5976	0.4470	0.4944	0.7234	0.9182	0.9769	0.9901	(86)
MIT	19.4376	19.6919	20.0311	20.4556	20.7748	20.9425	20.9865	20.9796	20.8720	20.4507	19.8708	19.3949	(87)
Th 2	20.0041	20.0060	20.0078	20.0166	20.0182	20.0258	20.0258	20.0272	20.0229	20.0182	20.0149	20.0114	(88)
util rest of house	0.9850	0.9699	0.9403	0.8637	0.7217	0.5198	0.3524	0.3966	0.6504	0.8931	0.9705	0.9877	(89)
MIT 2	18.1879	18.5108	18.9370	19.4588	19.8197	19.9884	20.0202	20.0181	19.9287	19.4657	18.7465	18.1388	(90)
Living area fraction	18.3614	18.6748	19.0889	19.5972	19.9523	20.1209	20.1544	20.1516	20.0596	19.6024	18.9026	18.3132	(91)
MIT	18.3614	18.6748	19.0889	19.5972	19.9523	20.1209	20.1544	20.1516	20.0596	19.6024	18.9026	18.3132	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.3614	18.6748	19.0889	19.5972	19.9523	20.1209	20.1544	20.1516	20.0596	19.6024	18.9026	18.3132	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9781	0.9595	0.9268	0.8507	0.7180	0.5278	0.3652	0.4095	0.6534	0.8800	0.9606	0.9817	(94)
Useful gains	829.6712	962.5128	1034.2158	1056.0048	945.1213	686.9894	455.4678	477.4534	707.9322	839.0188	815.3951	791.6247	(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	1864.7866	1822.9126	1662.5201	1398.9162	1077.1905	714.4579	459.9752	484.7136	773.8135	1175.1125	1546.3875	1856.3152	(97)
Space heating kWh	770.1258	578.1886	467.4584	246.8962	98.2595	0.0000	0.0000	0.0000	0.0000	250.0537	526.3145	792.1297	(98a)
Space heating requirement - total per year (kWh/year)												3729.4265	
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	770.1258	578.1886	467.4584	246.8962	98.2595	0.0000	0.0000	0.0000	0.0000	250.0537	526.3145	792.1297	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3729.4265	
Space heating per m2										(98c) / (4) =		30.8217	(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 %)													92.3000	(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	770.1258	578.1886	467.4584	246.8962	98.2595	0.0000	0.0000	0.0000	0.0000	250.0537	526.3145	792.1297	(98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)	
Space heating fuel (main heating system)	834.3725	626.4232	506.4554	267.4932	106.4566	0.0000	0.0000	0.0000	0.0000	270.9141	570.2216	858.2121	(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	251.4726	222.3144	236.2772	208.3062	202.2324	182.5888	180.6092	187.6756	189.5866	210.9397	223.6703	248.8313	(64)	
Efficiency of water heater	86.4013	86.1031	85.5602	84.4419	82.5353	79.8000	79.8000	79.8000	79.8000	84.4422	85.9104	86.4689	(216)	
Fuel for water heating, kWh/month	291.0518	258.1955	276.1533	246.6857	245.0252	228.8080	226.3273	235.1825	237.5772	249.8036	260.3530	287.7698	(217)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	30.7370	24.6584	22.2021	16.2662	12.5645	10.2653	11.4618	14.8984	19.3516	25.3903	28.6783	31.5913	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-54.1844	-75.1814	-106.3543	-117.5847	-125.0754	-116.0542	-114.5256	-108.8926	-98.7880	-84.9288	-59.1003	-46.9806	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	-34.3995	-71.8968	-142.0823	-212.2631	-279.6299	-280.6644	-277.4471	-235.4602	-173.2554	-102.5411	-45.8283	-27.2456	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	

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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												4040.5487	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												3042.9331	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												248.0651	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2990.3641	(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												4427.1829	(238)

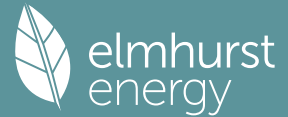
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4040.5487	0.2100	848.5152 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3042.9331	0.2100	639.0160 (264)
Space and water heating			1487.5312 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	248.0651	0.1443	35.8035 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1107.6504	0.1349	-149.4771
PV Unit electricity exported	-1882.7137	0.1260	-237.3101
Total			-386.7872 (269)
Total CO2, kg/year			1148.4767 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.4900 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	4040.5487	1.1300	4565.8201 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3042.9331	1.1300	3438.5145 (278)
Space and water heating			8004.3345 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	248.0651	1.5338	380.4905 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1107.6504	1.4988	-1660.1151
PV Unit electricity exported	-1882.7137	0.4627	-871.1031
Total			-2531.2182 (283)
Total Primary energy kWh/year			5983.7077 (286)
Target Primary Energy Rate (TPER)			49.4500 (287)

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Property Reference	House 1				Issued on Date	03/07/2025	
Assessment Reference	001			Prop Type Ref	House 1		
Property	Rear of 164 Harefield Rd, UXBRIDGE, UB8 1PP						
SAP Rating	99 A		DER	-0.64		TER	9.49
Environmental	101 A		% DER < TER				106.74
CO ₂ Emissions (t/year)	-0.15		DFEE	36.14		TFEE	36.80
Compliance Check	See BREL		% DFEE < TFEE				1.78
% DPER < TPER	87.87		DPER	6.00		TPER	49.45
Assessor Details	Mr. Ondrej Gajdos					Assessor ID	W452-0001
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 314.6000 (5)

2. Ventilation rate

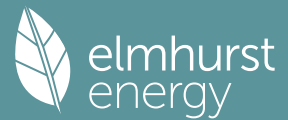
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (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) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1550 (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	0.1976	0.1938	0.1899	0.1705	0.1666	0.1473	0.1473	0.1434	0.1550	0.1666	0.1744	0.1821 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.2971	0.2933	0.2894	0.2700	0.2661	0.2467	0.2467	0.2429	0.2545	0.2661	0.2739	0.2816 (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							
1			3.3600	1.0000	3.3600		(26a)
1			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650	110.0000	6655.0000 (28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724	60.0000	6190.8003 (29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550	9.0000	544.5000 (30)
Total net area of external elements Aum(A, m ²)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	61.0478	(33)
Main dwelling							
pw			47.8400	0.0000	0.0000	110.0000	5262.4000 (32)
iw			216.2000			9.0000	1945.8000 (32c)
if			60.5000			18.0000	1089.0000 (32d)
ic			60.5000			9.0000	544.5000 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 22232.0002 (34)

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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	59.1836	59.4126	59.6435	60.8251	61.0671	62.3064	62.3064	62.5603	61.8047	61.0671	60.5851	60.1106	
alpha	4.9456	4.9608	4.9762	5.0550	5.0711	5.1538	5.1538	5.1707	5.1203	5.0711	5.0390	5.0074	
util living area	0.9859	0.9680	0.9313	0.8336	0.6756	0.4834	0.3504	0.3897	0.6150	0.8769	0.9696	0.9887 (86)	
Living	19.9010	20.1452	20.4339	20.7568	20.9305	20.9900	20.9984	20.9974	20.9673	20.7295	20.2727	19.8704	
Non living	18.9141	19.2232	19.5823	19.9747	20.1626	20.2302	20.2361	20.2384	20.2075	19.9545	19.3973	18.8837	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.4378	20.1452	20.4339	20.7568	20.9305	20.9900	20.9984	20.9974	20.9673	20.7295	20.2727	20.0284 (87)	
Th 2	20.1996	20.2025	20.2053	20.2196	20.2224	20.2368	20.2368	20.2396	20.2310	20.2224	20.2167	20.2110 (88)	
util rest of house	0.9827	0.9613	0.9175	0.8045	0.6298	0.4281	0.2901	0.3262	0.5547	0.8476	0.9621	0.9861 (89)	
MIT 2	19.6871	19.2232	19.5823	19.9747	20.1626	20.2302	20.2361	20.2384	20.2075	19.9545	19.3973	19.1229 (90)	
Living area fraction									fLA = Living area / (4) =				0.1388 (91)
MIT	19.7913	19.3512	19.7005	20.0833	20.2692	20.3357	20.3419	20.3438	20.3130	20.0621	19.5189	19.2486 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.7913	19.3512	19.7005	20.0833	20.2692	20.3357	20.3419	20.3438	20.3130	20.0621	19.5189	19.2486 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9808	0.9523	0.9072	0.7990	0.6327	0.4354	0.2985	0.3350	0.5613	0.8408	0.9536	0.9821 (94)
Useful gains	822.8217	946.4390	1003.8310	984.3869	826.9827	563.8954	370.3704	388.3893	604.5938	793.8558	800.5433	782.7958 (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	1616.4551	1502.1059	1366.7973	1135.4370	866.5825	568.5022	370.8858	389.3062	620.8015	956.8795	1265.8806	1546.0438 (97)
Space heating kWh	590.4632	373.4081	270.0469	108.7561	29.4622	0.0000	0.0000	0.0000	0.0000	121.2896	335.0428	567.8565 (98a)
Space heating requirement - total per year (kWh/year)												2396.3256
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	590.4632	373.4081	270.0469	108.7561	29.4622	0.0000	0.0000	0.0000	0.0000	121.2896	335.0428	567.8565 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2396.3256
Space heating per m2										(98c) / (4) =		19.8043 (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 %)													291.9047 (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	590.4632	373.4081	270.0469	108.7561	29.4622	0.0000	0.0000	0.0000	0.0000	121.2896	335.0428	567.8565 (98)	
Space heating efficiency (main heating system 1)	291.9047	291.9047	291.9047	291.9047	291.9047	0.0000	0.0000	0.0000	0.0000	291.9047	291.9047	291.9047 (210)	
Space heating fuel (main heating system)	202.2794	127.9212	92.5120	37.2574	10.0931	0.0000	0.0000	0.0000	0.0000	41.5511	114.7781	194.5349 (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	278.6197	246.2124	260.9820	227.9382	219.9498	197.0885	193.6522	201.9196	204.7864	229.6899	245.8866	275.3663 (64)	
Efficiency of water heater	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650	270.4650 (216)	
Fuel for water heating, kWh/month	103.0151	91.0330	96.4938	84.2764	81.3228	72.8703	71.5997	74.6565	75.7164	84.9241	90.9125	101.8122 (219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	21.5145	19.4325	21.5145	20.8205	21.5145	20.8205	21.5145	21.5145	20.8205	21.5145	20.8205	21.5145 (231)	
Lighting	30.7370	24.6584	22.2021	16.2662	12.5645	10.2653	11.4618	14.8984	19.3516	25.3903	28.6783	31.5913 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-61.6427	-89.7470	-132.2849	-147.3420	-156.2646	-144.2707	-142.2791	-134.1871	-118.3238	-100.2591	-67.6984	-52.5771 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	-26.5202	-61.3910	-134.0570	-219.7432	-303.9429	-310.4130	-305.4934	-252.9679	-178.1185	-95.5496	-37.7097	-20.6146 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													820.9273 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													270.4650
Water heating fuel used													1028.6328 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.1000, SFP = 0.6600)													
mechanical ventilation fans (SFP = 0.6600)													253.3159 (230a)
Total electricity for the above, kWh/year													253.3159 (231)

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Electricity for lighting (calculated in Appendix L)	248.0651 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3293.3975 (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	-942.4564 (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	820.9273	0.1571	128.9450 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1028.6328	0.1410	145.0702 (264)
Space and water heating			274.0152 (265)
Pumps, fans and electric keep-hot	253.3159	0.1387	35.1380 (267)
Energy for lighting	248.0651	0.1443	35.8035 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1346.8765	0.1346	-181.3414
PV Unit electricity exported	-1946.5210	0.1238	-240.8996
Total			-422.2410 (269)
Total CO2, kg/year			-77.2843 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			-0.6400 (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	820.9273	1.5814	1298.2524 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1028.6328	1.5215	1565.0566 (278)
Space and water heating			2863.3090 (279)
Pumps, fans and electric keep-hot	253.3159	1.5128	383.2163 (281)
Energy for lighting	248.0651	1.5338	380.4905 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1346.8765	1.4976	-2017.1027
PV Unit electricity exported	-1946.5210	0.4542	-884.1074
Total			-2901.2100 (283)
Total Primary energy kWh/year			725.8058 (286)
Dwelling Primary energy Rate (DPER)			6.0000 (287)

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

1. Overall dwelling characteristics

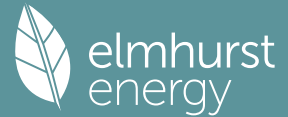
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	314.6000 (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	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1271 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3771 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2923 (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												

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Effective ac	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (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							
TER Semi-glazed door			3.3600	1.0000	3.3600		(26a)
TER Opening Type			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650		(28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724		(29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550		(30)
Total net area of external elements Aum (A, m2)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)					61.0478		(33)
Main dwelling							
pw			47.8400	0.0000	0.0000		(32)

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

183.7355 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	249.0200	0.0500	12.4510
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			12.4510 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 73.4988 (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	59.1182	58.8382	58.5638	57.2750	57.0338	55.9113	55.9113	55.7034	56.3437	57.0338	57.5217	58.0317 (38)
Average = Sum(39)m / 12 =	132.6170	132.3370	132.0626	130.7738	130.5327	129.4101	129.4101	129.2023	129.8425	130.5327	131.0205	131.5305 (39)
												130.7727

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0960	1.0937	1.0914	1.0808	1.0788	1.0695	1.0695	1.0678	1.0731	1.0788	1.0828	1.0870 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

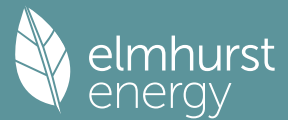
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.8671 (42)
Hot water usage for mixer showers													
72.2916	71.2052	69.6221	66.5931	64.3578	61.8650	60.4481	62.0192	63.7415	66.4180	69.5120	72.0146	(42a)	
Hot water usage for baths													
31.2110	30.7475	30.0947	28.8912	27.9900	26.9907	26.4509	27.0991	27.8048	28.8741	30.1024	31.1055	(42b)	
Hot water usage for other uses													
43.9919	42.3922	40.7925	39.1928	37.5931	35.9934	35.9934	37.5931	39.1928	40.7925	42.3922	43.9919	(42c)	
Average daily hot water use (litres/day)												135.5806 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
147.4945	144.3449	140.5093	134.6771	129.9409	124.8491	122.8924	126.7114	130.7391	136.0846	142.0067	147.1120	(44)	
Energy content (annual)	233.5953	205.5452	215.9576	184.3662	174.9254	153.5165	148.6278	156.8952	161.2144	184.6655	202.3146	230.3419 (45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2251.9657	
35.0393	30.8318	32.3936	27.6549	26.2388	23.0275	22.2942	23.5343	24.1822	27.6998	30.3472	34.5513	(46)	
Water storage loss:													
Store volume												200.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.6525 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.8924 (55)	
Total storage loss													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)	
If cylinder contains dedicated solar storage													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (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	(61)	
Total heat required for water heating calculated for each month													
284.5213	251.5429	266.8837	233.6495	225.8515	202.7998	199.5538	207.8213	210.4977	235.5916	251.5979	281.2680	(62)	
WWHRS	-33.0487	-29.2285	-30.6064	-25.3433	-23.6191	-20.2110	-18.9446	-20.1457	-20.9111	-24.6519	-27.9276	-32.4367 (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													
251.4726	222.3144	236.2772	208.3062	202.2324	182.5888	180.6092	187.6756	189.5866	210.9397	223.6703	248.8313	(64)	
12Total per year (kWh/year)												2544.5044 (64)	
Electric shower(s)												2545 (64)	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)	
Heat gains from water heating, kWh/month													
118.4113	105.1420	112.5468	100.7284	98.9036	90.4709	90.1596	92.9085	93.0304	102.1422	106.6962	117.3295	(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	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	147.9303	163.7799	147.9303	152.8613	147.9303	152.8613	147.9303	147.9303	152.8613	147.9303	152.8613	147.9303 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	286.5094	289.4824	281.9904	266.0407	245.9071	226.9844	214.3428	211.3698	218.8618	234.8115	254.9451	273.8678 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355 (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)	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839 (71)
Water heating gains (Table 5)	159.1550	156.4613	151.2725	139.9006	132.9349	125.6540	121.1822	124.8770	129.2089	137.2878	148.1892	157.7010 (72)
Total internal gains	662.6010	678.7301	650.1996	627.8090	595.7787	571.5061	549.4618	550.1835	566.9385	589.0360	625.0020	648.5055 (73)

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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				13.8800	36.7938	0.6300		0.7000	0.7700		156.0761 (77)	
Southwest				0.4300	36.7938	0.6300		0.7000	0.7700		4.8352 (79)	
Northwest				7.1700	11.2829	0.6300		0.7000	0.7700		24.7237 (81)	
Solar gains	185.6350	324.4172	465.6949	613.5807	720.6337	730.1017	697.7871	615.6766	516.5556	364.4315	223.8434	157.8971 (83)
Total gains	848.2360	1003.1473	1115.8946	1241.3897	1316.4124	1301.6079	1247.2489	1165.8601	1083.4941	953.4675	848.8454	806.4026 (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	46.5669	46.6654	46.7623	47.2232	47.3104	47.7208	47.7208	47.7976	47.5619	47.3104	47.1343	46.9515
alpha	4.1045	4.1110	4.1175	4.1482	4.1540	4.1814	4.1814	4.1865	4.1708	4.1540	4.1423	4.1301
util living area	0.9879	0.9756	0.9518	0.8896	0.7720	0.5976	0.4470	0.4944	0.7234	0.9182	0.9769	0.9901 (86)
MIT	19.4376	19.6919	20.0311	20.4556	20.7748	20.9425	20.9865	20.9796	20.8720	20.4507	19.8708	19.3949 (87)
Th 2	20.0041	20.0060	20.0078	20.0166	20.0182	20.0258	20.0258	20.0272	20.0229	20.0182	20.0149	20.0114 (88)
util rest of house	0.9850	0.9699	0.9403	0.8637	0.7217	0.5198	0.3524	0.3966	0.6504	0.8931	0.9705	0.9877 (89)
MIT 2	18.1879	18.5108	18.9370	19.4588	19.8197	19.9884	20.0202	20.0181	19.9287	19.4657	18.7465	18.1388 (90)
Living area fraction	18.3614	18.6748	19.0889	19.5972	19.9523	20.1209	20.1544	20.1516	20.0596	19.6024	18.9026	18.3132 (92)
MIT	18.3614	18.6748	19.0889	19.5972	19.9523	20.1209	20.1544	20.1516	20.0596	19.6024	18.9026	18.3132 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3614	18.6748	19.0889	19.5972	19.9523	20.1209	20.1544	20.1516	20.0596	19.6024	18.9026	18.3132 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9781	0.9595	0.9268	0.8507	0.7180	0.5278	0.3652	0.4095	0.6534	0.8800	0.9606	0.9817 (94)
Useful gains	829.6712	962.5128	1034.2158	1056.0048	945.1213	686.9894	455.4678	477.4534	707.9322	839.0188	815.3951	791.6247 (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	1864.7866	1822.9126	1662.5201	1398.9162	1077.1905	714.4579	459.9752	484.7136	773.8135	1175.1125	1546.3875	1856.3152 (97)
Space heating kWh	770.1258	578.1886	467.4584	246.8962	98.2595	0.0000	0.0000	0.0000	0.0000	250.0537	526.3145	792.1297 (98a)
Space heating requirement - total per year (kWh/year)												3729.4265
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	770.1258	578.1886	467.4584	246.8962	98.2595	0.0000	0.0000	0.0000	0.0000	250.0537	526.3145	792.1297 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3729.4265
Space heating per m2										(98c) / (4) =		30.8217 (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 %)													92.3000 (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	770.1258	578.1886	467.4584	246.8962	98.2595	0.0000	0.0000	0.0000	0.0000	250.0537	526.3145	792.1297	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	834.3725	626.4232	506.4554	267.4932	106.4566	0.0000	0.0000	0.0000	0.0000	270.9141	570.2216	858.2121	(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	251.4726	222.3144	236.2772	208.3062	202.2324	182.5888	180.6092	187.6756	189.5866	210.9397	223.6703	248.8313	(64)
Efficiency of water heater	86.4013	86.1031	85.5602	84.4419	82.5353	79.8000	79.8000	79.8000	79.8000	84.4422	85.9104	79.8000	(216)
Fuel for water heating, kWh/month	291.0518	258.1955	276.1533	246.6857	245.0252	228.8080	226.3273	235.1825	237.5772	249.8036	260.3530	287.7698	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	30.7370	24.6584	22.2021	16.2662	12.5645	10.2653	11.4618	14.8984	19.3516	25.3903	28.6783	31.5913	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-54.1844	-75.1814	-106.3543	-117.5847	-125.0754	-116.0542	-114.5256	-108.8926	-98.7880	-84.9288	-59.1003	-46.9806	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-34.3995	-71.8968	-142.0823	-212.2631	-279.6299	-280.6644	-277.4471	-235.4602	-173.2554	-102.5411	-45.8283	-27.2456	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)

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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	(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	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1											4040.5487	(211)
Space heating fuel - main system 2											0.0000	(213)
Space heating fuel - secondary											0.0000	(215)
Efficiency of water heater											79.8000	
Water heating fuel used											3042.9331	(219)
Space cooling fuel											0.0000	(221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year											86.0000	(231)
Electricity for lighting (calculated in Appendix L)											248.0651	(232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation											-2990.3641	(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											4427.1829	(238)

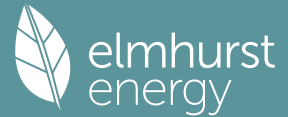
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4040.5487	0.2100	848.5152 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3042.9331	0.2100	639.0160 (264)
Space and water heating			1487.5312 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	248.0651	0.1443	35.8035 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1107.6504	0.1349	-149.4771
PV Unit electricity exported	-1882.7137	0.1260	-237.3101
Total			-386.7872 (269)
Total CO2, kg/year			1148.4767 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.4900 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	4040.5487	1.1300	4565.8201 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3042.9331	1.1300	3438.5145 (278)
Space and water heating			8004.3345 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	248.0651	1.5338	380.4905 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1107.6504	1.4988	-1660.1151
PV Unit electricity exported	-1882.7137	0.4627	-871.1031
Total			-2531.2182 (283)
Total Primary energy kWh/year			5983.7077 (286)
Target Primary Energy Rate (TPER)			49.4500 (287)

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Property Reference	House 2			Issued on Date	16/06/2025
Assessment Reference	001	Prop Type Ref	House 2		
Property	Rear of 164 Harefield Rd, UXBRIDGE, UB8 1PP				
SAP Rating	86 B	DER	11.18	TER	9.53
Environmental	90 B	% DER < TER			-17.31
CO ₂ Emissions (t/year)	1.16	DFEE	36.55	TFEE	37.33
Compliance Check	See BREL	% DFEE < TFEE			2.11
% DPER < TPER	-29.46	DPER	64.28	TPER	49.65
Assessor Details	Mr. Ondrej Gajdos			Assessor ID	W452-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 314.6000 (5)

2. Ventilation rate

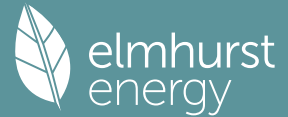
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (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) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1700 (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	0.2167	0.2125	0.2083	0.1870	0.1827	0.1615	0.1615	0.1573	0.1700	0.1827	0.1913	0.1998 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.3162	0.3120	0.3077	0.2865	0.2823	0.2610	0.2610	0.2568	0.2695	0.2823	0.2907	0.2993 (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							
1			3.3600	1.0000	3.3600		(26a)
1			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650	110.0000	6655.0000 (28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724	60.0000	6190.8003 (29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550	9.0000	544.5000 (30)
Total net area of external elements Aum(A, m ²)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	61.0478	(33)
Main dwelling							
pw			47.8400	0.0000	0.0000	110.0000	5262.4000 (32)
iw			216.2000			9.0000	1945.8000 (32c)
if			60.5000			18.0000	1089.0000 (32d)
ic			60.5000			9.0000	544.5000 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 22232.0002 (34)

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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	58.0785	58.3205	58.5645	59.8159	60.0726	61.3901	61.3901	61.6605	60.8562	60.0726	59.5614	59.0587	
alpha	4.8719	4.8880	4.9043	4.9877	5.0048	5.0927	5.0927	5.1107	5.0571	5.0048	4.9708	4.9372	
util living area	0.9858	0.9683	0.9326	0.8371	0.6811	0.4892	0.3550	0.3946	0.6214	0.8790	0.9697	0.9886 (86)	
MIT	19.8715	20.1171	20.4101	20.7427	20.9246	20.9888	20.9982	20.9970	20.9641	20.7170	20.2518	19.8434 (87)	
Th 2	20.1856	20.1887	20.1918	20.2074	20.2106	20.2262	20.2262	20.2294	20.2200	20.2106	20.2043	20.1980 (88)	
util rest of house	0.9827	0.9617	0.9189	0.8080	0.6348	0.4327	0.2931	0.3295	0.5601	0.8498	0.9622	0.9860 (89)	
MIT 2	18.8663	19.1775	19.5424	19.9481	20.1456	20.2189	20.2255	20.2280	20.1940	19.9300	19.3617	18.8398 (90)	
Living area fraction									fLA = Living area / (4) =				0.1388 (91)
MIT	19.0058	19.3079	19.6629	20.0584	20.2537	20.3258	20.3327	20.3348	20.3010	20.0393	19.4853	18.9792 (92)	
Temperature adjustment												-0.1500	
adjusted MIT	18.8558	19.1579	19.5129	19.9084	20.1037	20.1758	20.1827	20.1848	20.1510	19.8893	19.3353	18.8292 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9756	0.9508	0.9051	0.7959	0.6283	0.4290	0.2896	0.3257	0.5544	0.8361	0.9515	0.9800 (94)
Useful gains	823.1423	949.4640	1005.8454	984.4073	824.2224	556.4197	359.9388	378.2224	598.2214	793.3893	803.3878	785.7856 (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	1547.7390	1509.7717	1372.1945	1136.5393	863.9154	560.9012	360.4072	379.0590	614.0371	954.9502	1268.6049	1529.7204 (97)
Space heating kWh	539.0999	376.5268	272.5637	109.5350	29.5316	0.0000	0.0000	0.0000	0.0000	120.2013	334.9563	553.4875 (98a)
Space heating requirement - total per year (kWh/year)												2335.9021
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	539.0999	376.5268	272.5637	109.5350	29.5316	0.0000	0.0000	0.0000	0.0000	120.2013	334.9563	553.4875 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2335.9021
Space heating per m2										(98c) / (4) =		19.3050 (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 %)												88.9000 (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	539.0999	376.5268	272.5637	109.5350	29.5316	0.0000	0.0000	0.0000	0.0000	120.2013	334.9563	553.4875 (98)	
Space heating efficiency (main heating system 1)	88.9000	88.9000	88.9000	88.9000	88.9000	0.0000	0.0000	0.0000	0.0000	88.9000	88.9000	88.9000 (210)	
Space heating fuel (main heating system)	606.4116	423.5397	306.5959	123.2115	33.2189	0.0000	0.0000	0.0000	0.0000	135.2095	376.7787	622.5956 (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	280.2937	247.7244	262.6560	229.5582	221.6238	198.7085	195.3262	203.5936	206.4064	231.3639	247.5066	277.0403 (64)	
Efficiency of water heater (217)m	85.7582	85.2758	84.4609	82.8902	81.2239	80.3000	80.3000	80.3000	80.3000	83.0468	85.0303	85.8336 (217)	
Fuel for water heating, kWh/month	326.8419	290.4980	310.9794	276.9425	272.8554	247.4577	243.2455	253.5413	257.0441	278.5947	291.0804	322.7644 (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	34.6862	31.3295	34.6862	33.5673	34.6862	33.5673	34.6862	34.6862	33.5673	34.6862	33.5673	34.6862 (231)	
Lighting	30.7370	24.6584	22.2021	16.2662	12.5645	10.2653	11.4618	14.8984	19.3516	25.3903	28.6783	31.5913 (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												2627.5614 (211)	
Space heating fuel - main system 2												0.0000 (213)	
Space heating fuel - secondary												0.0000 (215)	
Efficiency of water heater												80.3000	
Water heating fuel used												3371.8454 (219)	
Space cooling fuel												0.0000 (221)	
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												322.4021 (230a)	
central heating pump												41.0000 (230c)	
main heating flue fan												45.0000 (230e)	
Total electricity for the above, kWh/year													408.4021 (231)
Electricity for lighting (calculated in Appendix L)													248.0651 (232)

Energy saving/generation technologies (Appendices M ,N and Q)

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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	6655.8739 (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	2627.5614	0.2100	551.7879 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3371.8454	0.2100	708.0875 (264)
Space and water heating			1259.8754 (265)
Pumps, fans and electric keep-hot	408.4021	0.1387	56.6504 (267)
Energy for lighting	248.0651	0.1443	35.8035 (268)
Total CO2, kg/year			1352.3293 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.1800 (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	2627.5614	1.1300	2969.1444 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3371.8454	1.1300	3810.1853 (278)
Space and water heating			6779.3296 (279)
Pumps, fans and electric keep-hot	408.4021	1.5128	617.8307 (281)
Energy for lighting	248.0651	1.5338	380.4905 (282)
Total Primary energy kWh/year			7777.6508 (286)
Dwelling Primary energy Rate (DPER)			64.2800 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	314.6000 (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	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

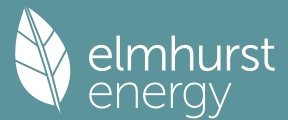
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1271 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3771	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3206 (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	0.4087	0.4007	0.3927	0.3526	0.3446	0.3045	0.3045	0.2965	0.3206	0.3446	0.3606	0.3767 (22b)
Effective ac	0.5835	0.5803	0.5771	0.5622	0.5594	0.5464	0.5464	0.5440	0.5514	0.5594	0.5650	0.5709 (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							
TER Semi-glazed door			3.3600	1.0000	3.3600		(26a)
TER Opening Type			21.4800	1.1450	24.5954		(27)

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ground floor				60.5000	0.1300	7.8650	(28a)
exposed wall	128.0200	24.8400		103.1800	0.1800	18.5724	(29a)
pitched (joists)	60.5000			60.5000	0.1100	6.6550	(30)
Total net area of external elements Aum(A, m2)				249.0200			(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =		61.0478	(33)
Main dwelling							
pw		47.8400	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							183.7355 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				249.0200	0.0500	12.4510	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.4510 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	73.4988 (37)

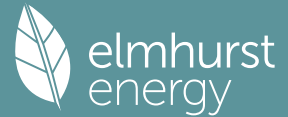
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	60.5810	60.2442	59.9142	58.3638	58.0738	56.7234	56.7234	56.4734	57.2436	58.0738	58.6606	59.2740	(38)
Average = Sum(39)m / 12 =	134.0798	133.7431	133.4130	131.8626	131.5726	130.2223	130.2223	129.9722	130.7424	131.5726	132.1594	132.7728	(39)
												131.8612	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1081	1.1053	1.1026	1.0898	1.0874	1.0762	1.0762	1.0742	1.0805	1.0874	1.0922	1.0973	(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													2.8671 (42)
Hot water usage for mixer showers													
	72.2916	71.2052	69.6221	66.5931	64.3578	61.8650	60.4481	62.0192	63.7415	66.4180	69.5120	72.0146	(42a)
Hot water usage for baths													
	31.2110	30.7475	30.0947	28.8912	27.9900	26.9907	26.4509	27.0991	27.8048	28.8741	30.1024	31.1055	(42b)
Hot water usage for other uses													
	43.9919	42.3922	40.7925	39.1928	37.5931	35.9934	35.9934	37.5931	39.1928	40.7925	42.3922	43.9919	(42c)
Average daily hot water use (litres/day)													135.5806 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	147.4945	144.3449	140.5093	134.6771	129.9409	124.8491	122.8924	126.7114	130.7391	136.0846	142.0067	147.1120	(44)
Energy conte	233.5953	205.5452	215.9576	184.3662	174.9254	153.5165	148.6278	156.8952	161.2144	184.6655	202.3146	230.3419	(45)
Energy content (annual)										Total = Sum(45)m =		2251.9657	
Distribution loss (46)m = 0.15 x (45)m													
	35.0393	30.8318	32.3936	27.6549	26.2388	23.0275	22.2942	23.5343	24.1822	27.6998	30.3472	34.5513	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(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													
	280.1902	247.6309	262.5525	229.4581	221.5203	198.6084	195.2227	203.4901	206.3063	231.2604	247.4064	276.9368	(62)
WWHRS	-33.0487	-29.2285	-30.6064	-25.3433	-23.6191	-20.2110	-18.9446	-20.1457	-20.9111	-24.6519	-27.9276	-32.4367	(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	247.1415	218.4024	231.9461	204.1147	197.9012	178.3974	176.2780	183.3444	185.3952	206.6086	219.4788	244.5001	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2493.5083	(64)
Electric shower(s)												2494	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)
Heat gains from water heating, kWh/month													
	114.9463	102.0124	109.0818	97.3752	95.4386	87.1177	86.6947	89.4436	89.6773	98.6772	103.3431	113.8646	(65)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	143.3548	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.9303	163.7799	147.9303	152.8613	147.9303	152.8613	147.9303	147.9303	152.8613	147.9303	152.8613	147.9303	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	286.5094	289.4824	281.9904	266.0407	245.9071	226.9844	214.3428	211.3698	218.8618	234.8115	254.9451	273.8678	(68)
Pumps, fans	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	37.3355	(69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	-114.6839	(71)
Total internal gains	154.4978	151.8041	146.6154	135.2434	128.2777	120.9968	116.5251	120.2199	124.5518	132.6307	143.5320	153.0438	(72)
	657.9438	674.0729	645.5425	623.1518	591.1216	566.8489	544.8046	545.5263	562.2813	584.3788	620.3448	643.8483	(73)

6. Solar gains													
[Jan]		Area	Solar flux	g	FF	Access	Gains						
		m2	Table 6a	Specific data	Specific data	factor	W						
			W/m2	or Table 6b	or Table 6c	Table 6d							
Southeast		13.8800	36.7938	0.6300	0.7000	0.7700	156.0761	(77)					
Southwest		0.4300	36.7938	0.6300	0.7000	0.7700	4.8352	(79)					
Northwest		7.1700	11.2829	0.6300	0.7000	0.7700	24.7237	(81)					

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Solar gains	185.6350	324.4172	465.6949	613.5807	720.6337	730.1017	697.7871	615.6766	516.5556	364.4315	223.8434	157.8971 (83)
Total gains	843.5788	998.4901	1111.2374	1236.7325	1311.7552	1296.9507	1242.5917	1161.2029	1078.8369	948.8104	844.1882	801.7455 (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	46.0588	46.1748	46.2890	46.8332	46.9365	47.4232	47.4232	47.5144	47.2345	46.9365	46.7281	46.5122
alpha	4.0706	4.0783	4.0859	4.1222	4.1291	4.1615	4.1615	4.1676	4.1490	4.1291	4.1152	4.1008
util living area	0.9882	0.9762	0.9530	0.8920	0.7761	0.6020	0.4510	0.4986	0.7279	0.9202	0.9775	0.9903 (86)
MIT	19.4094	19.6654	20.0080	20.4404	20.7662	20.9400	20.9857	20.9785	20.8669	20.4368	19.8507	19.3701 (87)
Th 2	19.9942	19.9965	19.9987	20.0092	20.0112	20.0203	20.0203	20.0220	20.0168	20.0112	20.0072	20.0030 (88)
util rest of house	0.9854	0.9706	0.9417	0.8663	0.7258	0.5236	0.3552	0.3998	0.6548	0.8955	0.9713	0.9880 (89)
MIT 2	18.1455	18.4708	18.9018	19.4354	19.8048	19.9812	20.0144	20.0124	19.9186	19.4441	18.7160	18.1015 (90)
Living area fraction									fLA =	Living area / (4) =		0.1388 (91)
MIT	18.3210	18.6366	19.0554	19.5749	19.9382	20.1143	20.1493	20.1465	20.0502	19.5819	18.8735	18.2777 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3210	18.6366	19.0554	19.5749	19.9382	20.1143	20.1493	20.1465	20.0502	19.5819	18.8735	18.2777 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9785	0.9602	0.9281	0.8531	0.7217	0.5315	0.3681	0.4128	0.6575	0.8822	0.9614	0.9820 (94)
Useful gains	825.4491	958.7789	1031.3950	1055.0391	946.7211	689.3507	457.4303	479.3013	709.3301	837.0119	811.5754	787.3218 (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	1879.9328	1837.1814	1675.0493	1407.6245	1083.9274	718.0852	462.1953	486.9452	777.9494	1181.7714	1555.9825	1869.1319 (97)
Space heating kWh	784.5359	590.2865	478.8788	253.8615	102.0815	0.0000	0.0000	0.0000	0.0000	256.5010	535.9731	804.8667 (98a)
Space heating requirement - total per year (kWh/year)												3806.9850
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	784.5359	590.2865	478.8788	253.8615	102.0815	0.0000	0.0000	0.0000	0.0000	256.5010	535.9731	804.8667 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3806.9850
Space heating per m2										(98c) / (4) =		31.4627 (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 %)												92.3000 (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	784.5359	590.2865	478.8788	253.8615	102.0815	0.0000	0.0000	0.0000	0.0000	256.5010	535.9731	804.8667 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	849.9847	639.5303	518.8286	275.0396	110.5976	0.0000	0.0000	0.0000	0.0000	277.8993	580.6859	872.0115 (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	247.1415	218.4024	231.9461	204.1147	197.9012	178.3974	176.2780	183.3444	185.3952	206.6086	219.4788	244.5001 (64)
Efficiency of water heater (217)m	86.4640	86.1752	85.6480	84.5500	82.6505	79.8000	79.8000	79.8000	79.8000	84.5460	85.9827	79.8000 (216)
Fuel for water heating, kWh/month	285.8317	253.4400	270.8131	241.4129	239.4434	223.5556	220.8998	229.7549	232.3248	244.3741	255.2593	282.5733 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	30.7370	24.6584	22.2021	16.2662	12.5645	10.2653	11.4618	14.8984	19.3516	25.3903	28.6783	31.5913 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-54.1844	-75.1814	-106.3543	-117.5847	-125.0754	-116.0542	-114.5256	-108.8926	-98.7880	-84.9288	-59.1003	-46.9806 (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	-34.3995	-71.8968	-142.0823	-212.2631	-279.6299	-280.6644	-277.4471	-235.4602	-173.2554	-102.5411	-45.8283	-27.2456 (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												4124.5775 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2979.6829 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

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Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	248.0651 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-2990.3641 (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	4447.9614 (238)

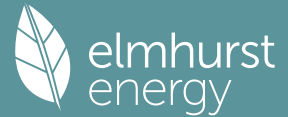
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4124.5775	0.2100	866.1613 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2979.6829	0.2100	625.7334 (264)
Space and water heating			1491.8947 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	248.0651	0.1443	35.8035 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1107.6504	0.1349	-149.4771
PV Unit electricity exported	-1882.7137	0.1260	-237.3101
Total			-386.7872 (269)
Total CO2, kg/year			1152.8402 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.5300 (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	4124.5775	1.1300	4660.7726 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2979.6829	1.1300	3367.0416 (278)
Space and water heating			8027.8142 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	248.0651	1.5338	380.4905 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1107.6504	1.4988	-1660.1151
PV Unit electricity exported	-1882.7137	0.4627	-871.1031
Total			-2531.2182 (283)
Total Primary energy kWh/year			6007.1873 (286)
Target Primary Energy Rate (TPER)			49.6500 (287)

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Property Reference	House 1			Issued on Date	16/06/2025
Assessment Reference	001	Prop Type Ref	House 1		
Property	Rear of 164 Harefield Rd, UXBRIDGE, UB8 1PP				
SAP Rating	86 B	DER	10.93	TER	9.41
Environmental	90 B	% DER < TER			-16.15
CO ₂ Emissions (t/year)	1.14	DFEE	36.14	TFEE	36.80
Compliance Check	See BREL	% DFEE < TFEE			1.78
% DPER < TPER	-27.46	DPER	62.49	TPER	49.03
Assessor Details	Mr. Ondrej Gajdos			Assessor ID	W452-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 314.6000 (5)

2. Ventilation rate

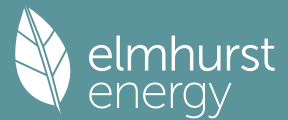
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (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) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1550 (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	0.1976	0.1938	0.1899	0.1705	0.1666	0.1473	0.1473	0.1434	0.1550	0.1666	0.1744	0.1821 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.2971	0.2933	0.2894	0.2700	0.2661	0.2467	0.2467	0.2429	0.2545	0.2661	0.2739	0.2816 (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							
1			3.3600	1.0000	3.3600		(26a)
1			21.4800	1.1450	24.5954		(27)
ground floor			60.5000	0.1300	7.8650	110.0000	6655.0000 (28a)
exposed wall	128.0200	24.8400	103.1800	0.1800	18.5724	60.0000	6190.8003 (29a)
pitched (joists)	60.5000		60.5000	0.1100	6.6550	9.0000	544.5000 (30)
Total net area of external elements Aum(A, m ²)			249.0200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	61.0478	(33)
Main dwelling							
pw			47.8400	0.0000	0.0000	110.0000	5262.4000 (32)
iw			216.2000			9.0000	1945.8000 (32c)
if			60.5000			18.0000	1089.0000 (32d)
ic			60.5000			9.0000	544.5000 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 22232.0002 (34)

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Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K											183.7355 (35)
List of Thermal Bridges											
K1 Element											
E2 Other lintels (including other steel lintels)											
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						Length	Psi-value	Total			
Point Thermal bridges						249.0200	0.0500	12.4510			
Total fabric heat loss						(36a) =				0.0000	
						(33) + (36) + (36a) =				73.4988	

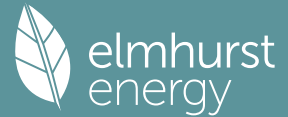
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)											
(38)m											
Heat transfer coeff											
Average = Sum(39)m / 12 =											
HLP											
HLP (average)											
Days in mont											

4. Water heating energy requirements (kWh/year)											
Assumed occupancy											
Hot water usage for mixer showers											
Hot water usage for baths											
Hot water usage for other uses											
Average daily hot water use (litres/day)											
Daily hot water use											
Energy content (annual)											
Distribution loss (46)m = 0.15 x (45)m											
Water storage loss:											
Store volume											
a) If manufacturer declared loss factor is known (kWh/day):											
Temperature factor from Table 2b											
Enter (49) or (54) in (55)											
Total storage loss											
If cylinder contains dedicated solar storage											
Primary loss											
Combi loss											
Total heat required for water heating calculated for each month											
WWHRS											
PV diverter											
Solar input											
FGHRS											
Output from w/h											
12Total per year (kWh/year)											
Electric shower(s)											
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											
Heat gains from water heating, kWh/month											

5. Internal gains (see Table 5 and 5a)											
Metabolic gains (Table 5), Watts											
(66)m											
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5											
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5											
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5											
Pumps, fans											
Losses e.g. evaporation (negative values) (Table 5)											
Water heating gains (Table 5)											
Total internal gains											

6. Solar gains											
[Jan]											
Southeast											
Southwest											
Northwest											
Solar gains											
Total gains											

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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	59.1836	59.4126	59.6435	60.8251	61.0671	62.3064	62.3064	62.5603	61.8047	61.0671	60.5851	60.1106
alpha	4.9456	4.9608	4.9762	5.0550	5.0711	5.1538	5.1538	5.1707	5.1203	5.0711	5.0390	5.0074
util living area	0.9855	0.9674	0.9303	0.8320	0.6736	0.4827	0.3499	0.3891	0.6141	0.8751	0.9689	0.9884 (86)
MIT	19.9064	20.1501	20.4380	20.7592	20.9314	20.9900	20.9984	20.9974	20.9675	20.7326	20.2777	19.8759 (87)
Th 2	20.1996	20.2025	20.2053	20.2196	20.2224	20.2368	20.2368	20.2396	20.2310	20.2224	20.2167	20.2110 (88)
util rest of house	0.9823	0.9606	0.9163	0.8028	0.6279	0.4275	0.2897	0.3257	0.5538	0.8456	0.9612	0.9858 (89)
MIT 2	18.9208	19.2292	19.5871	19.9773	20.1634	20.2303	20.2361	20.2384	20.2076	19.9578	19.4034	18.8906 (90)
Living area fraction	19.0576	19.3571	19.7052	20.0859	20.2700	20.3358	20.3419	20.3438	20.3131	20.0654	19.5248	19.0274 (92)
MIT	18.9076	19.2071	19.5552	19.9359	20.1200	20.1858	20.1919	20.1938	20.1631	19.9154	19.3748	18.8774 (93)
Temperature adjustment												-0.1500
adjusted MIT												

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9753	0.9498	0.9027	0.7910	0.6216	0.4238	0.2862	0.3219	0.5483	0.8322	0.9506	0.9797 (94)
Useful gains	822.8593	948.4394	1003.2053	978.3879	815.5036	549.6736	355.6142	373.7700	591.5802	789.7231	802.5904	785.5999 (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	1524.2455	1487.1261	1351.7554	1120.4681	851.4953	553.6390	356.0189	374.5001	605.8298	942.0414	1251.1943	1507.9051 (97)
Space heating kWh	521.8314	361.9974	259.3213	102.2978	26.7778	0.0000	0.0000	0.0000	0.0000	113.3248	322.9948	537.3950 (98a)
Space heating requirement - total per year (kWh/year)												2245.9402
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	521.8314	361.9974	259.3213	102.2978	26.7778	0.0000	0.0000	0.0000	0.0000	113.3248	322.9948	537.3950 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2245.9402
Space heating per m2										(98c) / (4) =		18.5615 (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 %)													88.9000 (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	521.8314	361.9974	259.3213	102.2978	26.7778	0.0000	0.0000	0.0000	0.0000	113.3248	322.9948	537.3950 (98)	
Space heating efficiency (main heating system 1)	88.9000	88.9000	88.9000	88.9000	88.9000	0.0000	0.0000	0.0000	0.0000	88.9000	88.9000	88.9000 (210)	
Space heating fuel (main heating system)	586.9869	407.1962	291.7000	115.0706	30.1212	0.0000	0.0000	0.0000	0.0000	127.4745	363.3237	604.4938 (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	280.2937	247.7244	262.6560	229.5582	221.6238	198.7085	195.3262	203.5936	206.4064	231.3639	247.5066	277.0403 (64)	
Efficiency of water heater	85.6930	85.1930	84.3541	82.7682	81.1462	80.3000	80.3000	80.3000	80.3000	82.9378	84.9528	80.3000 (216)	
Fuel for water heating, kWh/month	327.0905	290.7803	311.3733	277.3508	273.1166	247.4577	243.2455	253.5413	257.0441	278.9607	291.3460	322.9844 (219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	28.8186	26.0297	28.8186	27.8890	28.8186	27.8890	28.8186	28.8186	27.8890	28.8186	27.8890	28.8186 (231)	
Lighting	30.7370	24.6584	22.2021	16.2662	12.5645	10.2653	11.4618	14.8984	19.3516	25.3903	28.6783	31.5913 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1												2526.3670 (211)	
Space heating fuel - main system 2												0.0000 (213)	
Space heating fuel - secondary												0.0000 (215)	
Efficiency of water heater												80.3000	
Water heating fuel used												3374.2912 (219)	
Space cooling fuel												0.0000 (221)	
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.1000, SFP = 0.6600)													
mechanical ventilation fans (SFP = 0.6600)													253.3159 (230a)
central heating pump													41.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													339.3159 (231)
Electricity for lighting (calculated in Appendix L)													248.0651 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													

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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	6488.0392 (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	2526.3670	0.2100	530.5371 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3374.2912	0.2100	708.6012 (264)
Space and water heating			1239.1382 (265)
Pumps, fans and electric keep-hot	339.3159	0.1387	47.0673 (267)
Energy for lighting	248.0651	0.1443	35.8035 (268)
Total CO2, kg/year			1322.0090 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.9300 (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	2526.3670	1.1300	2854.7947 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3374.2912	1.1300	3812.9491 (278)
Space and water heating			6667.7438 (279)
Pumps, fans and electric keep-hot	339.3159	1.5128	513.3171 (281)
Energy for lighting	248.0651	1.5338	380.4905 (282)
Total Primary energy kWh/year			7561.5514 (286)
Dwelling Primary energy Rate (DPER)			62.4900 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	60.5000 (1b)	x 2.5000 (2b)	= 151.2500 (1b) - (3b)
First floor	60.5000 (1c)	x 2.7000 (2c)	= 163.3500 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	121.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	314.6000 (5)

2. Ventilation rate

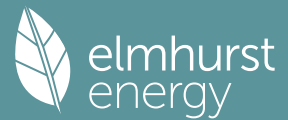
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1271 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3771 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2923 (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	0.3727	0.3654	0.3581	0.3215	0.3142	0.2777	0.2777	0.2704	0.2923	0.3142	0.3288	0.3434 (22b)
Effective ac	0.5694	0.5667	0.5641	0.5517	0.5494	0.5386	0.5386	0.5365	0.5427	0.5494	0.5541	0.5590 (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							
TER Semi-glazed door			3.3600	1.0000	3.3600		(26a)
TER Opening Type			21.4800	1.1450	24.5954		(27)

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ground floor				60.5000	0.1300	7.8650	(28a)
exposed wall	128.0200	24.8400		103.1800	0.1800	18.5724	(29a)
pitched (joists)	60.5000			60.5000	0.1100	6.6550	(30)
Total net area of external elements Aum(A, m2)				249.0200			(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =		61.0478	(33)
Main dwelling							
pw				47.8400	0.0000	0.0000	(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							183.7355 (35)
List of Thermal Bridges							
K1 Element							
E2 Other lintels (including other steel lintels)							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							
Point Thermal bridges							
Total fabric heat loss							

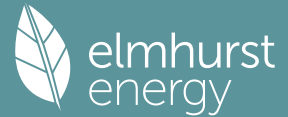
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	59.1182	58.8382	58.5638	57.2750	57.0338	55.9113	55.9113	55.7034	56.3437	57.0338	57.5217	58.0317	(38)
Average = Sum(39)m / 12 =													
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0960	1.0937	1.0914	1.0808	1.0788	1.0695	1.0695	1.0678	1.0731	1.0788	1.0828	1.0870	(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													2.8671 (42)
Hot water usage for mixer showers													
Hot water usage for baths													
Hot water usage for other uses													
Average daily hot water use (litres/day)													
Daily hot water use													
Energy conte													
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss													
If cylinder contains dedicated solar storage													
Primary loss													
Combi loss													
Total heat required for water heating calculated for each month													
WWHRS													
PV diverter													
Solar input													
FGHRS													
Output from w/h													
12Total per year (kWh/year)													
Electric shower(s)													
Heat gains from water heating, kWh/month													

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
(66)m													
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
Pumps, fans													
Losses e.g. evaporation (negative values) (Table 5)													
Water heating gains (Table 5)													
Total internal gains													

6. Solar gains													
[Jan]													
Area													
Solar flux													
Specific data													
Specific data													
Access factor													
Gains W													
Southeast													
Southwest													
Northwest													

Full SAP Calculation Printout



Solar gains	185.6350	324.4172	465.6949	613.5807	720.6337	730.1017	697.7871	615.6766	516.5556	364.4315	223.8434	157.8971 (83)
Total gains	843.5788	998.4901	1111.2374	1236.7325	1311.7552	1296.9507	1242.5917	1161.2029	1078.8369	948.8104	844.1882	801.7455 (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	46.5669	46.6654	46.7623	47.2232	47.3104	47.7208	47.7208	47.7976	47.5619	47.3104	47.1343	46.9515
alpha	4.1045	4.1110	4.1175	4.1482	4.1540	4.1814	4.1814	4.1865	4.1708	4.1540	4.1423	4.1301
util living area	0.9881	0.9759	0.9524	0.8907	0.7735	0.5994	0.4486	0.4962	0.7254	0.9193	0.9774	0.9903 (86)
MIT	19.4326	19.6872	20.0269	20.4524	20.7730	20.9419	20.9863	20.9793	20.8706	20.4470	19.8660	19.3899 (87)
Th 2	20.0041	20.0060	20.0078	20.0166	20.0182	20.0258	20.0258	20.0272	20.0229	20.0182	20.0149	20.0114 (88)
util rest of house	0.9853	0.9703	0.9411	0.8649	0.7233	0.5215	0.3537	0.3981	0.6525	0.8944	0.9711	0.9879 (89)
MIT 2	18.1816	18.5049	18.9318	19.4552	19.8179	19.9880	20.0202	20.0180	19.9275	19.4615	18.7406	18.1324 (90)
Living area fraction	18.3553	18.6690	19.0838	19.5936	19.9505	20.1204	20.1543	20.1514	20.0585	19.5983	18.8969	0.1388 (91)
MIT	18.3553	18.6690	19.0838	19.5936	19.9505	20.1204	20.1543	20.1514	20.0585	19.5983	18.8969	18.3070 (92)
Temperature adjustment	18.3553	18.6690	19.0838	19.5936	19.9505	20.1204	20.1543	20.1514	20.0585	19.5983	18.8969	0.0000
adjusted MIT	18.3553	18.6690	19.0838	19.5936	19.9505	20.1204	20.1543	20.1514	20.0585	19.5983	18.8969	18.3070 (93)

8. Space heating requirement

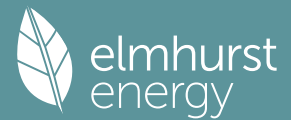
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9785	0.9600	0.9276	0.8518	0.7195	0.5294	0.3665	0.4111	0.6554	0.8813	0.9612	0.9820 (94)
Useful gains	825.4282	958.5792	1030.7692	1053.5100	943.8189	686.6222	455.3951	477.3320	707.0394	836.1863	811.4466	787.3205 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.0000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1863.9715	1822.1509	1661.8512	1398.4460	1076.9611	714.3983	459.9635	484.6942	773.6618	1174.5740	1545.6293	1855.4957 (97)
Space heating kWh	772.6762	580.3202	469.5250	248.3539	99.0578	0.0000	0.0000	0.0000	0.0000	251.7604	528.6115	794.7223 (98a)
Space heating requirement - total per year (kWh/year)												3745.0273
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	772.6762	580.3202	469.5250	248.3539	99.0578	0.0000	0.0000	0.0000	0.0000	251.7604	528.6115	794.7223 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3745.0273
Space heating per m2										(98c) / (4) =		30.9506 (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 %)												92.3000 (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	772.6762	580.3202	469.5250	248.3539	99.0578	0.0000	0.0000	0.0000	0.0000	251.7604	528.6115	794.7223 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	837.1356	628.7326	508.6945	269.0725	107.3216	0.0000	0.0000	0.0000	0.0000	272.7632	572.7102	861.0209 (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	247.1415	218.4024	231.9461	204.1147	197.9012	178.3974	176.2780	183.3444	185.3952	206.6086	219.4788	244.5001 (64)
Efficiency of water heater (217)m	86.4375	86.1434	85.6075	84.5008	82.5923	79.8000	79.8000	79.8000	79.8000	84.5041	85.9558	79.8000 (216)
Fuel for water heating, kWh/month	285.9191	253.5334	270.9412	241.5536	239.6122	223.5556	220.8998	229.7549	232.3248	244.4952	255.3390	282.6439 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	30.7370	24.6584	22.2021	16.2662	12.5645	10.2653	11.4618	14.8984	19.3516	25.3903	28.6783	31.5913 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-54.1844	-75.1814	-106.3543	-117.5847	-125.0754	-116.0542	-114.5256	-108.8926	-98.7880	-84.9288	-59.1003	-46.9806 (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	-34.3995	-71.8968	-142.0823	-212.2631	-279.6299	-280.6644	-277.4471	-235.4602	-173.2554	-102.5411	-45.8283	-27.2456 (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												4057.4510 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2980.5728 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

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Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	248.0651 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-2990.3641 (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	4381.7248 (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	4057.4510	0.2100	852.0647 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2980.5728	0.2100	625.9203 (264)
Space and water heating			1477.9850 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	248.0651	0.1443	35.8035 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1107.6504	0.1349	-149.4771
PV Unit electricity exported	-1882.7137	0.1260	-237.3101
Total			-386.7872 (269)
Total CO2, kg/year			1138.9305 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.4100 (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	4057.4510	1.1300	4584.9196 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2980.5728	1.1300	3368.0473 (278)
Space and water heating			7952.9669 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	248.0651	1.5338	380.4905 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1107.6504	1.4988	-1660.1151
PV Unit electricity exported	-1882.7137	0.4627	-871.1031
Total			-2531.2182 (283)
Total Primary energy kWh/year			5932.3401 (286)
Target Primary Energy Rate (TPER)			49.0300 (287)

Predicted Energy Assessment



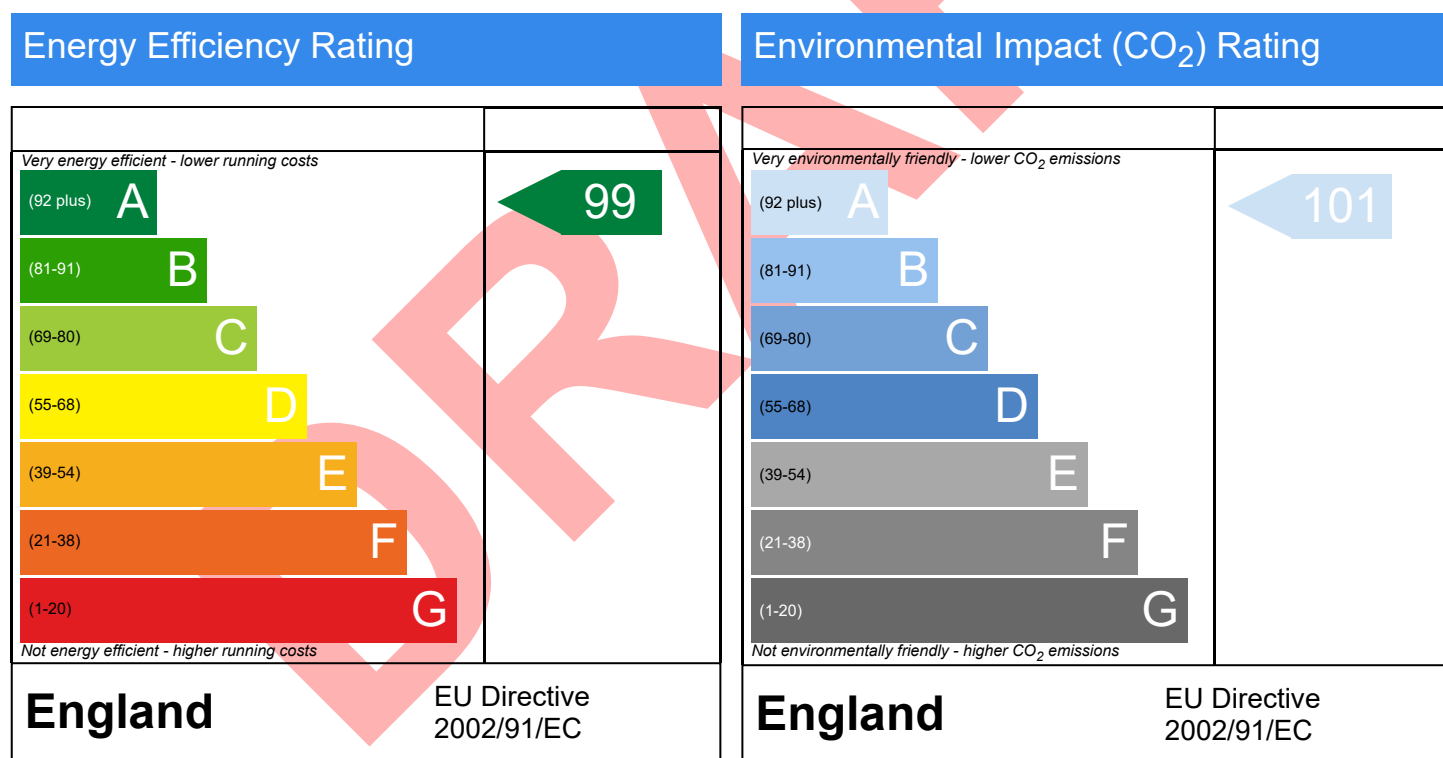
Rear of 164 Harefield Rd, UXBRIDGE, UB8 1PP

Dwelling type:
Date of assessment:
Produced by:
Total floor area:
DRRN:

House, Semi-Detached
03/07/2025
Ondrej Gajdos
121 m²

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

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



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

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

Predicted Energy Assessment



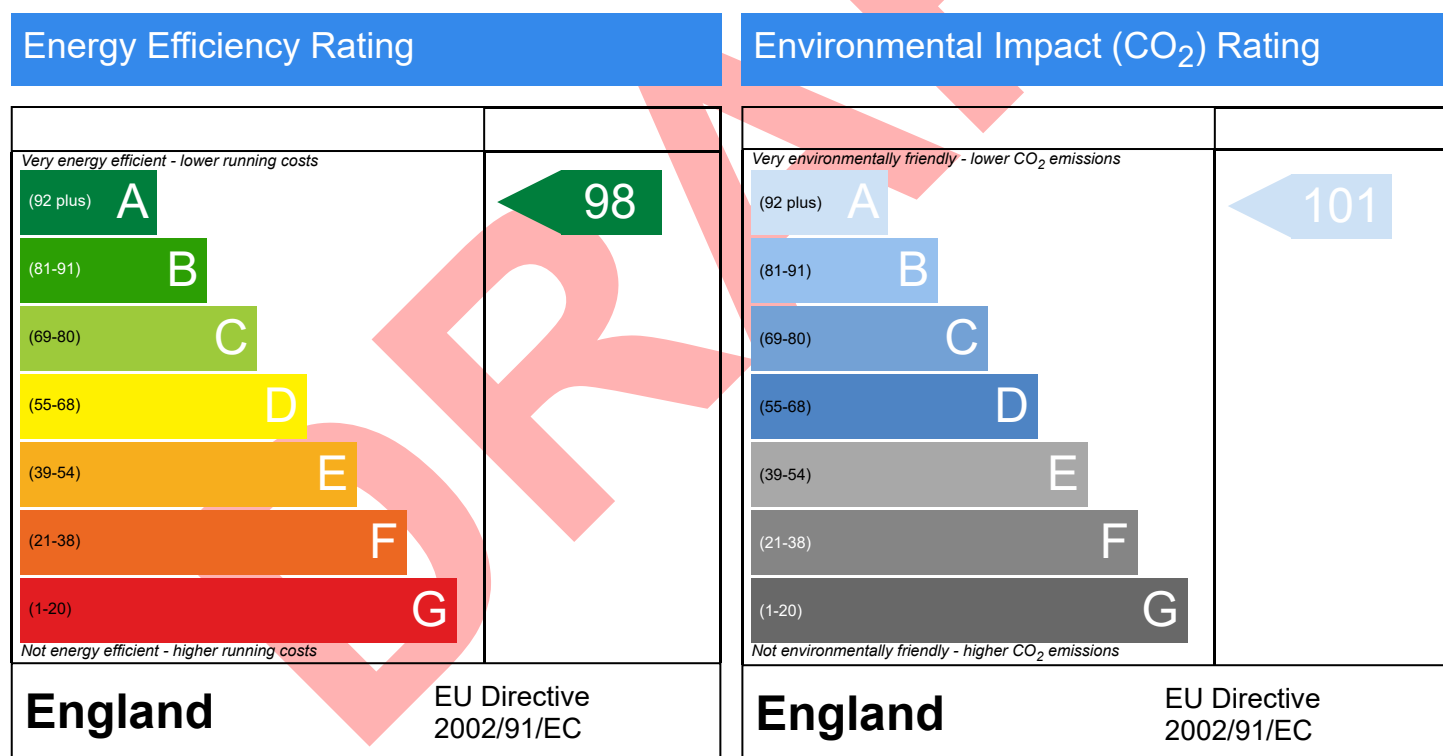
Rear of 164 Harefield Rd, UXBRIDGE, UB8 1PP

Dwelling type:
Date of assessment:
Produced by:
Total floor area:
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House, Semi-Detached
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