



ASSESSMENT HIVE

Energy Statement

Rear Flat, 6 Turnpike Lane London N8 0PT

Property Type: Conversion

Result: COMPLIANCE MET

Calculation Method SAP 10 Software

Date: 10 February 2026

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Executive Summary

Site Description

This Energy and Sustainability Assessment has been prepared to support the planning application for the conversion of a commercial storage area into a flat.

Strategy

The strategy highlights how the proposed development will promote sustainability throughout both design and operation and responds to the UK Planning and regulatory framework, National Planning Policy Framework 2021, the London Plan 2021 and the Haringey Council Local Plan Policy SP4: Working Towards a Low Carbon Haringey, summarising how the relevant targets will be addressed and achieved.

Energy Hierarchy

In accordance with the Energy Hierarchy detailed within The London Plan 2021, this statement outlines an overall commitment to reducing energy consumption under occupancy through the adoption of a 'Fabric First' principle, which will seek to enhance insulation standards and improved heating and lighting efficiencies in comparison to the standard requirements of Approved Document Part L 2021. The viability of district heating will be explored.

Energy Efficiency & Carbon Reduction:

Be 'Lean': Passive design principles including a high level of insulation and reduced air permeability to deliver Part L compliant Building in absence of renewable technologies. It will achieve **12%** reduction in carbon emissions over Part L 2021 baseline.

Be 'Clean': district heating was deemed not viable for this project,

Be 'Green': Air Source Heat Pumps have been proposed for the specific scheme and will deliver a further **67%** reduction in regulated carbon emissions over Part L 2021 baseline,

Material and Waste Management

Minimising the use of virgin materials during construction by recycling and reusing where feasible. Low waste benchmark levels will be targeted during construction with requirements identifying that the diversion of waste from landfill is to be achieved by the contractor.

Recommendation and Results

This report demonstrates that the proposed development can achieve a carbon emission reduction of **80%** over the notional development (see Table 2).

The following tables demonstrate the carbon emissions and savings:

Table 1. Carbon Dioxide emissions after each stage of the Energy Hierarchy

	Carbon Dioxide Emissions for residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	1.9	
After energy demand reduction (be lean)	1.7	
After heat network connection (be clean)	1.7	
After renewable energy (be green)	0.4	

Table 2. Carbon Dioxide Savings from each stage of the Energy Hierarchy

	Regulated residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.2	12%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	1.3	67%
Cumulative on site savings	1.5	80%

Methodology

The Standard Assessment Procedure (SAP) is the UK Government methodology for assessing and calculating the energy performance of dwellings.

The Simplified Building Energy Model (SBEM) is the UK Government methodology for assessing and calculating the energy performance of non-domestic buildings.

SAP and SBEM calculations take into account a range of factors that contribute to energy efficiency, including:

- Materials used for the construction and the thermal insulation of the building fabric (u-values¹ and thermal mass)
- Air permeability
- Efficiency, fuel source, and control of heating and cooling systems
- Ventilation system energy use and heat recovery
- Lighting energy
- Low carbon and energy saving or generating technologies

Approved Document Part L of current Building Regulations addresses the conservation of fuel and power. Part L is divided into two separate documents:

- Part L1 Newly constructed and extended or renovated existing dwellings
- Part L2 Newly constructed and extended or renovated existing non-domestic buildings

To comply with Part L, the calculations should demonstrate how the building will either meet or achieve a percentage reduction in the Building Emission Rate (BER) under the required Target Emission Rate (TER).

The calculation software has been used to calculate a baseline of energy demand and carbon dioxide emissions as appropriate from which any reductions or contributions have been measured.

Planning Policy Context

National Planning Policy Framework (NPPF) 2021

Emphasised the concept of sustainable development by encouraging local authorities to adopt proactive strategies to mitigate and adapt to climate change. It recommends the move to a low carbon future by:

Avoiding increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

Contributing to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

To help increase the use and supply of renewable and low carbon energy and heat, plans should:

- provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
- consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and
- identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for colocating potential heat customers and suppliers.

The London Plan 2021

Policy SI 2 Minimising Greenhouse Gas Emissions:

Major development should be net zero-carbon. Proposals should make the fullest contribution to reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy: i) Be lean: use less energy and manage demand during operation, ii) Be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly, iii) Be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site, iiiii) Be seen: monitor, verify and report on energy performance

Major development proposals should include a detailed energy strategy to demonstrate how the zero-carbon target will be met within the framework of the energy hierarchy.

A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either: i) through a cash in lieu contribution to the borough's carbon offset fund, or ii) off-site provided that an alternative proposal is identified, and delivery is certain.

Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver carbon reductions. The operation of offset funds should be monitored and reported on annually.

Policy 5.3 Sustainable Design and Construction:

Major development proposals should meet minimum standards outlined in the supplementary guidance Sustainable Design and Construction SPG (2014), to consider the following principles:

- Minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems)
- Avoiding internal overheating and contributing to the urban heat island effect
- Efficient use of natural resources (including water), including making the most of natural systems both within and around buildings
- Minimising pollution (including noise, air and urban runoff)
- Minimising the generation of waste and maximising reuse or recycling
- Avoiding impacts from natural hazards (including flooding)
- Ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions,
- Securing sustainable procurement of materials, using local supplies where feasible, and
- Promoting and protecting biodiversity and green infrastructure.

Haringey Local plan - Policy SP4: Working Towards a Low Carbon Haringey

The Haringey Local Planning Policy requirements are as follows.

A 20% CO₂ reduction from on-site renewable technology sources

Energy Strategy

The Energy strategy for the proposed development is based on the Building Regulations Part L; it adopts a set of principles to guide design and decisions regarding energy, balanced with the need to optimise environmental and economic benefits. It seeks to incorporate energy efficiency through the approach detailed below.

Baseline Model

In accordance with London Plan Policy SI 2, a baseline model is run assuming the development complied with Part L 2021 of the Building Regulations. This baseline model is then used in the Energy Strategy process in comparison to the Be 'Lean', Be 'Clean' and Be 'Green' scenarios of the Energy Hierarchy, to establish the regulated CO² emissions from the development.

The baseline model used for this project assumed that any heating and hot water supply would be provided by gas boilers and any active cooling would be provided by electrically powered equipment. The comparative Be 'Lean' model assumes the same heating strategy.

Be 'Lean' – Demand Reduction

In accordance with London Plan Policy SI 2 the development must achieve at least a 10% improvement in energy efficiency on Building Regulations Part L 2021 baseline scenario.

The building fabric performance and engineering systems have been optimised in order to use less energy prior to the inclusion or consideration of Low and Zero Carbon (LZC) Technology.

Through passive design measures, efficient building fabric and engineering systems the building is estimated to achieve **12%** reduction in annual regulated CO₂ emissions over Part L benchmark, therefore demonstrating compliance with Building Regulations Through passive means alone without the utilisation of renewable technologies.

Passive Design Measures

Fabric Performance - The fabric performance values aim to reduce unwanted heat loss and heat gains, whilst maintaining a comfortable internal environment.

The heat loss of different building elements is dependent upon their U –value. A building with low U values provides better levels of insulation and reduced heating demand.

The development will incorporate high levels of insulation and efficient glazing; thereby reduce demand for space heating. The table below shows the U values for the development and the associated improvements over Building Regulations.

Table 3. Energy Efficient Design Specification

Element	Building Regulations Baseline Standards 2021	Specification
Existing Solid Walls	0.30 W/m ² k	0.24 W/m ² k
Existing Floors	0.25 W/m ² k	0.13 W/m ² k
Existing Roofs	0.16 W/m ² k	0.11 W/m ² k
Windows	2.60 W/m ² k	1.20 W/m ² k
Rooflights	2.20 W/m ² k	1.20 W/m ² k

Efficient Lighting and Controls - Throughout the development natural lighting will be optimised. The development will also incorporate low energy light fittings throughout. All light fittings will be specified as low energy lighting and will accommodate LED luminaires only.

Ventilation - The use of natural ventilation is proposed.

Space Heating & Cooling - Space heating will be provided by Air Source Heat Pump.

Domestic Hot Water (DHW) system – from the Air Source Heat Pump.

Be 'Clean' – Supply Energy Efficiently

The Be Clean step of the energy hierarchy refers to the use of 'Clean energy supply'. This includes, but is not limited to, the use of Combined Heat and Power (CHP) and District Heat Networks. Policy SI 3 seeks for new development to promote the use of CHP and district heating.

Policy SI 1 Improving Air Quality

Development Plans, through relevant strategic, site-specific and area-based policies, should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.

To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

Development proposals should not:

- lead to further deterioration of existing poor air quality
- create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits
- create unacceptable risk of high levels of exposure to poor air quality.

In order to meet the requirements in Part 1, as a minimum:

- development proposals must be at least Air Quality Neutral
- development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures
- development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure.

Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development.

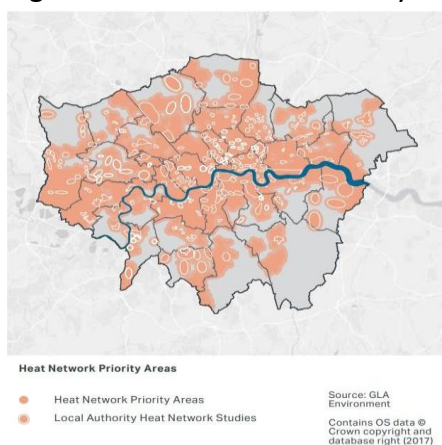
Policy SI 3 Energy Infrastructure

Boroughs and developers should engage at an early stage with relevant energy companies and bodies to establish the future energy and infrastructure requirements arising from large-scale development proposals such as Opportunity Areas, Town Centres, other growth areas or clusters of significant new development.

Development Plans should:

- identify the need for, and suitable sites for, any necessary energy infrastructure requirements including energy centres, energy storage and upgrades to existing infrastructure
- identify existing heating and cooling networks, identify proposed locations for future heating and cooling networks and identify opportunities for expanding and inter-connecting existing networks as well as establishing new networks.

Figure 2: Heat Network Priority Areas - District Heating and Cooling



There is no existing or planned heat and energy network in the vicinity and the site does not fall into an opportunity area with decentralised energy potential as identified in the London Plan.

Community heating and Combined Heat and Power (CHP system)

CHP systems are usually needed where there is a large heat demand (schemes with more than 100- 150 dwellings), usually resulting from the building(s) being in continuous use, or through specific heating requirements such as a swimming pool. Community (or district) heating involves using a central boiler plant (or other heat sources) to heat a number of buildings through a network of well- insulated underground pipes. This system is not considered appropriate for this development

In light of the small scale of the proposed development, it is apparent that the use of CHP is also technically and financially unviable in this instance.

Site-wide communal system/network and design for district network connection

In light of the small scale of the proposed development and its location; it is apparent that the use of a heat pump fed site-wide network is technically and financially unviable.

Be 'Green' – Renewable Energy

Once energy demand reduction measures have been applied, methods for generating low and zero carbon energy can be assessed. The following renewable technologies can be considered for the project: Biomass, Water source heat pump, air source heat pump, Wind energy and solar photovoltaic panels.

Table 4. Renewable Technologies Feasibility Table

Technology	Pros	Cons
Biomass Heating A biomass system designed for wood pellets, which have a high-energy content, would fuel this development.	Less volume of storage Less maintenance and produce considerably less ash residue	Nox Emissions which may impact High Costs Not suitable for the project
Ground Source Heat Pump It circulates a mixture of water and antifreeze around a loop of pipe, called a ground loop, which is buried in the garden. Heat from the ground is absorbed into the fluid and passes through a heat exchanger into the heat pump	Use all through the year	High Costs Not suitable for this project

Air Source Heat Pump They are an efficient and environmentally-friendly way of heating using air drawn freely from the atmosphere. They operate rather like a refrigerator in reverse, absorbing heat from the air into a working fluid which is passed into a compressor where its temperature is increased before it is transferred into the heating and hot water circuits of the building	Can generate less CO ₂ than conventional heating systems. Cheaper Provides heating and hot water Less maintenance	Needs electricity Can be noisy
Wind Turbines Wind turbines are available in various sizes from large rotors able to supply whole communities to small roof or wall-mounted units for individual dwellings.	Cheaper Less CO ₂	Local wind speeds in the area are likely to be below the level generally required for investment in large wind turbines. Noise and signal interference. Detrimental aesthetic impact
Solar Photovoltaic Panels (PV) Photovoltaic panels extract the energy of the sun to generate electricity. They operate most efficiently when oriented to the south and are inclined to about 35 degrees.	Cheaper Less CO ₂ No input power in order to generate electricity.	

Renewable Technologies Feasibility Review Conclusion

The renewable energy sources that have been reviewed for this project are Biomass Heating, Ground Source Heat Pump, Air Source Heat Pump, Domestic Wind Turbine and Solar Photovoltaic Panels (PV).

On review of the above technologies, it has been concluded that the use of air source heat pumps will be incorporated in the design to achieve an additional CO₂ percentage reduction of **67%** to contribute to an overall reduction of **80%** in carbon emissions.

Be 'Seen' – Monitoring Performance

In accordance with London Plan Policy Guidance 'Be Seen' Energy Monitoring 1.2, the following is suggested:

To truly achieve net zero-carbon buildings we need to have a better understanding of their actual operational energy performance. Although Part L calculations and Energy Performance Certificates (EPCs) give an indication of the theoretical performance of buildings, it is well established that there is a 'performance gap' between design theory and measured reality.

To address this gap the London Plan Policy SI 2 'Minimising greenhouse gas emissions' introduces a fourth stage to the energy hierarchy; the 'be seen' stage, which requires monitoring and reporting of the actual operational energy performance of major developments for at least five years via the Mayor's 'be seen' monitoring portal.

The 'be seen' policy establishes post-construction monitoring as good practice, enabling developers and building owners to better understand their buildings and identify methods for improving energy performance from the project inception stage and throughout the building's lifetime.

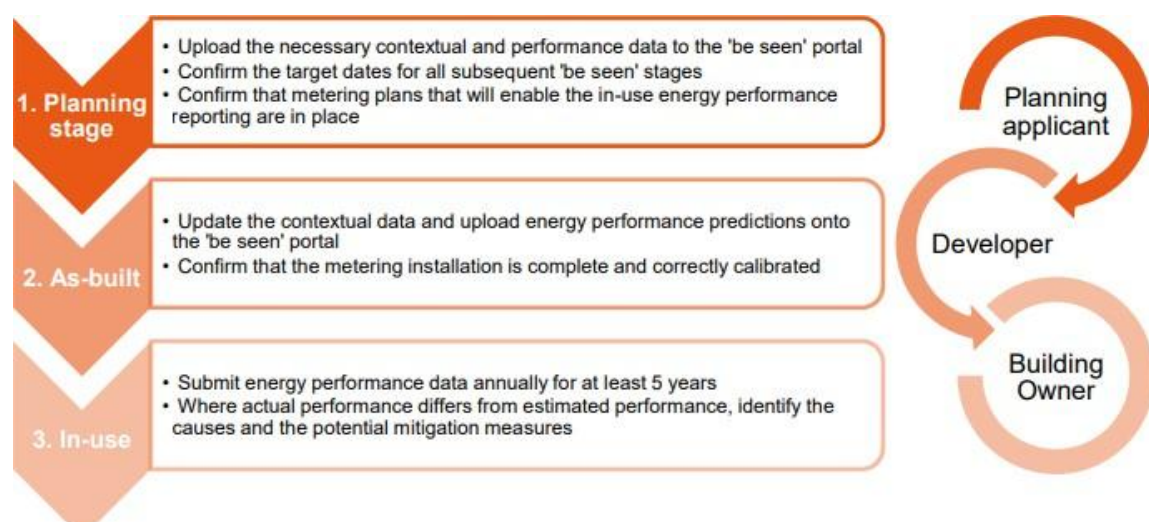
Ensuring that the actual energy and carbon performance of buildings is aligned with the estimated energy and carbon performance will also be a key factor in achieving a zero-carbon London.

The energy performance data that will be collected will provide an evidence base which could help inform future industry-wide benchmarks or performance ratings for major building typologies based on in-use performance.

An effectively implemented post-construction monitoring regime can have a number of benefits including environmental (for example, carbon emissions reduction) and socio-economic (for example, reduced occupants' bills, raised awareness around energy usage).

Figure 3 outlines the 'be seen' process through the reporting stages of a development.

Figure 3: 'Be seen' process and responsibilities.



Smart metering equipment will be installed with display of energy usage and generation to raise awareness of occupants. This can help occupants to reduce demand and subsequent running costs. The GLA spreadsheet informs the planning stage energy performance data including carbon offset. An on-site operational manual will be provided for the occupants on completion of the build to assist residents better understanding of appliances and cost management.

Conclusion

The development has been designed to exceed Part L building regulations requirements. In line with the national and local policies, regulated CO₂ emissions from the development will be reduced by **80%** from the notional emissions once energy efficiency measures and lean measures are taken into account.

The use of air source heat pumps will be incorporated in the design to achieve a CO₂ percentage reduction of **67%** to contribute to the overall reduction of **80%** in carbon emissions.

In order to achieve the required carbon emissions reduction, the report proposes the use of energy efficient measures outlined in the section 4 of this report.

An appraisal of the proposed development has been undertaken against key sustainability objectives identified from relevant policy guidance. The framework for the appraisal was guided by the National Plan. This process has ensured that the development responds to the sustainable development objectives that are relevant to the area. Key sustainability initiatives in ecology, waste management, water, health and wellbeing, materials, pollution and Surface water management have been incorporated in the design of the proposed Development.

Appendix 1

SAP Calculations - Notional

Full SAP Calculation Printout



Plot Reference	Notional Dwelling			Issued on Date	10/02/2026
Assessment Reference	Notional Dwelling	Plot Type Ref	Notional Dwelling		
Plot Address	Garden Flat, 6 Turnpike Lane, LONDON, N8 0PT			SAP Version	10.2
SAP Rating	71 C	DER	42.75	TER	
Environmental	72 C	% DER < TER			N/A
CO ₂ Emissions (t/year)	1.6	DFEE	120.66	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	233.28	TPER	
Assessor Details	Mr. Andreas Andreou			Assessor ID	AC35-0001
Client	Atlas Licensing, Atlas Licensing				

SAP 10 WORKSHEET FOR Conversion (As Built) (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	44.0000 (1b)	2.5000 (2b)	110.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		110.0000 (4)
Dwelling volume			110.0000 (5)

2. Ventilation rate

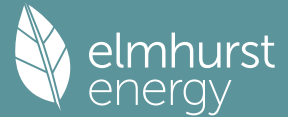
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1818 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9318 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.9318 (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	1.1881	1.1648	1.1415	1.0250	1.0017	0.8852	0.8852	0.8619	0.9318	1.0017	1.0483	1.0949 (22b)
Effective ac	1.1881	1.1648	1.1415	1.0250	1.0017	0.8918	0.8918	0.8715	0.9341	1.0017	1.0483	1.0949 (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												
Windows			5.5800	2.3551	13.1413		(27)					
Rooflights			2.0000	2.0221	4.0441		(27a)					
Heatloss Floor			44.0000	0.1800	7.9200	110.0000	4840.0000 (28a)					
Solid Brick	58.7500	5.5800	53.1700	0.3000	15.9510	190.0000	10102.3000 (29a)					
Flat Roof	44.0000	2.0000	42.0000	0.1500	6.3000	9.0000	378.0000 (30)					
Total net area of external elements Aum(A, m2)			146.7500				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.3564		(33)					
Main dwelling												
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000 (32)					
Internal Wall 1			55.0000			9.0000	495.0000 (32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		18290.3000 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							415.6886 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							29.3500 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss					(33) + (36) + (36a) =		76.7064 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 43.1269	Feb 42.2812	Mar 41.4356	Apr 37.2075	May 36.3619	Jun 32.3728	Jul 32.3728	Aug 31.6341	Sep 33.9094	Oct 36.3619	Nov 38.0531	Dec 39.7444 (38)

Full SAP Calculation Printout



Heat transfer coeff
 119.8333 118.9877 118.1420 113.9139 113.0683 109.0793 109.0793 108.3405 110.6158 113.0683 114.7595 116.4508 (39)
 Average = Sum(39)m / 12 = 113.7782

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	2.7235	2.7043	2.6850	2.5890	2.5697	2.4791	2.4791	2.4623	2.5140	2.5697	2.6082	2.6466 (40)
HLP (average)												2.5859
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.5162 (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 60.1748 59.2811 58.0226 55.7022 53.9647 52.0381 50.9974 52.2471 53.6078 55.6693 58.0376 59.9714 (42b)
 Hot water usage for other uses 31.7451 30.5907 29.4363 28.2820 27.1276 25.9732 25.9732 27.1276 28.2820 29.4363 30.5907 31.7451 (42c)
 Average daily hot water use (litres/day) 84.6507 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	91.9199	89.8718	87.4590	83.9842	81.0923	78.0113	76.9707	79.3747	81.8897	85.1057	88.6282	91.7164 (44)
Energy conte	145.5786	127.9763	134.4212	114.9701	109.1658	95.9240	93.0893	98.2825	100.9782	115.4876	126.2672	143.6058 (45)
Energy content (annual)												1405.7467
Distribution loss (46)m = 0.15 x (45)m	21.8368	19.1964	20.1632	17.2455	16.3749	14.3886	13.9634	14.7424	15.1467	17.3231	18.9401	21.5409 (46)
Water storage loss (or HIU 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	46.8414	41.3657	44.5681	41.4169	41.3237	38.4713	39.2234	40.4485	40.3840	43.3689	43.7071	46.7377 (61)
Total heat required for water heating calculated for each month	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435 (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	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435 (64)
12Total per year (kWh/year)												1914 (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	60.1152	52.8935	55.8371	48.5818	46.6286	41.5126	40.7581	42.7910	43.6713	49.2419	52.9106	59.4333 (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	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	67.7567	75.0164	67.7567	70.0153	67.7567	70.0153	67.7567	67.7567	70.0153	67.7567	70.0153	67.7567 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	131.7082	133.0749	129.6309	122.2988	113.0434	104.3446	98.5333	97.1666	100.6107	107.9427	117.1981	125.8969 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812 (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)	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496 (71)
Water heating gains (Table 5)	80.8000	78.7106	75.0498	67.4747	62.6728	57.6563	54.7823	57.5148	60.6545	66.1853	73.4870	79.8835 (72)
Total internal gains	329.0086	335.5455	321.1810	308.5324	292.2165	277.7598	266.8159	268.1817	277.0241	290.6283	309.4440	322.2807 (73)

6. Solar gains

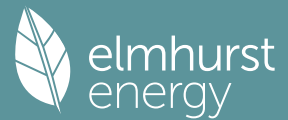
[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W						
West	5.5800	19.6403	0.7600	0.7000	0.7700	40.4042 (80)						
North	2.0000	26.0000	0.6300	0.7000	1.0000	20.6388 (82)						
Solar gains	61.0430	121.9044	206.3710	308.9097	385.0653	396.9245	376.7705	319.3949	242.6757	146.1774	76.5747	49.8962 (83)
Total gains	390.0516	457.4499	527.5520	617.4421	677.2818	674.6843	643.5864	587.5766	519.6998	436.8057	386.0186	372.1770 (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	42.3976	42.6989	43.0045	44.6007	44.9342	46.5775	46.5775	46.8951	45.9305	44.9342	44.2720	43.6291
alpha	3.8265	3.8466	3.8670	3.9734	3.9956	4.1052	4.1052	4.1263	4.0620	3.9956	3.9515	3.9086
util living area	0.9985	0.9969	0.9927	0.9769	0.9310	0.8176	0.6725	0.7337	0.9219	0.9879	0.9972	0.9988 (86)
MIT	18.8312	19.0320	19.3934	19.9426	20.4246	20.7979	20.9350	20.9070	20.6094	19.9826	19.3524	18.8510 (87)
Th 2	18.8946	18.9052	18.9157	18.9696	18.9806	19.0331	19.0331	19.0430	19.0127	18.9806	18.9587	18.9371 (88)
util rest of house	0.9975	0.9950	0.9876	0.9587	0.8695	0.6534	0.4059	0.4741	0.8199	0.9751	0.9951	0.9980 (89)
MIT 2	17.0648	17.2720	17.6381	18.2124	18.6603	18.9742	19.0273	19.0322	18.8514	18.2676	17.6289	17.1135 (90)
Living area fraction									fLA = Living area / (4) =			0.6136 (91)

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MIT	18.1487	18.3520	18.7152	19.2741	19.7429	20.0933	20.1979	20.1827	19.9302	19.3200	18.6865	18.1797 (92)
Temperature adjustment												0.0000
adjusted MIT	18.1487	18.3520	18.7152	19.2741	19.7429	20.0933	20.1979	20.1827	19.9302	19.3200	18.6865	18.1797 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9970	0.9942	0.9869	0.9623	0.8980	0.7537	0.5758	0.6408	0.8785	0.9781	0.9946	0.9976	(94)
Useful gains	388.8799	454.8024	520.6672	594.1650	608.1740	508.5386	370.6087	376.5336	456.5352	427.2359	383.9477	371.2789	(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	1659.5351	1600.6266	1443.1279	1181.7511	909.3988	599.2034	392.4601	409.8172	644.9109	985.9517	1329.6604	1627.9488	(97)
Space heating kWh	945.3675	769.9939	686.3108	423.0620	224.1112	0.0000	0.0000	0.0000	0.0000	415.6845	680.9131	934.9625	(98a)
Space heating requirement - total per year (kWh/year)												5080.4055	
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	945.3675	769.9939	686.3108	423.0620	224.1112	0.0000	0.0000	0.0000	0.0000	415.6845	680.9131	934.9625	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5080.4055	
Space heating per m2											(98c) / (4) =	115.4638	(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 %)													79.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	945.3675	769.9939	686.3108	423.0620	224.1112	0.0000	0.0000	0.0000	0.0000	415.6845	680.9131	934.9625	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	1196.6677	974.6758	868.7478	535.5215	283.6851	0.0000	0.0000	0.0000	0.0000	526.1829	861.9153	1183.4968	(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 requirement	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435	(64)
Efficiency of water heater (217)m	82.3292	82.2213	81.9654	81.3649	80.1368	75.0000	75.0000	75.0000	75.0000	81.3025	82.0335	82.3289	(216)
Fuel for water heating, kWh/month	233.7202	205.9588	218.3717	192.2046	187.7909	179.1938	176.4170	184.9746	188.4830	195.3896	207.2009	231.1988	(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	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938	(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													6430.8930 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													75.0000
Water heating fuel used													2400.9039 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
central heating pump													41.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													86.0000 (231)
Electricity for lighting (calculated in Appendix L)													100.4615 (232)

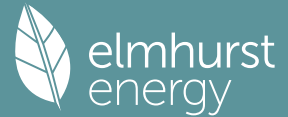
Energy saving/generation technologies (Appendices M ,N and Q)

PV generation													0.0000 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													
Energy saved or generated													-0.0000 (236)
Energy used													0.0000 (237)
Total delivered energy for all uses													9018.2584 (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	6430.8930	0.2100	1350.4875	(261)
Total CO2 associated with community systems			0.0000	(373)

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Water heating (other fuel)	2400.9039	0.2100	504.1898 (264)
Space and water heating			1854.6773 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	100.4615	0.1443	14.4997 (268)
Total CO ₂ , kg/year			1881.1063 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			42.7500 (273)

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

	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	6430.8930	1.1300	7266.9091 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	2400.9039	1.1300	2713.0214 (278)
Space and water heating			9979.9305 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	100.4615	1.5338	154.0913 (282)
Total Primary energy kWh/year			10264.1225 (286)
Dwelling Primary energy Rate (DPER)			233.2800 (287)

SAP 10 WORKSHEET FOR Conversion (As Built) (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	44.0000 (1b)	x 2.5000 (2b)	= 110.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	110.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 20.0000 / (5) = 0.1818 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9318 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.9318 (21)

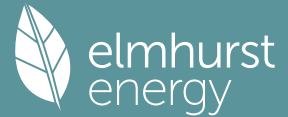
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.1881	1.1648	1.1415	1.0250	1.0017	0.8852	0.8852	0.8619	0.9318	1.0017	1.0483	1.0949 (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	1.1881	1.1648	1.1415	1.0250	1.0017	0.8918	0.8918	0.8715	0.9341	1.0017	1.0483	1.0949 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			5.5800	2.3551	13.1413		(27)
Rooflights			2.0000	2.0221	4.0441		(27a)
Heatloss Floor			44.0000	0.1800	7.9200	110.0000	4840.0000 (28a)
Solid Brick	58.7500	5.5800	53.1700	0.3000	15.9510	190.0000	10102.3000 (29a)
Flat Roof	44.0000	2.0000	42.0000	0.1500	6.3000	9.0000	378.0000 (30)
Total net area of external elements Aum(A, m ²)			146.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.3564		(33)
Main dwelling							
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000 (32)
Internal Wall 1			55.0000			9.0000	495.0000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 18290.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							415.6886 (35)
Thermal bridges (Default value 0.200 * total exposed area)							29.3500 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	76.7064 (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
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(38)m	43.1269	42.2812	41.4356	37.2075	36.3619	32.3728	32.3728	31.6341	33.9094	36.3619	38.0531	39.7444 (38)
Heat transfer coeff	119.8333	118.9877	118.1420	113.9139	113.0683	109.0793	109.0793	108.3405	110.6158	113.0683	114.7595	116.4508 (39)
Average = Sum(39)m / 12 =												113.7782
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	2.7235	2.7043	2.6850	2.5890	2.5697	2.4791	2.4791	2.4623	2.5140	2.5697	2.6082	2.6466 (40)
HLP (average)												2.5859
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.5162 (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	21.4708	21.1519	20.7029	19.8750	19.2550	18.5676	18.1963	18.6422	19.1277	19.8632	20.7082	21.3982 (42b)
Hot water usage for other uses	30.1578	29.0612	27.9645	26.8679	25.7712	24.6746	24.6746	25.7712	26.8679	27.9645	29.0612	30.1578 (42c)
Average daily hot water use (litres/day)												47.3230 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	51.6286	50.2131	48.6674	46.7428	45.0262	43.2421	42.8708	44.4134	45.9955	47.8277	49.7694	51.5560 (44)
Energy conte	81.7671	71.5028	74.8000	63.9886	60.6139	53.1713	51.8485	54.9930	56.7171	64.9018	70.9056	80.7243 (45)
Energy content (annual)										Total = Sum(45)m =		785.9340
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 (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	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)
Total heat required for water heating calculated for each month												
WWHRS	69.5020	60.7774	63.5800	54.3903	51.5219	45.1956	44.0713	46.7441	48.2095	55.1665	60.2698	68.6156 (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	69.5020	60.7774	63.5800	54.3903	51.5219	45.1956	44.0713	46.7441	48.2095	55.1665	60.2698	68.6156 (64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				668.0439 (64a)
Electric shower(s)	39.7548	35.4218	38.6793	36.9112	37.6038	35.8704	37.0661	37.6038	36.9112	38.6793	37.9520	39.7548 (64a)
												452.2084 (64a)
Heat gains from water heating, kWh/month	27.3142	24.0498	25.5648	22.8254	22.2814	20.2665	20.2843	21.0870	21.2802	23.4615	24.5554	27.0926 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	67.7567	75.0164	67.7567	70.0153	67.7567	70.0153	67.7567	67.7567	70.0153	67.7567	70.0153	67.7567 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	131.7082	133.0749	129.6309	122.2988	113.0434	104.3446	98.5333	97.1666	100.6107	107.9427	117.1981	125.8969 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812 (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)	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496 (71)
Water heating gains (Table 5)	36.7126	35.7884	34.3613	31.7019	29.9481	28.1479	27.2639	28.3427	29.5558	31.5342	34.1048	36.4148 (72)
Total internal gains	281.9212	289.6233	277.4925	269.7596	256.4918	248.2514	239.2975	239.0096	245.9253	252.9772	267.0618	275.8120 (73)

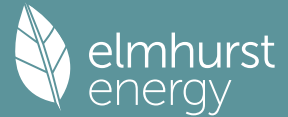
6. Solar gains

[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
West					5.5800	19.6403	0.7600	0.7000			0.7700	40.4042 (80)
North					2.0000	26.0000	0.6300	0.7000			1.0000	20.6388 (82)
Solar gains	61.0430	121.9044	206.3710	308.9097	385.0653	396.9245	376.7705	319.3949	242.6757	146.1774	76.5747	49.8962 (83)
Total gains	342.9642	411.5277	483.8635	578.6693	641.5571	645.1759	616.0680	558.4045	488.6011	399.1547	343.6364	325.7083 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	42.3976	42.6989	43.0045	44.6007	44.9342	46.5775	46.5775	46.8951	45.9305	44.9342	44.2720	43.6291
alpha	3.8265	3.8466	3.8670	3.9734	3.9956	4.1052	4.1052	4.1263	4.0620	3.9956	3.9515	3.9086
util living area	0.9990	0.9979	0.9946	0.9813	0.9408	0.8345	0.6933	0.7567	0.9344	0.9911	0.9982	0.9992 (86)
MIT	18.7682	18.9708	19.3360	19.8944	20.3878	20.7796	20.9271	20.8952	20.5784	19.9335	19.2953	18.7883 (87)
Th 2	18.8946	18.9052	18.9157	18.9696	18.9806	19.0331	19.0331	19.0430	19.0127	18.9806	18.9587	18.9371 (88)
util rest of house	0.9984	0.9965	0.9908	0.9662	0.8856	0.6749	0.4230	0.4964	0.8427	0.9815	0.9967	0.9988 (89)
MIT 2	17.0020	17.2113	17.5819	18.1676	18.6320	18.9667	19.0264	19.0303	18.8317	18.2209	17.5723	17.0510 (90)

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Living area fraction									fLA = Living area / (4) =	0.6136 (91)		
MIT	18.0858	18.2910	18.6583	19.2272	19.7094	20.0792	20.1928	20.1747	19.9035	19.2718	18.6296	18.1171 (92)
Temperature adjustment												0.0000
adjusted MIT	18.0858	18.2910	18.6583	19.2272	19.7094	20.0792	20.1928	20.1747	19.9035	19.2718	18.6296	18.1171 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9981	0.9959	0.9901	0.9688	0.9104	0.7722	0.5960	0.6644	0.8948	0.9835	0.9964	0.9985	(94)
Useful gains	342.3007	409.8536	479.0644	560.5973	584.1035	498.2139	367.1759	370.9899	437.1761	392.5553	342.3992	325.2164	(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	1651.9958	1593.3669	1436.4028	1176.4133	905.6092	597.6653	391.8969	408.9486	641.9596	980.5082	1323.1295	1620.6521	(97)
Space heating kWh	974.4132	795.3209	712.2598	443.3876	239.2002	0.0000	0.0000	0.0000	0.0000	437.4370	706.1258	963.8041	(98a)
Space heating requirement - total per year (kWh/year)												5271.9487	
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	974.4132	795.3209	712.2598	443.3876	239.2002	0.0000	0.0000	0.0000	0.0000	437.4370	706.1258	963.8041	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5271.9487	
Space heating per m2										(98c) / (4) =		119.8170	(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	1025.3450	807.1865	823.3881	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6320	0.7242	0.6698	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	647.9852	584.5820	551.5444	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	702.8871	671.7245	609.9104	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	39.5294	64.8340	43.4243	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	9.8824	16.2085	10.8561	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												36.9469	(107)
Energy for space heating												119.8170	(99)
Energy for space cooling												0.8397	(108)
Total												120.6567	(109)
Fabric Energy Efficiency (DFEE)												120.7	(109)

SAP 10 WORKSHEET FOR Conversion (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

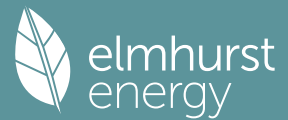
Main dwelling		Area (m2)	Storey height (m)	Volume (m3)	
Ground floor		44.0000 (1b)	x 2.5000 (2b)	=	110.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)		44.0000			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		110.0000 (5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)	
Number of open flues	0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)	
Number of blocked chimneys	0 * 20 =	0.0000 (6f)	
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)	
Number of passive vents	0 * 10 =	0.0000 (7b)	
Number of flueless gas fires	0 * 40 =	0.0000 (7c)	
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1818 (8)
Pressure test		No	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.9318	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.9318 (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	1.1881	1.1648	1.1415	1.0250	1.0017	0.8852	0.8852	0.8619	0.9318	1.0017	1.0483	1.0949	(22b)

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Effective ac 1.1881 1.1648 1.1415 1.0250 1.0017 0.8918 0.8918 0.8715 0.9341 1.0017 1.0483 1.0949 (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													
Windows			5.5800	2.3551	13.1413			(27)					
Rooflights			2.0000	2.0221	4.0441			(27a)					
Heatloss Floor			44.0000	0.1800	7.9200	110.0000	4840.0000	(28a)					
Solid Brick	58.7500	5.5800	53.1700	0.3000	15.9510	190.0000	10102.3000	(29a)					
Flat Roof	44.0000	2.0000	42.0000	0.1500	6.3000	9.0000	378.0000	(30)					
Total net area of external elements Aum(A, m2)			146.7500					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		47.3564			(33)					
Main dwelling													
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000	(32)					
Internal Wall 1			55.0000			9.0000	495.0000	(32c)					
Heat capacity Cm = Sum(A x k)					(28) ... (30) + (32) + (32a) ... (32e) =		18290.3000	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							415.6886	(35)					
Thermal bridges (Default value 0.200 * total exposed area)							29.3500	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	76.7064	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 43.1269	Feb 42.2812	Mar 41.4356	Apr 37.2075	May 36.3619	Jun 32.3728	Jul 32.3728	Aug 31.6341	Sep 33.9094	Oct 36.3619	Nov 38.0531	Dec 39.7444	(38)
Heat transfer coeff	119.8333	118.9877	118.1420	113.9139	113.0683	109.0793	109.0793	108.3405	110.6158	113.0683	114.7595	116.4508	(39)
Average = Sum(39)m / 12 =												113.7782	
HLP	Jan 2.7235	Feb 2.7043	Mar 2.6850	Apr 2.5890	May 2.5697	Jun 2.4791	Jul 2.4791	Aug 2.4623	Sep 2.5140	Oct 2.5697	Nov 2.6082	Dec 2.6466	(40)
HLP (average)												2.5859	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.5162 (42)
Hot water usage for mixer showers													(42a)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													
Hot water usage for baths													(42b)
60.1748 59.2811 58.0226 55.7022 53.9647 52.0381 50.9974 52.2471 53.6078 55.6693 58.0376 59.9714													
Hot water usage for other uses													(42c)
31.7451 30.5907 29.4363 28.2820 27.1276 25.9732 25.9732 27.1276 28.2820 29.4363 30.5907 31.7451													(43)
Average daily hot water use (litres/day)													
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec													
Daily hot water use	91.9199	89.8718	87.4590	83.9842	81.0923	78.0113	76.9707	79.3747	81.8897	85.1057	88.6282	91.7164	(44)
Energy conte	145.5786	127.9763	134.4212	114.9701	109.1658	95.9240	93.0893	98.2825	100.9782	115.4876	126.2672	143.6058	(45)
Energy content (annual)										Total = Sum(45)m =		1405.7467	
Distribution loss (46)m = 0.15 x (45)m													(46)
21.8368 19.1964 20.1632 17.2455 16.3749 14.3886 13.9634 14.7424 15.1467 17.3231 18.9401 21.5409													
Water storage loss (or HIU 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	46.8414	41.3657	44.5681	41.4169	41.3237	38.4713	39.2234	40.4485	40.3840	43.3689	43.7071	46.7377	(61)
Total heat required for water heating calculated for each month													
192.4200 169.3419 178.9893 156.3870 150.4896 134.3953 132.3127 138.7309 141.3622 158.8565 169.9743 190.3435													(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	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435	(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)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													(64a)
Heat gains from water heating, kWh/month	60.1152	52.8935	55.8371	48.5818	46.6286	41.5126	40.7581	42.7910	43.6713	49.2419	52.9106	59.4333	(65)

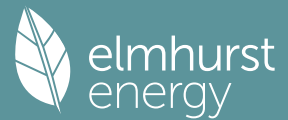
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan 90.9743	Feb 90.9743	Mar 90.9743	Apr 90.9743	May 90.9743	Jun 90.9743	Jul 90.9743	Aug 90.9743	Sep 90.9743	Oct 90.9743	Nov 90.9743	Dec 90.9743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.2214	12.6313	10.2725	7.7769	5.8133	4.9079	5.3031	6.8932	9.2520	11.7476	13.7112	14.6166	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	196.5794	198.6193	193.4789	182.5355	168.7215	155.7382	147.0646	145.0248	150.1652	161.1086	174.9226	187.9058	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	(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)	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	(71)
Water heating gains (Table 5)	80.8000	78.7106	75.0498	67.4747	62.6728	57.6563	54.7823	57.5148	60.6545	66.1853	73.4870	79.8835	(72)
Total internal gains	370.5393	368.8997	357.7396	336.7256	316.1461	294.2409	283.0885	285.3712	296.0102	317.9799	341.0591	361.3444	(73)

6. Solar gains

[Jan] Area Solar flux g FF Access Gains

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m2					Table 6a	Specific data		Specific data		factor		W
					W/m2	or Table 6b		or Table 6c		Table 6d		
West	5.5800				19.6403	0.7600		0.7000		0.7700		40.4042 (80)
North	2.0000				26.0000	0.6300		0.7000		1.0000		20.6388 (82)
Solar gains	61.0430	121.9044	206.3710	308.9097	385.0653	396.9245	376.7705	319.3949	242.6757	146.1774	76.5747	49.8962 (83)
Total gains	431.5823	490.8040	564.1107	645.6353	701.2114	691.1654	659.8590	604.7661	538.6859	464.1573	417.6338	411.2407 (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	42.3976	42.6989	43.0045	44.6007	44.9342	46.5775	46.5775	46.8951	45.9305	44.9342	44.2720	43.6291
alpha	3.8265	3.8466	3.8670	3.9734	3.9956	4.1052	4.1052	4.1263	4.0620	3.9956	3.9515	3.9086
util living area	0.9978	0.9960	0.9908	0.9733	0.9240	0.8081	0.6605	0.7204	0.9138	0.9851	0.9963	0.9982 (86)
MIT	18.8866	19.0763	19.4409	19.9770	20.4483	20.8075	20.9392	20.9133	20.6275	20.0177	19.3948	18.9036 (87)
Th 2	18.8946	18.9052	18.9157	18.9696	18.9806	19.0331	19.0331	19.0430	19.0127	18.9806	18.9587	18.9371 (88)
util rest of house	0.9964	0.9936	0.9846	0.9527	0.8584	0.6418	0.3964	0.4618	0.8059	0.9697	0.9935	0.9971 (89)
MIT 2	17.1199	17.3159	17.6846	18.2440	18.6781	18.9779	19.0278	19.0332	18.8625	18.3006	17.6708	17.1659 (90)
Living area fraction	fLA = Living area / (4) =											0.6136 (91)
MIT	18.2040	18.3961	18.7623	19.3074	19.7644	20.1006	20.2007	20.1869	19.9455	19.3543	18.7287	18.2322 (92)
Temperature adjustment												0.0000
adjusted MIT	18.2040	18.3961	18.7623	19.3074	19.7644	20.1006	20.2007	20.1869	19.9455	19.3543	18.7287	18.2322 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9958	0.9927	0.9839	0.9572	0.8893	0.7435	0.5644	0.6274	0.8682	0.9736	0.9930	0.9966 (94)
Useful gains	429.7598	487.2259	555.0409	618.0063	623.6013	513.8982	372.4265	379.4485	467.6975	451.9205	414.7127	409.8386 (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	1666.1618	1605.8727	1448.6976	1185.5478	911.8237	600.0015	392.7605	410.2773	646.6097	989.8345	1334.5051	1634.0649 (97)
Space heating kWh	919.8831	751.7306	664.8806	408.6299	214.4375	0.0000	0.0000	0.0000	0.0000	400.2080	662.2505	910.8244 (98a)
Space heating requirement - total per year (kWh/year)												4932.8446
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	919.8831	751.7306	664.8806	408.6299	214.4375	0.0000	0.0000	0.0000	0.0000	400.2080	662.2505	910.8244 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4932.8446
Space heating per m2												(98c) / (4) = 112.1101 (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 %)												79.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	919.8831	751.7306	664.8806	408.6299	214.4375	0.0000	0.0000	0.0000	0.0000	400.2080	662.2505	910.8244 (98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000 (210)
Space heating fuel (main heating system)	1164.4090	951.5578	841.6210	517.2530	271.4399	0.0000	0.0000	0.0000	0.0000	506.5924	838.2918	1152.9422 (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	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435 (64)
Water heating requirement	82.2917	82.1868	81.9150	81.2997	80.0392	75.0000	75.0000	75.0000	75.0000	81.2302	81.9905	75.0000 (216)
Efficiency of water heater (217)m	233.8267	206.0453	218.5060	192.3586	188.0199	179.1938	176.4170	184.9746	188.4830	195.5633	207.3097	82.2930 (217)
Fuel for water heating, kWh/month	233.8267	206.0453	218.5060	192.3586	188.0199	179.1938	176.4170	184.9746	188.4830	195.5633	207.3097	231.2997 (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	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)
Pumps and Fa	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938 (232)
Lighting	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 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)
(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 (234a)
(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 (235a)
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)
(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)	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	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)
(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)	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 (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)
(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)	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 (235d)
Annual totals kWh/year												6244.1071 (211)
Space heating fuel - main system 1												0.0000 (213)
Space heating fuel - main system 2												0.0000 (215)
Space heating fuel - secondary												0.0000 (215)

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Efficiency of water heater	75.0000	
Water heating fuel used	2401.9974	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	100.4615	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	8832.5661	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	6244.1071	3.6400	227.2855	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2401.9974	3.6400	87.4327	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	86.0000	16.4900	14.1814	(249)
Energy for lighting	100.4615	16.4900	16.5661	(250)
Additional standing charges			92.0000	(251)
Total energy cost			437.4657	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.7695 (257)
SAP value		71.3160
SAP rating (Section 12)		71 (258)
SAP band		C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	6244.1071	0.2100	1311.2625	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2401.9974	0.2100	504.4195	(264)
Space and water heating			1815.6819	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	100.4615	0.1443	14.4997	(268)
Total CO2, kg/year			1842.1109	(272)
CO2 emissions per m2			41.8700	(273)
EI value			72.2648	
EI rating			72	(274)
EI band			C	

SAP 10 WORKSHEET FOR Conversion (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

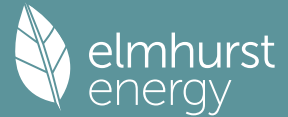
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	44.0000	x 2.5000	= 110.0000	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	110.0000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1818 (8)
Pressure test		No
Pressure Test Method		Blower Door

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Measured/design AP50 15.0000 (17)
Infiltration rate 0.9318 (18)
Number of sides sheltered 0 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.9318 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.6000	4.3000	4.4000	4.0000	4.0000	3.5000	3.6000	3.8000	3.7000	3.9000	3.9000	4.3000
Adj infilt rate	1.1500	1.0750	1.1000	1.0000	1.0000	0.8750	0.9000	0.9500	0.9250	0.9750	0.9750	1.0750
Effective ac	1.0716	1.0017	1.0250	0.9318	0.9318	0.8153	0.8386	0.8852	0.8619	0.9085	0.9085	1.0017
	1.0716	1.0017	1.0250	0.9341	0.9341	0.8324	0.8517	0.8918	0.8715	0.9127	0.9127	1.0017

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							
Windows			5.5800	2.3551	13.1413		(27)
Rooflights			2.0000	2.0221	4.0441		(27a)
Heatloss Floor			44.0000	0.1800	7.9200	110.0000	4840.0000 (28a)
Solid Brick	58.7500	5.5800	53.1700	0.3000	15.9510	190.0000	10102.3000 (29a)
Flat Roof	44.0000	2.0000	42.0000	0.1500	6.3000	9.0000	378.0000 (30)
Total net area of external elements Aum(A, m2)			146.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	47.3564		(33)
Main dwelling							
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000 (32)
Internal Wall 1			55.0000			9.0000	495.0000 (32c)
Heat capacity Cm = Sum(A x k)							(28) ... (30) + (32) + (32a) ... (32e) = 18290.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							415.6886 (35)
Thermal bridges (Default value 0.200 * total exposed area)							29.3500 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	76.7064 (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	38.8987	36.3619	37.2075	33.9094	33.9094	30.2158	30.9151	32.3728	31.6341	33.1313	33.1313	36.3619
Heat transfer coeff	115.6052	113.0683	113.9139	110.6158	110.6158	106.9222	107.6215	109.0793	108.3405	109.8377	109.8377	113.0683
Average = Sum(39)m / 12 =												110.7105
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.6274	2.5697	2.5890	2.5140	2.5140	2.4300	2.4459	2.4791	2.4623	2.4963	2.4963	2.5697
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

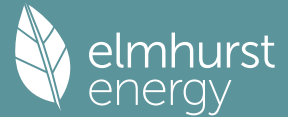
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.5162 (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	60.1748	59.2811	58.0226	55.7022	53.9647	52.0381	50.9974	52.2471	53.6078	55.6693	58.0376	59.9714
Hot water usage for other uses	31.7451	30.5907	29.4363	28.2820	27.1276	25.9732	25.9732	27.1276	28.2820	29.4363	30.5907	31.7451
Average daily hot water use (litres/day)												84.6507 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
91.9199	89.8718	87.4590	83.9842	81.0923	78.0113	76.9707	79.3747	81.8897	85.1057	88.6282	91.7164	(44)
Energy conte	145.5786	127.9763	134.4212	114.9701	109.1658	95.9240	93.0893	98.2825	100.9782	115.4876	126.2672	143.6058
Energy content (annual)										Total = Sum(45)m =		1405.7467 (45)
Distribution loss (46)m = 0.15 x (45)m	21.8368	19.1964	20.1632	17.2455	16.3749	14.3886	13.9634	14.7424	15.1467	17.3231	18.9401	21.5409
Water storage loss (or HIU loss):												(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
If cylinder contains dedicated solar storage												(56)
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
Combi loss	46.8414	41.3657	44.5681	41.4169	41.3237	38.4713	39.2234	40.4485	40.3840	43.3689	43.7071	46.7377
Total heat required for water heating calculated for each month	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435
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
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
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
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
Output from w/h	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435
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
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
Heat gains from water heating, kWh/month	60.1152	52.8935	55.8371	48.5818	46.6286	41.5126	40.7581	42.7910	43.6713	49.2419	52.9106	59.4333

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	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.2214	12.6313	10.2725	7.7769	5.8133	4.9079	5.3031	6.8932	9.2520	11.7476	13.7112	14.6166
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	196.5794	198.6193	193.4789	182.5355	168.7215	155.7382	147.0646	145.0248	150.1652	161.1086	174.9226	187.9058
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137
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
Losses e.g. evaporation (negative values) (Table 5)												

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Water heating gains (Table 5)	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496 (71)
Total internal gains	80.8000	78.7106	75.0498	67.4747	62.6728	57.6563	54.7823	57.5148	60.6545	66.1853	73.4870	79.8835 (72)
	370.5393	368.8997	357.7396	336.7256	316.1461	294.2409	283.0885	285.3712	296.0102	317.9799	341.0591	361.3444 (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			
West				5.5800	21.5869	0.7600	0.7000	0.7700	44.4089 (80)			
North				2.0000	29.0000	0.6300	0.7000	1.0000	23.0202 (82)			
Solar gains	67.4291	120.8166	204.7934	317.2652	381.2222	420.9592	400.8937	347.9755	266.1141	158.1145	87.3427	56.4637 (83)
Total gains	437.9684	489.7163	562.5330	653.9908	697.3683	715.2001	683.9823	633.3467	562.1243	476.0943	428.4019	417.8081 (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	43.9482	44.9342	44.6007	45.9305	45.9305	47.5172	47.2084	46.5775	46.8951	46.2559	46.2559	44.9342
alpha	3.9299	3.9956	3.9734	4.0620	4.0620	4.1678	4.1472	4.1052	4.1263	4.0837	4.0837	3.9956
util living area	0.9971	0.9953	0.9873	0.9577	0.8696	0.6350	0.3883	0.4541	0.8207	0.9721	0.9944	0.9976 (86)
MIT	19.1429	19.3172	19.7065	20.2340	20.6780	20.9477	20.9952	20.9904	20.8290	20.2912	19.6657	19.1589 (87)
Th 2	18.9479	18.9806	18.9696	19.0127	19.0127	19.0620	19.0526	19.0331	19.0430	19.0230	19.0230	18.9806 (88)
util rest of house	0.9952	0.9921	0.9778	0.9226	0.7533	0.3928	0.0869	0.1262	0.6168	0.9391	0.9897	0.9960 (89)
MIT 2	17.4120	17.6077	17.9843	18.5173	18.8814	19.0569	19.0526	19.0331	19.0066	18.5915	17.9849	17.4506 (90)
Living area fraction	17.4120	17.6077	17.9843	18.5173	18.8814	19.0569	19.0526	19.0331	19.0066	18.5915	17.9849	17.4506 (91)
MIT	18.4742	18.6567	19.0411	19.5707	19.9838	20.2172	20.2447	20.2342	20.1249	19.6345	19.0163	18.4989 (92)
Temperature adjustment	18.4742	18.6567	19.0411	19.5707	19.9838	20.2172	20.2447	20.2342	20.1249	19.6345	19.0163	18.4989 (93)
adjusted MIT	18.4742	18.6567	19.0411	19.5707	19.9838	20.2172	20.2447	20.2342	20.1249	19.6345	19.0163	18.4989 (93)

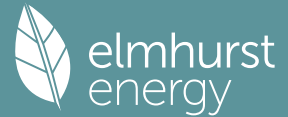
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	435.5710	485.4954	550.3217	611.5240	571.4618	390.2400	187.1248	209.4291	419.5262	453.5944	423.9825	415.8945 (95)
Ext temp.	5.4000	5.8000	7.8000	10.3000	13.4000	16.4000	18.5000	18.3000	15.6000	12.1000	8.3000	5.4000 (96)
Heat loss rate W	1511.4395	1453.6846	1280.5175	1025.4879	728.2757	408.1401	187.7652	210.9781	490.2299	827.5704	1177.0536	1481.0653 (97)
Space heating kWh	800.4461	650.6231	543.2657	298.0540	116.6696	0.0000	0.0000	0.0000	0.0000	278.2382	542.2112	792.4870 (98a)
Space heating requirement - total per year (kWh/year)												4021.9949
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	800.4461	650.6231	543.2657	298.0540	116.6696	0.0000	0.0000	0.0000	0.0000	278.2382	542.2112	792.4870 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4021.9949
Space heating per m2										(98c) / (4) =		91.4090 (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 %)												79.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	800.4461	650.6231	543.2657	298.0540	116.6696	0.0000	0.0000	0.0000	0.0000	278.2382	542.2112	792.4870 (98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000 (210)
Space heating fuel (main heating system)	1013.2229	823.5735	687.6781	377.2836	147.6830	0.0000	0.0000	0.0000	0.0000	352.2002	686.3433	1003.1482 (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	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435 (64)
Efficiency of water heater (217)m	82.0909	81.9686	81.5741	80.6687	78.6815	75.0000	75.0000	75.0000	75.0000	80.4896	81.6612	75.0000 (216)
Fuel for water heating, kWh/month	234.3987	206.5937	219.4193	193.8632	191.2643	179.1938	176.4170	184.9746	188.4830	197.3626	208.1456	231.8656 (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	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938 (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)												

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(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												5091.1328	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												75.0000	
Water heating fuel used												2411.9814	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												100.4615	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												7689.5757	(238)

10a. Fuel costs - using BEDF prices (590)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5091.1328	6.5500	333.4692	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2411.9814	6.5500	157.9848	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	86.0000	28.4300	24.4498	(249)
Energy for lighting	100.4615	28.4300	28.5612	(250)
Additional standing charges			104.0000	(251)
Total energy cost			648.4650	(255)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	5091.1328	0.2100	1069.1379	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2411.9814	0.2100	506.5161	(264)
Space and water heating			1575.6540	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	100.4615	0.1443	14.4997	(268)
Total CO2, kg/year			1602.0829	(272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	5091.1328	1.1300	5752.9800	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2411.9814	1.1300	2725.5390	(278)
Space and water heating			8478.5190	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	100.4615	1.5338	154.0913	(282)
Total Primary energy kWh/year			8762.7111	(286)

SAP 10 EPC IMPROVEMENTS

Notional Dwelling

Current energy efficiency rating:	C 71
Current environmental impact rating:	C 72

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures: (none)	SAP change	Cost change	CO2 change
---------------------------------	------------	-------------	------------

Recommended measures (none)	Typical annual savings	Energy efficiency	Environmental impact
	Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating:	C 71
Potential environmental impact rating:	C 72

Fuel prices for cost data on this page from database revision number 590 TEST (30 Jan 2026)

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Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£53	£53	£0
Mains gas	£595	£595	£0
Space heating	£462	£462	£0
Water heating	£158	£158	£0
Lighting	£29	£29	£0
Total cost of fuels	£648	£648	£0
Total cost of uses	£649	£649	£0
Delivered energy	175 kWh/m ²	175 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	1.6 tonnes	1.6 tonnes	0.0 tonnes
CO2 emissions per m ²	36 kg/m ²	36 kg/m ²	0 kg/m ²
Primary energy	199 kWh/m ²	199 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR Conversion (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	44.0000 (1b)	x 2.5000 (2b)	= 110.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =	110.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 20.0000 / (5) = 0.1818 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9318 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.9318 (21)

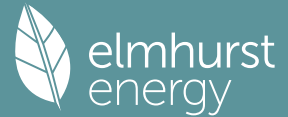
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.1881	1.1648	1.1415	1.0250	1.0017	0.8852	0.8852	0.8619	0.9318	1.0017	1.0483	1.0949 (22b)
Effective ac	1.1881	1.1648	1.1415	1.0250	1.0017	0.8918	0.8918	0.8715	0.9341	1.0017	1.0483	1.0949 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			5.5800	2.3551	13.1413		(27)
Rooflights			2.0000	2.0221	4.0441		(27a)
Heatloss Floor			44.0000	0.1800	7.9200	110.0000	4840.0000 (28a)
Solid Brick	58.7500	5.5800	53.1700	0.3000	15.9510	190.0000	10102.3000 (29a)
Flat Roof	44.0000	2.0000	42.0000	0.1500	6.3000	9.0000	378.0000 (30)
Total net area of external elements Aum(A, m ²)			146.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.3564		(33)
Main dwelling							
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000 (32)
Internal Wall 1			55.0000			9.0000	495.0000 (32c)
Heat capacity Cm = Sum (A x k)							(28)...(30) + (32) + (32a)...(32e) = 18290.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							415.6886 (35)
Thermal bridges (Default value 0.200 * total exposed area)							29.3500 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 76.7064 (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	43.1269	42.2812	41.4356	37.2075	36.3619	32.3728	32.3728	31.6341	33.9094	36.3619	38.0531	39.7444 (38)
Heat transfer coeff	119.8333	118.9877	118.1420	113.9139	113.0683	109.0793	109.0793	108.3405	110.6158	113.0683	114.7595	116.4508 (39)
Average = Sum(39)m / 12 =												113.7782
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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HLP	2.7235	2.7043	2.6850	2.5890	2.5697	2.4791	2.4791	2.4623	2.5140	2.5697	2.6082	2.6466 (40)
HLP (average)												2.5859
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.5162 (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												
60.1748	59.2811	58.0226	55.7022	53.9647	52.0381	50.9974	52.2471	53.6078	55.6693	58.0376	59.9714	(42b)
Hot water usage for other uses												
31.7451	30.5907	29.4363	28.2820	27.1276	25.9732	25.9732	27.1276	28.2820	29.4363	30.5907	31.7451	(42c)
Average daily hot water use (litres/day)												84.6507 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use												
91.9199	89.8718	87.4590	83.9842	81.0923	78.0113	76.9707	79.3747	81.8897	85.1057	88.6282	91.7164	(44)
Energy conte	145.5786	127.9763	134.4212	114.9701	109.1658	95.9240	93.0893	98.2825	100.9782	115.4876	126.2672	143.6058 (45)
Energy content (annual)												Total = Sum(45)m = 1405.7467
Distribution loss (46)m = 0.15 x (45)m												
21.8368	19.1964	20.1632	17.2455	16.3749	14.3886	13.9634	14.7424	15.1467	17.3231	18.9401	21.5409	(46)
Water storage loss (or HIU 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	(59)
Combi loss	46.8414	41.3657	44.5681	41.4169	41.3237	38.4713	39.2234	40.4485	40.3840	43.3689	43.7071	46.7377 (61)
Total heat required for water heating calculated for each month												
192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435	(62)
WWHRS	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	(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	(63c)
FGHRS	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												
192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435	(64)
Electric shower(s)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month												
60.1152	52.8935	55.8371	48.5818	46.6286	41.5126	40.7581	42.7910	43.6713	49.2419	52.9106	59.4333	(65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)

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	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
14.2214	12.6313	10.2725	7.7769	5.8133	4.9079	5.3031	6.8932	9.2520	11.7476	13.7112	14.6166	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
196.5794	198.6193	193.4789	182.5355	168.7215	155.7382	147.0646	145.0248	150.1652	161.1086	174.9226	187.9058	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	(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	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	(71)
Water heating gains (Table 5)												
80.8000	78.7106	75.0498	67.4747	62.6728	57.6563	54.7823	57.5148	60.6545	66.1853	73.4870	79.8835	(72)
Total internal gains												
370.5393	368.8997	357.7396	336.7256	316.1461	294.2409	283.0885	285.3712	296.0102	317.9799	341.0591	361.3444	(73)

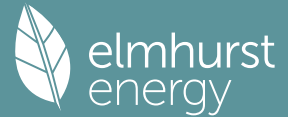
6. Solar gains

[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						
West				5.5800	19.6403	0.7600	0.7000	0.7700	40.4042 (80)						
North				2.0000	26.0000	0.6300	0.7000	1.0000	20.6388 (82)						
Solar gains				61.0430	121.9044	206.3710	308.9097	385.0653	396.9245	376.7705	319.3949	242.6757	146.1774	76.5747	49.8962 (83)
Total gains				431.5823	490.8040	564.1107	645.6353	701.2114	691.1654	659.8590	604.7661	538.6859	464.1573	417.6338	411.2407 (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	42.3976	42.6989	43.0045	44.6007	44.9342	46.5775	46.5775	46.8951	45.9305	44.9342	44.2720	43.6291
alpha	3.8265	3.8466	3.8670	3.9734	3.9956	4.1052	4.1052	4.1263	4.0620	3.9956	3.9515	3.9086
util living area	0.9978	0.9960	0.9908	0.9733	0.9240	0.8081	0.6605	0.7204	0.9138	0.9851	0.9963	0.9982 (86)
MIT	18.8866	19.0763	19.4409	19.9770	20.4483	20.8075	20.9392	20.9133	20.6275	20.0177	19.3948	18.9036 (87)
Th 2	18.8946	18.9052	18.9157	18.9696	18.9806	19.0331	19.0331	19.0430	19.0127	18.9806	18.9587	18.9371 (88)
util rest of house	0.9964	0.9936	0.9846	0.9527	0.8584	0.6418	0.3964	0.4618	0.8059	0.9697	0.9935	0.9971 (89)
MIT 2	17.1199	17.3159	17.6846	18.2440	18.6781	18.9779	19.0278	19.0332	18.8625	18.3006	17.6708	17.1659 (90)
Living area fraction												
	18.2040	18.3961	18.7623	19.3074	19.7644	20.1006	20.2007	20.1869	19.9455	19.3543	18.7287	18.2322 (91)
MIT												
Temperature adjustment												0.0000
adjusted MIT	18.2040	18.3961	18.7623	19.3074	19.7644	20.1006	20.2007	20.1869	19.9455	19.3543	18.7287	18.2322 (93)

Full SAP Calculation Printout



8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9958	0.9927	0.9839	0.9572	0.8893	0.7435	0.5644	0.6274	0.8682	0.9736	0.9930	0.9966	(94)
Useful gains	429.7598	487.2259	555.0409	618.0063	623.6013	513.8982	372.4265	379.4485	467.6975	451.9205	414.7127	409.8386	(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	1666.1618	1605.8727	1448.6976	1185.5478	911.8237	600.0015	392.7605	410.2773	646.6097	989.8345	1334.5051	1634.0649	(97)
Space heating kWh	919.8831	751.7306	664.8806	408.6299	214.4375	0.0000	0.0000	0.0000	0.0000	400.2080	662.2505	910.8244	(98a)
Space heating requirement - total per year (kWh/year)												4932.8446	
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	919.8831	751.7306	664.8806	408.6299	214.4375	0.0000	0.0000	0.0000	0.0000	400.2080	662.2505	910.8244	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4932.8446	
Space heating per m2											(98c) / (4) =	112.1101	(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 %)												79.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	919.8831	751.7306	664.8806	408.6299	214.4375	0.0000	0.0000	0.0000	0.0000	400.2080	662.2505	910.8244	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	1164.4090	951.5578	841.6210	517.2530	271.4399	0.0000	0.0000	0.0000	0.0000	506.5924	838.2918	1152.9422	(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	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435	(64)
Efficiency of water heater (217)m	82.2917	82.1868	81.9150	81.2997	80.0392	75.0000	75.0000	75.0000	75.0000	81.2302	81.9905	75.0000	(216)
Fuel for water heating, kWh/month	233.8267	206.0453	218.5060	192.3586	188.0199	179.1938	176.4170	184.9746	188.4830	195.5633	207.3097	231.2997	(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	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938	(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												6244.1071	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												75.0000	
Water heating fuel used												2401.9974	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												100.4615	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												8832.5661	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	6244.1071	3.6400	227.2855	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2401.9974	3.6400	87.4327	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	86.0000	16.4900	14.1814	(249)
Energy for lighting	100.4615	16.4900	16.5661	(250)
Additional standing charges			92.0000	(251)
Total energy cost			437.4657	(255)

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11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] = 1.7695 (257)
SAP value	71.3160
SAP rating (Section 12)	71 (258)
SAP band	C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	6244.1071	0.2100	1311.2625 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2401.9974	0.2100	504.4195 (264)
Space and water heating			1815.6819 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	100.4615	0.1443	14.4997 (268)
Total CO2, kg/year			1842.1109 (272)
CO2 emissions per m2			41.8700 (273)
EI value			72.2648
EI rating			72 (274)
EI band			C

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	44.0000 (1b)	x 2.5000 (2b)	= 110.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	110.0000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

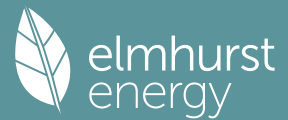
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1818 (8)
Pressure test		No
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.9318 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.9318 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.6000	4.3000	4.4000	4.0000	4.0000	3.5000	3.6000	3.8000	3.7000	3.9000	3.9000	4.3000 (22)
Wind factor	1.1500	1.0750	1.1000	1.0000	1.0000	0.8750	0.9000	0.9500	0.9250	0.9750	0.9750	1.0750 (22a)
Adj infilt rate	1.0716	1.0017	1.0250	0.9318	0.9318	0.8153	0.8386	0.8852	0.8619	0.9085	0.9085	1.0017 (22b)
Effective ac	1.0716	1.0017	1.0250	0.9341	0.9341	0.8324	0.8517	0.8918	0.8715	0.9127	0.9127	1.0017 (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							
Windows			5.5800	2.3551	13.1413		(27)
Rooflights			2.0000	2.0221	4.0441		(27a)
Heatloss Floor			44.0000	0.1800	7.9200	110.0000	4840.0000 (28a)
Solid Brick	58.7500	5.5800	53.1700	0.3000	15.9510	190.0000	10102.3000 (29a)
Flat Roof	44.0000	2.0000	42.0000	0.1500	6.3000	9.0000	378.0000 (30)
Total net area of external elements Aum (A, m2)			146.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.3564		(33)
Main dwelling							
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000 (32)
Internal Wall 1			55.0000			9.0000	495.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		18290.3000 (34)

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Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 415.6886 (35)
 Thermal bridges (Default value 0.200 * total exposed area) 29.3500 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 76.7064 (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 38.8987 36.3619 37.2075 33.9094 33.9094 30.2158 30.9151 32.3728 31.6341 33.1313 33.1313 36.3619 (38)
 Average = Sum(39)m / 12 = 115.6052 113.0683 113.9139 110.6158 110.6158 106.9222 107.6215 109.0793 108.3405 109.8377 109.8377 113.0683 (39)
 110.7105

HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 HLP (average) 2.6274 2.5697 2.5890 2.5140 2.5140 2.4300 2.4459 2.4791 2.4623 2.4963 2.4963 2.5697 (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 1.5162 (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 60.8748 59.2811 58.0226 55.7022 53.9647 52.0381 50.9974 52.2471 53.6078 55.6693 58.0376 59.9714 (42b)
 Hot water usage for other uses 31.7451 30.5907 29.4363 28.2820 27.1276 25.9732 25.9732 27.1276 28.2820 29.4363 30.5907 31.7451 (42c)
 Average daily hot water use (litres/day) 84.6507 (43)
 Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 Energy conte 91.9199 89.8718 87.4590 83.9842 81.0923 78.0113 76.9707 79.3747 81.8897 85.1057 88.6282 91.7164 (44)
 Energy content (annual) 145.5786 127.9763 134.4212 114.9701 109.1658 95.9240 93.0893 98.2825 100.9782 115.4876 126.2672 143.6058 (45)
 Distribution loss (46)m = 0.15 x (45)m Total = Sum(45)m = 1405.7467
 21.8368 19.1964 20.1632 17.2455 16.3749 14.3886 13.9634 14.7424 15.1467 17.3231 18.9401 21.5409 (46)
 Water storage loss (or HIU 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 46.8414 41.3657 44.5681 41.4169 41.3237 38.4713 39.2234 40.4485 40.3840 43.3689 43.7071 46.7377 (61)
 Total heat required for water heating calculated for each month
 WWHRs 192.4200 169.3419 178.9893 156.3870 150.4896 134.3953 132.3127 138.7309 141.3622 158.8565 169.9743 190.3435 (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 192.4200 169.3419 178.9893 156.3870 150.4896 134.3953 132.3127 138.7309 141.3622 158.8565 169.9743 190.3435 (64)
 Total per year (kWh/year) = Sum(64)m = 1913.6033 (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 60.1152 52.8935 55.8371 48.5818 46.6286 41.5126 40.7581 42.7910 43.6713 49.2419 52.9106 59.4333 (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 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 (66)
 Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 14.2214 12.6313 10.2725 7.7769 5.8133 4.9079 5.3031 6.8932 9.2520 11.7476 13.7112 14.6166 (67)
 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 196.5794 198.6193 193.4789 182.5355 168.7215 155.7382 147.0646 145.0248 150.1652 161.1086 174.9226 187.9058 (68)
 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 (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) -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 (71)
 Water heating gains (Table 5) 80.8000 78.7106 75.0498 67.4747 62.6728 57.6563 54.7823 57.5148 60.6545 66.1853 73.4870 79.8835 (72)
 Total internal gains 370.5393 368.8997 357.7396 336.7256 316.1461 294.2409 283.0885 285.3712 296.0102 317.9799 341.0591 361.3444 (73)

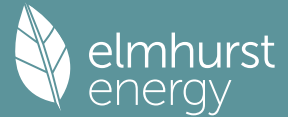
6. Solar gains

[Jan] Area Solar flux g FF Access Gains
 m2 Table 6a Specific data Specific data Access factor W
 or Table 6b or Table 6c Table 6d
 West 5.5800 21.5869 0.7600 0.7000 0.7700 44.4089 (80)
 North 2.0000 29.0000 0.6300 0.7000 1.0000 23.0202 (82)
 Solar gains 67.4291 120.8166 204.7934 317.2652 381.2222 420.9592 400.8937 347.9755 266.1141 158.1145 87.3427 56.4637 (83)
 Total gains 437.9684 489.7163 562.5330 653.9908 697.3683 715.2001 683.9823 633.3467 562.1243 476.0943 428.4019 417.8081 (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 43.9482 44.9342 44.6007 45.9305 45.9305 47.5172 47.2084 46.5775 46.8951 46.2559 46.2559 44.9342
 alpha 3.9299 3.9956 3.9734 4.0620 4.0620 4.1678 4.1472 4.1052 4.1263 4.0837 4.0837 3.9956
 util living area 0.9971 0.9953 0.9873 0.9577 0.8696 0.6350 0.3883 0.4541 0.8207 0.9721 0.9944 0.9976 (86)

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MIT	19.1429	19.3172	19.7065	20.2340	20.6780	20.9477	20.9952	20.9904	20.8290	20.2912	19.6657	19.1589 (87)
Th 2	18.9479	18.9806	18.9696	19.0127	19.0127	19.0620	19.0526	19.0331	19.0430	19.0230	19.0230	18.9806 (88)
util rest of house	0.9952	0.9921	0.9778	0.9226	0.7533	0.3928	0.0869	0.1262	0.6168	0.9391	0.9897	0.9960 (89)
MIT 2	17.4120	17.6077	17.9843	18.5173	18.8814	19.0569	19.0526	19.0331	19.0066	18.5915	17.9849	17.4506 (90)
Living area fraction									fLA = Living area / (4) =			0.6136 (91)
MIT	18.4742	18.6567	19.0411	19.5707	19.9838	20.2172	20.2447	20.2342	20.1249	19.6345	19.0163	18.4989 (92)
Temperature adjustment												0.0000
adjusted MIT	18.4742	18.6567	19.0411	19.5707	19.9838	20.2172	20.2447	20.2342	20.1249	19.6345	19.0163	18.4989 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9945	0.9914	0.9783	0.9351	0.8195	0.5456	0.2736	0.3307	0.7463	0.9527	0.9897	0.9954 (94)
Useful gains	435.5710	485.4954	550.3217	611.5240	571.4618	390.2400	187.1248	209.4291	419.5262	453.5944	423.9825	415.8945 (95)
Ext temp.	5.4000	5.8000	7.8000	10.3000	13.4000	16.4000	18.5000	18.3000	15.6000	12.1000	8.3000	5.4000 (96)
Heat loss rate W	1511.4395	1453.6846	1280.5175	1025.4879	728.2757	408.1401	187.7652	210.9781	490.2299	827.5704	1177.0536	1481.0653 (97)
Space heating kWh	800.4461	650.6231	543.2657	298.0540	116.6696	0.0000	0.0000	0.0000	0.0000	278.2382	542.2112	792.4870 (98a)
Space heating requirement - total per year (kWh/year)												4021.9949
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	800.4461	650.6231	543.2657	298.0540	116.6696	0.0000	0.0000	0.0000	0.0000	278.2382	542.2112	792.4870 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4021.9949
Space heating per m2										(98c) / (4) =		91.4090 (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 %)												79.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	800.4461	650.6231	543.2657	298.0540	116.6696	0.0000	0.0000	0.0000	0.0000	278.2382	542.2112	792.4870 (98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000 (210)
Space heating fuel (main heating system)	1013.2229	823.5735	687.6781	377.2836	147.6830	0.0000	0.0000	0.0000	0.0000	352.2002	686.3433	1003.1482 (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	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435 (64)
Efficiency of water heater (217)m	82.0909	81.9686	81.5741	80.6687	78.6815	75.0000	75.0000	75.0000	75.0000	80.4896	81.6612	75.0000 (216)
Fuel for water heating, kWh/month	234.3987	206.5937	219.4193	193.8632	191.2643	179.1938	176.4170	184.9746	188.4830	197.3626	208.1456	82.0922 (217)
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	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938 (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												5091.1328 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												75.0000
Water heating fuel used												2411.9814 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												41.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												100.4615 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												7689.5757 (238)

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10a. Fuel costs - using BEDF prices (590)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	5091.1328	6.5500	333.4692 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2411.9814	6.5500	157.9848 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	86.0000	28.4300	24.4498 (249)
Energy for lighting	100.4615	28.4300	28.5612 (250)
Additional standing charges			104.0000 (251)
Total energy cost			648.4650 (255)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	5091.1328	0.2100	1069.1379 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2411.9814	0.2100	506.5161 (264)
Space and water heating			1575.6540 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	100.4615	0.1443	14.4997 (268)
Total CO2, kg/year			1602.0829 (272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	5091.1328	1.1300	5752.9800 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2411.9814	1.1300	2725.5390 (278)
Space and water heating			8478.5190 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	100.4615	1.5338	154.0913 (282)
Total Primary energy kWh/year			8762.7111 (286)

Appendix 2

SAP Calculations – Be Lean

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Plot Reference	Be Lean			Issued on Date	10/02/2026
Assessment Reference	Be Lean	Plot Type Ref	Notional Dwelling		
Plot Address	Garden Flat, 6 Turnpike Lane, LONDON, N8 0PT			SAP Version	10.2
SAP Rating	74 C	DER	37.59	TER	
Environmental	76 C	% DER < TER			N/A
CO ₂ Emissions (t/year)	1.4	DFEE	101.37	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	205.49	TPER	
Assessor Details	Mr. Andreas Andreou			Assessor ID	AC35-0001
Client	Atlas Licensing, Atlas Licensing				

SAP 10 WORKSHEET FOR Conversion (As Built) (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	44.0000 (1b)	2.5000 (2b)	110.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		110.0000 (4)
Dwelling volume			110.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1818 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9318 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.9318 (21)

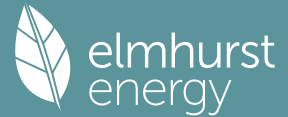
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.1881	1.1648	1.1415	1.0250	1.0017	0.8852	0.8852	0.8619	0.9318	1.0017	1.0483	1.0949 (22b)
Effective ac	1.1881	1.1648	1.1415	1.0250	1.0017	0.8918	0.8918	0.8715	0.9341	1.0017	1.0483	1.0949 (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												
Windows			5.5800	1.1450	6.3893		(27)					
Rooflights			2.0000	1.1450	2.2901		(27a)					
Heatloss Floor			44.0000	0.1300	5.7200	110.0000	4840.0000 (28a)					
Solid Brick	58.7500	5.5800	53.1700	0.2400	12.7608	190.0000	10102.3000 (29a)					
Flat Roof	44.0000	2.0000	42.0000	0.1100	4.6200	9.0000	378.0000 (30)					
Total net area of external elements Aum(A, m2)			146.7500				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.7802		(33)					
Main dwelling												
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000 (32)					
Internal Wall 1			55.0000			9.0000	495.0000 (32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		18290.3000 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							415.6886 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							29.3500 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	61.1302 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 43.1269	Feb 42.2812	Mar 41.4356	Apr 37.2075	May 36.3619	Jun 32.3728	Jul 32.3728	Aug 31.6341	Sep 33.9094	Oct 36.3619	Nov 38.0531	Dec 39.7444 (38)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nill,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	48.7318	49.1303	49.5354	51.6652	52.1134	54.3366	54.3366	54.7693	53.4581	52.1134	51.2247	50.3659
alpha	4.2488	4.2754	4.3024	4.4443	4.4742	4.6224	4.6224	4.6513	4.5639	4.4742	4.4150	4.3577
util living area	0.9987	0.9971	0.9925	0.9732	0.9140	0.7696	0.6075	0.6725	0.9011	0.9867	0.9974	0.9989 (86)
MIT	19.1141	19.3099	19.6500	20.1665	20.5921	20.8866	20.9708	20.9547	20.7326	20.1734	19.5967	19.1392 (87)
Th 2	19.0984	19.1101	19.1218	19.1813	19.1934	19.2513	19.2513	19.2621	19.2288	19.1934	19.1693	19.1454 (88)
util rest of house	0.9978	0.9953	0.9874	0.9533	0.8468	0.6117	0.3823	0.4456	0.7930	0.9733	0.9954	0.9983 (89)
MIT 2	17.4887	17.6921	18.0380	18.5835	18.9708	19.2195	19.2486	19.2569	19.1214	18.6082	18.0213	17.5474 (90)
Living area fraction									fLA = Living area / (4) =			0.6136 (91)

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MIT	18.4861	18.6849	19.0272	19.5549	19.9657	20.2425	20.3054	20.2987	20.1101	19.5687	18.9880	18.5242 (92)
Temperature adjustment												0.0000
adjusted MIT	18.4861	18.6849	19.0272	19.5549	19.9657	20.2425	20.3054	20.2987	20.1101	19.5687	18.9880	18.5242 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9974	0.9947	0.9871	0.9585	0.8806	0.7090	0.5237	0.5890	0.8567	0.9771	0.9951	0.9980	(94)
Useful gains	389.0535	455.0348	520.7394	591.8266	596.3938	478.3229	337.0384	346.1118	445.2408	426.7850	384.1376	371.4278	(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	1479.0039	1425.5133	1284.8616	1047.7745	805.8370	527.5898	346.4651	361.6640	571.1940	874.3737	1179.0927	1444.9463	(97)
Space heating kWh	810.9231	652.1615	568.5069	328.2825	155.8257	0.0000	0.0000	0.0000	0.0000	333.0060	572.3677	798.6977	(98a)
Space heating requirement - total per year (kWh/year)												4219.7712	
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	810.9231	652.1615	568.5069	328.2825	155.8257	0.0000	0.0000	0.0000	0.0000	333.0060	572.3677	798.6977	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4219.7712	
Space heating per m2										(98c) / (4) =		95.9039	(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 %)													79.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	810.9231	652.1615	568.5069	328.2825	155.8257	0.0000	0.0000	0.0000	0.0000	333.0060	572.3677	798.6977	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	1026.4849	825.5209	719.6290	415.5475	197.2477	0.0000	0.0000	0.0000	0.0000	421.5266	724.5160	1011.0098	(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 requirement	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435	(64)
Efficiency of water heater (217)m	82.1104	81.9723	81.6537	80.8688	79.3235	75.0000	75.0000	75.0000	75.0000	80.8659	81.7537	82.1039	(216)
Fuel for water heating, kWh/month	234.3431	206.5844	219.2053	193.3837	189.7163	179.1938	176.4170	184.9746	188.4830	196.4443	207.9102	231.8325	(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	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938	(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													5341.4825 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													75.0000
Water heating fuel used													2408.4881 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
central heating pump													41.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													86.0000 (231)
Electricity for lighting (calculated in Appendix L)													100.4615 (232)

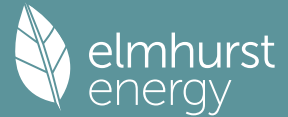
Energy saving/generation technologies (Appendices M ,N and Q)

PV generation		0.0000 (233)
Wind generation		0.0000 (234)
Hydro-electric generation (Appendix N)		0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)		0.0000 (235)
Appendix Q - special features		
Energy saved or generated		-0.0000 (236)
Energy used		0.0000 (237)
Total delivered energy for all uses		7936.4321 (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	5341.4825	0.2100	1121.7113	(261)
Total CO2 associated with community systems			0.0000	(373)

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Water heating (other fuel)	2408.4881	0.2100	505.7825 (264)
Space and water heating			1627.4938 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	100.4615	0.1443	14.4997 (268)
Total CO ₂ , kg/year			1653.9228 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			37.5900 (273)

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

	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	5341.4825	1.1300	6035.8752 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	2408.4881	1.1300	2721.5915 (278)
Space and water heating			8757.4667 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	100.4615	1.5338	154.0913 (282)
Total Primary energy kWh/year			9041.6588 (286)
Dwelling Primary energy Rate (DPER)			205.4900 (287)

SAP 10 WORKSHEET FOR Conversion (As Built) (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	44.0000 (1b)	x 2.5000 (2b)	= 110.0000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 110.0000 (5)
Dwelling volume			

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 20.0000 / (5) = 0.1818 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9318 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.9318 (21)

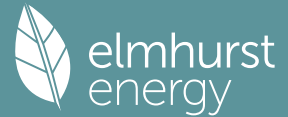
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.1881	1.1648	1.1415	1.0250	1.0017	0.8852	0.8852	0.8619	0.9318	1.0017	1.0483	1.0949 (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	1.1881	1.1648	1.1415	1.0250	1.0017	0.8918	0.8918	0.8715	0.9341	1.0017	1.0483	1.0949 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			5.5800	1.1450	6.3893		(27)
Rooflights			2.0000	1.1450	2.2901		(27a)
Heatloss Floor			44.0000	0.1300	5.7200	110.0000	4840.0000 (28a)
Solid Brick	58.7500	5.5800	53.1700	0.2400	12.7608	190.0000	10102.3000 (29a)
Flat Roof	44.0000	2.0000	42.0000	0.1100	4.6200	9.0000	378.0000 (30)
Total net area of external elements Aum(A, m ²)			146.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.7802		(33)
Main dwelling							
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000 (32)
Internal Wall 1			55.0000			9.0000	495.0000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 18290.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							415.6886 (35)
Thermal bridges (Default value 0.200 * total exposed area)							29.3500 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	61.1302 (37)

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

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(38)m	43.1269	42.2812	41.4356	37.2075	36.3619	32.3728	32.3728	31.6341	33.9094	36.3619	38.0531	39.7444 (38)
Heat transfer coeff	104.2571	103.4114	102.5658	98.3377	97.4921	93.5030	93.5030	92.7643	95.0396	97.4921	99.1833	100.8746 (39)
Average = Sum(39)m / 12 =												98.2020
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	2.3695	2.3503	2.3310	2.2349	2.2157	2.1251	2.1251	2.1083	2.1600	2.2157	2.2542	2.2926 (40)
HLP (average)												2.2319
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.5162 (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	21.4708	21.1519	20.7029	19.8750	19.2550	18.5676	18.1963	18.6422	19.1277	19.8632	20.7082	21.3982 (42b)
Hot water usage for other uses	30.1578	29.0612	27.9645	26.8679	25.7712	24.6746	24.6746	25.7712	26.8679	27.9645	29.0612	30.1578 (42c)
Average daily hot water use (litres/day)												47.3230 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	51.6286	50.2131	48.6674	46.7428	45.0262	43.2421	42.8708	44.4134	45.9955	47.8277	49.7694	51.5560 (44)
Energy conte	81.7671	71.5028	74.8000	63.9886	60.6139	53.1713	51.8485	54.9930	56.7171	64.9018	70.9056	80.7243 (45)
Energy content (annual)										Total = Sum(45)m =		785.9340
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 (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	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)
Total heat required for water heating calculated for each month												
WWHRS	69.5020	60.7774	63.5800	54.3903	51.5219	45.1956	44.0713	46.7441	48.2095	55.1665	60.2698	68.6156 (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	69.5020	60.7774	63.5800	54.3903	51.5219	45.1956	44.0713	46.7441	48.2095	55.1665	60.2698	68.6156 (64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				668.0439 (64a)
Electric shower(s)	39.7548	35.4218	38.6793	36.9112	37.6038	35.8704	37.0661	37.6038	36.9112	38.6793	37.9520	39.7548 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												452.2084 (64a)
Heat gains from water heating, kWh/month	27.3142	24.0498	25.5648	22.8254	22.2814	20.2665	20.2843	21.0870	21.2802	23.4615	24.5554	27.0926 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	67.7567	75.0164	67.7567	70.0153	67.7567	70.0153	67.7567	67.7567	70.0153	67.7567	70.0153	67.7567 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	131.7082	133.0749	129.6309	122.2988	113.0434	104.3446	98.5333	97.1666	100.6107	107.9427	117.1981	125.8969 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812 (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)	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496 (71)
Water heating gains (Table 5)	36.7126	35.7884	34.3613	31.7019	29.9481	28.1479	27.2639	28.3427	29.5558	31.5342	34.1048	36.4148 (72)
Total internal gains	281.9212	289.6233	277.4925	269.7596	256.4918	248.2514	239.2975	239.0096	245.9253	252.9772	267.0618	275.8120 (73)

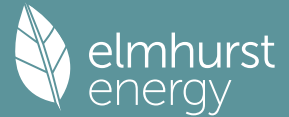
6. Solar gains

[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
West					5.5800	19.6403	0.7600	0.7000			0.7700	40.4042 (80)
North					2.0000	26.0000	0.6300	0.7000			1.0000	20.6388 (82)
Solar gains	61.0430	121.9044	206.3710	308.9097	385.0653	396.9245	376.7705	319.3949	242.6757	146.1774	76.5747	49.8962 (83)
Total gains	342.9642	411.5277	483.8635	578.6693	641.5571	645.1759	616.0680	558.4045	488.6011	399.1547	343.6364	325.7083 (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	48.7318	49.1303	49.5354	51.6652	52.1134	54.3366	54.3366	54.7693	53.4581	52.1134	51.2247	50.3659
alpha	4.2488	4.2754	4.3024	4.4443	4.4742	4.6224	4.6224	4.6513	4.5639	4.4742	4.4150	4.3577
util living area	0.9992	0.9981	0.9946	0.9787	0.9268	0.7899	0.6295	0.6982	0.9174	0.9906	0.9984	0.9994 (86)
MIT	19.0488	19.2465	19.5907	20.1176	20.5574	20.8728	20.9662	20.9471	20.7039	20.1229	19.5375	19.0741 (87)
Th 2	19.0984	19.1101	19.1218	19.1813	19.1934	19.2513	19.2513	19.2621	19.2288	19.1934	19.1693	19.1454 (88)
util rest of house	0.9987	0.9969	0.9909	0.9624	0.8661	0.6343	0.3988	0.4675	0.8193	0.9807	0.9971	0.9990 (89)
MIT 2	17.4236	17.6291	17.9798	18.5386	18.9454	19.2145	19.2481	19.2557	19.1045	18.5605	17.9626	17.4825 (90)

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Living area fraction									fLA = Living area / (4) =		0.6136 (91)
MIT	18.4209	18.6216	18.9683	19.5075	19.9346	20.2321	20.3024	20.2936	20.0860	19.5192	18.4592 (92)
Temperature adjustment											0.0000
adjusted MIT	18.4209	18.6216	18.9683	19.5075	19.9346	20.2321	20.3024	20.2936	20.0860	19.5192	18.4592 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9984	0.9964	0.9904	0.9662	0.8958	0.7300	0.5441	0.6139	0.8766	0.9832	0.9969	0.9988	(94)
Useful gains	342.4247	410.0555	479.2419	559.0972	574.7145	471.0060	335.1935	342.8103	428.3037	392.4328	342.5607	325.3187	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1472.1986	1418.9699	1278.8255	1043.1203	802.8077	526.6193	346.1864	361.1901	568.9051	869.5536	1173.2366	1438.3867	(97)
Space heating kWh	840.5518	677.9905	594.8902	348.4966	169.7013	0.0000	0.0000	0.0000	0.0000	354.9779	598.0867	828.1226	(98a)
Space heating requirement - total per year (kWh/year)												4412.8175	
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	840.5518	677.9905	594.8902	348.4966	169.7013	0.0000	0.0000	0.0000	0.0000	354.9779	598.0867	828.1226	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4412.8175	
Space heating per m2											(98c) / (4) =	100.2913	(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	878.9284	691.9224	705.0087	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7200	0.8097	0.7587	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	632.8530	560.2839	534.9067	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	702.8871	671.7245	609.9104	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	50.4245	82.9118	55.8027	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	12.6061	20.7280	13.9507	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												47.2848	(107)
Energy for space heating												100.2913	(99)
Energy for space cooling												1.0747	(108)
Total												101.3660	(109)
Fabric Energy Efficiency (DFEE)												101.4	(109)

SAP 10 WORKSHEET FOR Conversion (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

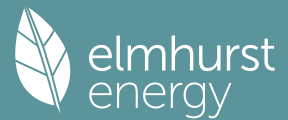
Main dwelling		Area (m2)	Storey height (m)	Volume (m3)	
Ground floor		44.0000 (1b)	x 2.5000 (2b)	= 110.0000 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)		44.0000		(4)	
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	110.0000 (5)	

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)	
Number of open flues	0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)	
Number of blocked chimneys	0 * 20 =	0.0000 (6f)	
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)	
Number of passive vents	0 * 10 =	0.0000 (7b)	
Number of flueless gas fires	0 * 40 =	0.0000 (7c)	
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1818 (8)
Pressure test		No	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.9318	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.9318 (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	1.1881	1.1648	1.1415	1.0250	1.0017	0.8852	0.8852	0.8619	0.9318	1.0017	1.0483	1.0949	(22b)

Full SAP Calculation Printout



Effective ac 1.1881 1.1648 1.1415 1.0250 1.0017 0.8918 0.8918 0.8715 0.9341 1.0017 1.0483 1.0949 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K						
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K						
Windows			5.5800	1.1450	6.3893			(27)					
Rooflights			2.0000	1.1450	2.2901			(27a)					
Heatloss Floor			44.0000	0.1300	5.7200	110.0000	4840.0000	(28a)					
Solid Brick	58.7500	5.5800	53.1700	0.2400	12.7608	190.0000	10102.3000	(29a)					
Flat Roof	44.0000	2.0000	42.0000	0.1100	4.6200	9.0000	378.0000	(30)					
Total net area of external elements Aum(A, m2)			146.7500					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		31.7802			(33)					
Main dwelling													
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000	(32)					
Internal Wall 1			55.0000			9.0000	495.0000	(32c)					
Heat capacity Cm = Sum(A x k)					(28) ... (30) + (32) + (32a) ... (32e) =		18290.3000	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							415.6886	(35)					
Thermal bridges (Default value 0.200 * total exposed area)							29.3500	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss					(33) + (36) + (36a) =		61.1302	(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	43.1269	42.2812	41.4356	37.2075	36.3619	32.3728	32.3728	31.6341	33.9094	36.3619	38.0531	39.7444	(38)
Average = Sum(39)m / 12 =	104.2571	103.4114	102.5658	98.3377	97.4921	93.5030	93.5030	92.7643	95.0396	97.4921	99.1833	100.8746	(39)
												98.2020	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.3695	2.3503	2.3310	2.2349	2.2157	2.1251	2.1251	2.1083	2.1600	2.2157	2.2542	2.2926	(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													1.5162	(42)
Hot water usage for mixer showers														(42a)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
Hot water usage for baths														(42b)
60.1748	59.2811	58.0226	55.7022	53.9647	52.0381	50.9974	52.2471	53.6078	55.6693	58.0376	59.9714			
Hot water usage for other uses														(42c)
31.7451	30.5907	29.4363	28.2820	27.1276	25.9732	25.9732	27.1276	28.2820	29.4363	30.5907	31.7451			(43)
Average daily hot water use (litres/day)														
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Daily hot water use	91.9199	89.8718	87.4590	83.9842	81.0923	78.0113	76.9707	79.3747	81.8897	85.1057	88.6282	91.7164	(44)	
Energy conte	145.5786	127.9763	134.4212	114.9701	109.1658	95.9240	93.0893	98.2825	100.9782	115.4876	126.2672	143.6058	(45)	
Energy content (annual)										Total = Sum(45)m =		1405.7467		
Distribution loss (46)m = 0.15 x (45)m													(46)	
21.8368	19.1964	20.1632	17.2455	16.3749	14.3886	13.9634	14.7424	15.1467	17.3231	18.9401	21.5409			
Water storage loss (or HIU 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													(57)	
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	46.8414	41.3657	44.5681	41.4169	41.3237	38.4713	39.2234	40.4485	40.3840	43.3689	43.7071	46.7377	(61)	
Total heat required for water heating calculated for each month													(62)	
192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435		(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	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435	(64)	
Electric shower(s)													(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	0.0000	(64a)	
Heat gains from water heating, kWh/month													(64a)	
60.1152	52.8935	55.8371	48.5818	46.6286	41.5126	40.7581	42.7910	43.6713	49.2419	52.9106	59.4333		(65)	

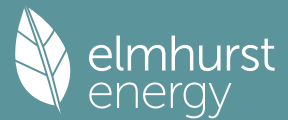
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts														
(66)m	Jan 90.9743	Feb 90.9743	Mar 90.9743	Apr 90.9743	May 90.9743	Jun 90.9743	Jul 90.9743	Aug 90.9743	Sep 90.9743	Oct 90.9743	Nov 90.9743	Dec 90.9743	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													(67)	
14.2214	12.6313	10.2725	7.7769	5.8133	4.9079	5.3031	6.8932	9.2520	11.7476	13.7112	14.6166			
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													(68)	
196.5794	198.6193	193.4789	182.5355	168.7215	155.7382	147.0646	145.0248	150.1652	161.1086	174.9226	187.9058			
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													(69)	
45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137		
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)													(71)	
-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496		
Water heating gains (Table 5)													(72)	
80.8000	78.7106	75.0498	67.4747	62.6728	57.6563	54.7823	57.5148	60.6545	66.1853	73.4870	79.8835			
Total internal gains	370.5393	368.8997	357.7396	336.7256	316.1461	294.2409	283.0885	285.3712	296.0102	317.9799	341.0591	361.3444	(73)	

6. Solar gains

[Jan] Area Solar flux g FF Access Gains

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	m2				Table 6a W/m2	Specific data or Table 6b		Specific data or Table 6c		factor Table 6d	W	
West	5.5800				19.6403	0.7600		0.7000		0.7700	40.4042 (80)	
North	2.0000				26.0000	0.6300		0.7000		1.0000	20.6388 (82)	

Solar gains	61.0430	121.9044	206.3710	308.9097	385.0653	396.9245	376.7705	319.3949	242.6757	146.1774	76.5747	49.8962 (83)
Total gains	431.5823	490.8040	564.1107	645.6353	701.2114	691.1654	659.8590	604.7661	538.6859	464.1573	417.6338	411.2407 (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	48.7318	49.1303	49.5354	51.6652	52.1134	54.3366	54.3366	54.7693	53.4581	52.1134	51.2247	50.3659
alpha	4.2488	4.2754	4.3024	4.4443	4.4742	4.6224	4.6224	4.6513	4.5639	4.4742	4.4150	4.3577
util living area	0.9980	0.9962	0.9904	0.9687	0.9049	0.7583	0.5951	0.6579	0.8906	0.9833	0.9964	0.9984 (86)
MIT	19.1716	19.3558	19.6992	20.2012	20.6141	20.8936	20.9731	20.9586	20.7489	20.2094	19.6406	19.1938 (87)
Th 2	19.0984	19.1101	19.1218	19.1813	19.1934	19.2513	19.2513	19.2621	19.2288	19.1934	19.1693	19.1454 (88)
util rest of house	0.9968	0.9939	0.9840	0.9461	0.8337	0.5996	0.3731	0.4336	0.7770	0.9669	0.9937	0.9975 (89)
MIT 2	17.5459	17.7375	18.0858	18.6149	18.9864	19.2220	19.2488	19.2574	19.1306	18.6418	18.0648	17.6018 (90)
Living area fraction	FLA = Living area / (4) = 0.6136 (91)											
MIT	18.5435	18.7306	19.0758	19.5883	19.9852	20.2477	20.3069	20.3014	20.1236	19.6038	19.0318	18.5787 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.5435	18.7306	19.0758	19.5883	19.9852	20.2477	20.3069	20.3014	20.1236	19.6038	19.0318	18.5787 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9963	0.9932	0.9838	0.9524	0.8700	0.6974	0.5122	0.5751	0.8443	0.9719	0.9935	0.9970 (94)
Useful gains	429.9737	487.4621	554.9537	614.9180	610.0774	482.0262	337.9879	347.7912	454.8085	451.1188	414.9036	410.0263 (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	1484.9845	1430.2390	1289.8502	1051.0614	807.7440	528.0813	346.6095	361.9070	572.4846	877.7948	1183.4339	1450.4441 (97)
Space heating kWh	784.9281	633.5461	546.7630	314.0232	147.0639	0.0000	0.0000	0.0000	0.0000	317.4470	553.3419	774.0709 (98a)
Space heating requirement - total per year (kWh/year)												4071.1840
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	784.9281	633.5461	546.7630	314.0232	147.0639	0.0000	0.0000	0.0000	0.0000	317.4470	553.3419	774.0709 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4071.1840
Space heating per m2												(98c) / (4) = 92.5269 (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 %)													79.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	784.9281	633.5461	546.7630	314.0232	147.0639	0.0000	0.0000	0.0000	0.0000	317.4470	553.3419	774.0709 (98)	
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000 (210)	
Space heating fuel (main heating system)	993.5798	801.9571	692.1050	397.4978	186.1569	0.0000	0.0000	0.0000	0.0000	401.8316	700.4327	979.8365 (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	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435 (64)	
Efficiency of water heater (217)m	82.0613	81.9264	81.5855	80.7775	79.1937	75.0000	75.0000	75.0000	75.0000	80.7675	81.6962	82.0566 (217)	
Fuel for water heating, kWh/month	234.4833	206.7000	219.3887	193.6022	190.0273	179.1938	176.4170	184.9746	188.4830	196.6837	208.0564	231.9662 (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	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938 (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												5153.3975 (211)	
Space heating fuel - main system 2												0.0000 (213)	
Space heating fuel - secondary												0.0000 (215)	

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Efficiency of water heater	75.0000	
Water heating fuel used	2409.9762	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	100.4615	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	7749.8351	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5153.3975	3.6400	187.5837	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2409.9762	3.6400	87.7231	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	86.0000	16.4900	14.1814	(249)
Energy for lighting	100.4615	16.4900	16.5661	(250)
Additional standing charges			92.0000	(251)
Total energy cost			398.0543	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.6101 (257)
SAP value		73.9002
SAP rating (Section 12)		74 (258)
SAP band		C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	5153.3975	0.2100	1082.2135	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2409.9762	0.2100	506.0950	(264)
Space and water heating			1588.3085	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	100.4615	0.1443	14.4997	(268)
Total CO2, kg/year			1614.7374	(272)
CO2 emissions per m2			36.7000	(273)
EI value			75.6882	
EI rating			76	(274)
EI band			C	

SAP 10 WORKSHEET FOR Conversion (As Built) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

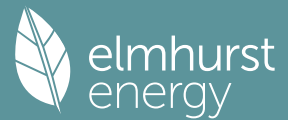
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	44.0000	x 2.5000	= 110.0000	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	110.0000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1818 (8)
Pressure test		No
Pressure Test Method		Blower Door

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Measured/design AP50 15.0000 (17)
Infiltration rate 0.9318 (18)
Number of sides sheltered 0 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.9318 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.6000	4.3000	4.4000	4.0000	4.0000	3.5000	3.6000	3.8000	3.7000	3.9000	3.9000	4.3000 (22)
Adj infilt rate	1.1500	1.0750	1.1000	1.0000	1.0000	0.8750	0.9000	0.9500	0.9250	0.9750	0.9750	1.0750 (22a)
Effective ac	1.0716	1.0017	1.0250	0.9318	0.9318	0.8153	0.8386	0.8852	0.8619	0.9085	0.9085	1.0017 (22b)
	1.0716	1.0017	1.0250	0.9341	0.9341	0.8324	0.8517	0.8918	0.8715	0.9127	0.9127	1.0017 (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							
Windows			5.5800	1.1450	6.3893		(27)
Rooflights			2.0000	1.1450	2.2901		(27a)
Heatloss Floor			44.0000	0.1300	5.7200	110.0000	4840.0000 (28a)
Solid Brick	58.7500	5.5800	53.1700	0.2400	12.7608	190.0000	10102.3000 (29a)
Flat Roof	44.0000	2.0000	42.0000	0.1100	4.6200	9.0000	378.0000 (30)
Total net area of external elements Aum(A, m2)			146.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.7802		(33)
Main dwelling							
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000 (32)
Internal Wall 1			55.0000			9.0000	495.0000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 18290.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							415.6886 (35)
Thermal bridges (Default value 0.200 * total exposed area)							29.3500 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	61.1302 (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	38.8987	36.3619	37.2075	33.9094	33.9094	30.2158	30.9151	32.3728	31.6341	33.1313	33.1313	36.3619 (38)
Average = Sum(39)m / 12 =	100.0289	97.4921	98.3377	95.0396	95.0396	91.3460	92.0453	93.5030	92.7643	94.2614	94.2614	97.4921 (39)
												95.1343

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.2734	2.2157	2.2349	2.1600	2.1600	2.0760	2.0919	2.1251	2.1083	2.1423	2.1423	2.2157 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

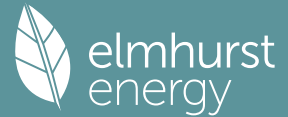
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.5162 (42)
Hot water usage for mixer showers												
Hot water usage for baths	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 other uses	60.1748	59.2811	58.0226	55.7022	53.9647	52.0381	50.9974	52.2471	53.6078	55.6693	58.0376	59.9714 (42b)
Average daily hot water use (litres/day)	31.7451	30.5907	29.4363	28.2820	27.1276	25.9732	25.9732	27.1276	28.2820	29.4363	30.5907	31.7451 (42c)
												84.6507 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	91.9199	89.8718	87.4590	83.9842	81.0923	78.0113	76.9707	79.3747	81.8897	85.1057	88.6282	91.7164 (44)
Energy content (annual)	145.5786	127.9763	134.4212	114.9701	109.1658	95.9240	93.0893	98.2825	100.9782	115.4876	126.2672	143.6058 (45)
Distribution loss (46)m = 0.15 x (45)m	21.8368	19.1964	20.1632	17.2455	16.3749	14.3886	13.9634	14.7424	15.1467	17.3231	18.9401	21.5409 (46)
Water storage loss (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	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)
Total heat required for water heating calculated for each month	46.8414	41.3657	44.5681	41.4169	41.3237	38.4713	39.2234	40.4485	40.3840	43.3689	43.7071	46.7377 (61)
WWHRS	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435 (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	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	60.1152	52.8935	55.8371	48.5818	46.6286	41.5126	40.7581	42.7910	43.6713	49.2419	52.9106	59.4333 (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	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	14.2214	12.6313	10.2725	7.7769	5.8133	4.9079	5.3031	6.8932	9.2520	11.7476	13.7112	14.6166 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	196.5794	198.6193	193.4789	182.5355	168.7215	155.7382	147.0646	145.0248	150.1652	161.1086	174.9226	187.9058 (68)
Pumps, fans	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137 (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)

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Water heating gains (Table 5)	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496 (71)
Total internal gains	80.8000	78.7106	75.0498	67.4747	62.6728	57.6563	54.7823	57.5148	60.6545	66.1853	73.4870	79.8835 (72)
	370.5393	368.8997	357.7396	336.7256	316.1461	294.2409	283.0885	285.3712	296.0102	317.9799	341.0591	361.3444 (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			
West	5.5800		21.5869		0.7600		0.7000		0.7700		44.4089	
North	2.0000		29.0000		0.6300		0.7000		1.0000		23.0202	
Solar gains	67.4291	120.8166	204.7934	317.2652	381.2222	420.9592	400.8937	347.9755	266.1141	158.1145	87.3427	56.4637 (83)
Total gains	437.9684	489.7163	562.5330	653.9908	697.3683	715.2001	683.9823	633.3467	562.1243	476.0943	428.4019	417.8081 (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	50.7917	52.1134	51.6652	53.4581	53.4581	55.6197	55.1972	54.3366	54.7693	53.8994	53.8994	52.1134
alpha	4.3861	4.4742	4.4443	4.5639	4.5639	4.7080	4.6798	4.6224	4.6513	4.5933	4.5933	4.4742
util living area	0.9973	0.9953	0.9861	0.9479	0.8344	0.5667	0.3351	0.3952	0.7726	0.9665	0.9943	0.9978 (86)
MIT	19.4162	19.5898	19.9480	20.4337	20.7997	20.9786	20.9987	20.9969	20.9044	20.4587	19.8978	19.4345 (87)
Th 2	19.1573	19.1934	19.1813	19.2288	19.2288	19.2831	19.2727	19.2513	19.2621	19.2402	19.2402	19.1934 (88)
util rest of house	0.9955	0.9922	0.9761	0.9087	0.7153	0.3661	0.1040	0.1404	0.5799	0.9303	0.9896	0.9963 (89)
MIT 2	17.8322	18.0308	18.3744	18.8661	19.1501	19.2809	19.2727	19.2512	19.2425	18.9112	18.3722	17.8767 (90)
Living area fraction	18.8042	18.9874	19.3400	19.8280	20.1623	20.3227	20.3318	20.3224	20.2623	19.8608	19.3084	18.8326 (92)
Temperature adjustment	18.8042	18.9874	19.3400	19.8280	20.1623	20.3227	20.3318	20.3224	20.2623	19.8608	19.3084	18.8326 (93)
adjusted MIT	18.8042	18.9874	19.3400	19.8280	20.1623	20.3227	20.3318	20.3224	20.2623	19.8608	19.3084	18.8326 (93)

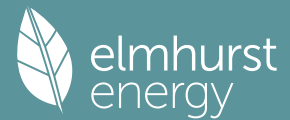
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9950	0.9917	0.9772	0.9248	0.7852	0.4912	0.2462	0.2978	0.7016	0.9466	0.9898	0.9959 (94)
Useful gains	435.7836	485.6576	549.7123	604.8092	547.6082	351.2776	168.4298	188.6064	394.3625	450.6799	424.0476	416.0901 (95)
Ext temp.	5.4000	5.8000	7.8000	10.3000	13.4000	16.4000	18.5000	18.3000	15.6000	12.1000	8.3000	5.4000 (96)
Heat loss rate W	1340.8111	1285.6699	1134.8208	905.5397	642.6900	358.3200	168.6110	189.1037	432.4935	731.5444	1037.6671	1309.5730 (97)
Space heating kWh	673.3405	537.6082	435.3207	216.5260	70.7409	0.0000	0.0000	0.0000	0.0000	208.9632	441.8060	664.7513 (98a)
Space heating requirement - total per year (kWh/year)												3249.0568
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	673.3405	537.6082	435.3207	216.5260	70.7409	0.0000	0.0000	0.0000	0.0000	208.9632	441.8060	664.7513 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3249.0568
Space heating per m2										(98c) / (4) =		73.8422 (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 %)												79.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	673.3405	537.6082	435.3207	216.5260	70.7409	0.0000	0.0000	0.0000	0.0000	208.9632	441.8060	664.7513 (98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000 (210)
Space heating fuel (main heating system)	852.3297	680.5167	551.0389	274.0835	89.5454	0.0000	0.0000	0.0000	0.0000	264.5104	559.2481	841.4573 (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	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435 (64)
Efficiency of water heater (217)m	81.8179	81.6529	81.1622	79.9753	77.6607	75.0000	75.0000	75.0000	75.0000	79.8611	81.2898	81.8146 (217)
Fuel for water heating, kWh/month	235.1809	207.3924	220.5327	195.5441	193.7784	179.1938	176.4170	184.9746	188.4830	198.9160	209.0967	232.6523 (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	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938 (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)												

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(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												4112.7301	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												75.0000	
Water heating fuel used												2422.1618	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												100.4615	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												6721.3534	(238)

10a. Fuel costs - using BEDF prices (590)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	4112.7301	6.5500	269.3838	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2422.1618	6.5500	158.6516	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	86.0000	28.4300	24.4498	(249)
Energy for lighting	100.4615	28.4300	28.5612	(250)
Additional standing charges			104.0000	(251)
Total energy cost			585.0464	(255)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	4112.7301	0.2100	863.6733	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2422.1618	0.2100	508.6540	(264)
Space and water heating			1372.3273	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	100.4615	0.1443	14.4997	(268)
Total CO2, kg/year			1398.7563	(272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	4112.7301	1.1300	4647.3850	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2422.1618	1.1300	2737.0429	(278)
Space and water heating			7384.4279	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	100.4615	1.5338	154.0913	(282)
Total Primary energy kWh/year			7668.6199	(286)

SAP 10 EPC IMPROVEMENTS

Be Lean

Current energy efficiency rating: C 74
Current environmental impact rating: C 76

N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: C 74
Potential environmental impact rating: C 76

Fuel prices for cost data on this page from database revision number 590 TEST (30 Jan 2026)

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Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£53	£53	£0
Mains gas	£532	£532	£0
Space heating	£398	£398	£0
Water heating	£159	£159	£0
Lighting	£29	£29	£0
Total cost of fuels	£585	£585	£0
Total cost of uses	£586	£586	£0
Delivered energy	153 kWh/m ²	153 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	1.4 tonnes	1.4 tonnes	0.0 tonnes
CO2 emissions per m ²	32 kg/m ²	32 kg/m ²	0 kg/m ²
Primary energy	174 kWh/m ²	174 kWh/m ²	0 kWh/m ²

SAP 10 WORKSHEET FOR Conversion (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	44.0000 (1b)	x 2.5000 (2b)	= 110.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =	110.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 20.0000 / (5) = 0.1818 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9318 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.9318 (21)

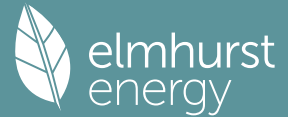
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	1.1881	1.1648	1.1415	1.0250	1.0017	0.8852	0.8852	0.8619	0.9318	1.0017	1.0483	1.0949 (22b)
Effective ac	1.1881	1.1648	1.1415	1.0250	1.0017	0.8918	0.8918	0.8715	0.9341	1.0017	1.0483	1.0949 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Windows			5.5800	1.1450	6.3893		(27)
Rooflights			2.0000	1.1450	2.2901		(27a)
Heatloss Floor			44.0000	0.1300	5.7200	110.0000	4840.0000 (28a)
Solid Brick	58.7500	5.5800	53.1700	0.2400	12.7608	190.0000	10102.3000 (29a)
Flat Roof	44.0000	2.0000	42.0000	0.1100	4.6200	9.0000	378.0000 (30)
Total net area of external elements Aum(A, m ²)			146.7500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.7802		(33)
Main dwelling							
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000 (32)
Internal Wall 1			55.0000			9.0000	495.0000 (32c)
Heat capacity Cm = Sum (A x k)							(28)...(30) + (32) + (32a)...(32e) = 18290.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							415.6886 (35)
Thermal bridges (Default value 0.200 * total exposed area)							29.3500 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 61.1302 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	43.1269	42.2812	41.4356	37.2075	36.3619	32.3728	32.3728	31.6341	33.9094	36.3619	38.0531	39.7444 (38)
Heat transfer coeff	104.2571	103.4114	102.5658	98.3377	97.4921	93.5030	93.5030	92.7643	95.0396	97.4921	99.1833	100.8746 (39)
Average = Sum(39)m / 12 =												98.2020
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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HLP	2.3695	2.3503	2.3310	2.2349	2.2157	2.1251	2.1251	2.1083	2.1600	2.2157	2.2542	2.2926 (40)
HLP (average)												2.2319
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.5162 (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												
60.1748	59.2811	58.0226	55.7022	53.9647	52.0381	50.9974	52.2471	53.6078	55.6693	58.0376	59.9714	(42b)
Hot water usage for other uses												
31.7451	30.5907	29.4363	28.2820	27.1276	25.9732	25.9732	27.1276	28.2820	29.4363	30.5907	31.7451	(42c)
Average daily hot water use (litres/day)												84.6507 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use												
91.9199	89.8718	87.4590	83.9842	81.0923	78.0113	76.9707	79.3747	81.8897	85.1057	88.6282	91.7164	(44)
Energy conte	145.5786	127.9763	134.4212	114.9701	109.1658	95.9240	93.0893	98.2825	100.9782	115.4876	126.2672	143.6058 (45)
Energy content (annual)												Total = Sum(45)m = 1405.7467
Distribution loss (46)m = 0.15 x (45)m												
21.8368	19.1964	20.1632	17.2455	16.3749	14.3886	13.9634	14.7424	15.1467	17.3231	18.9401	21.5409	(46)
Water storage loss (or HIU 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	(59)
Combi loss	46.8414	41.3657	44.5681	41.4169	41.3237	38.4713	39.2234	40.4485	40.3840	43.3689	43.7071	46.7377 (61)
Total heat required for water heating calculated for each month												
192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435	(62)
WWHRS	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	(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	(63c)
FGHRS	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												
192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435	(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												
60.1152	52.8935	55.8371	48.5818	46.6286	41.5126	40.7581	42.7910	43.6713	49.2419	52.9106	59.4333	(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	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
14.2214	12.6313	10.2725	7.7769	5.8133	4.9079	5.3031	6.8932	9.2520	11.7476	13.7112	14.6166	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
196.5794	198.6193	193.4789	182.5355	168.7215	155.7382	147.0646	145.0248	150.1652	161.1086	174.9226	187.9058	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	(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	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	(71)
Water heating gains (Table 5)												
80.8000	78.7106	75.0498	67.4747	62.6728	57.6563	54.7823	57.5148	60.6545	66.1853	73.4870	79.8835	(72)
Total internal gains												
370.5393	368.8997	357.7396	336.7256	316.1461	294.2409	283.0885	285.3712	296.0102	317.9799	341.0591	361.3444	(73)

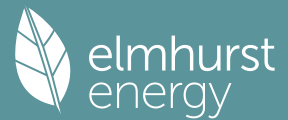
6. Solar gains

[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							
West	5.5800	19.6403	0.7600	0.7000	0.7700	40.4042 (80)						
North	2.0000	26.0000	0.6300	0.7000	1.0000	20.6388 (82)						
Solar gains	61.0430	121.9044	206.3710	308.9097	385.0653	396.9245	376.7705	319.3949	242.6757	146.1774	76.5747	49.8962 (83)
Total gains	431.5823	490.8040	564.1107	645.6353	701.2114	691.1654	659.8590	604.7661	538.6859	464.1573	417.6338	411.2407 (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	48.7318	49.1303	49.5354	51.6652	52.1134	54.3366	54.3366	54.7693	53.4581	52.1134	51.2247	50.3659
alpha	4.2488	4.2754	4.3024	4.4443	4.4742	4.6224	4.6224	4.6513	4.5639	4.4742	4.4150	4.3577
util living area	0.9980	0.9962	0.9904	0.9687	0.9049	0.7583	0.5951	0.6579	0.8906	0.9833	0.9964	0.9984 (86)
MIT	19.1716	19.3558	19.6992	20.2012	20.6141	20.8936	20.9731	20.9586	20.7489	20.2094	19.6406	19.1938 (87)
Th 2	19.0984	19.1101	19.1218	19.1813	19.1934	19.2513	19.2513	19.2621	19.2288	19.1934	19.1693	19.1454 (88)
util rest of house												
	0.9968	0.9939	0.9840	0.9461	0.8337	0.5996	0.3731	0.4336	0.7770	0.9669	0.9937	0.9975 (89)
MIT 2	17.5459	17.7375	18.0858	18.6149	18.9864	19.2220	19.2488	19.2574	19.1306	18.6418	18.0648	17.6018 (90)
Living area fraction												
MIT	18.5435	18.7306	19.0758	19.5883	19.9852	20.2477	20.3069	20.3014	20.1236	19.6038	19.0318	18.5787 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5435	18.7306	19.0758	19.5883	19.9852	20.2477	20.3069	20.3014	20.1236	19.6038	19.0318	18.5787 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9963	0.9932	0.9838	0.9524	0.8700	0.6974	0.5122	0.5751	0.8443	0.9719	0.9935	0.9970	(94)
Useful gains	429.9737	487.4621	554.9537	614.9180	610.0774	482.0262	337.9879	347.7912	454.8085	451.1188	414.9036	410.0263	(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	1484.9845	1430.2390	1289.8502	1051.0614	807.7440	528.0813	346.6095	361.9070	572.4846	877.7948	1183.4339	1450.4441	(97)
Space heating kWh	784.9281	633.5461	546.7630	314.0232	147.0639	0.0000	0.0000	0.0000	0.0000	317.4470	553.3419	774.0709	(98a)
Space heating requirement - total per year (kWh/year)												4071.1840	
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	784.9281	633.5461	546.7630	314.0232	147.0639	0.0000	0.0000	0.0000	0.0000	317.4470	553.3419	774.0709	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4071.1840	
Space heating per m2										(98c) / (4) =		92.5269	(99)

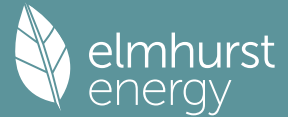
9a. Energy requirements - Individual heating systems, including micro-CHP

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 %)												79.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	784.9281	633.5461	546.7630	314.0232	147.0639	0.0000	0.0000	0.0000	0.0000	317.4470	553.3419	774.0709	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	993.5798	801.9571	692.1050	397.4978	186.1569	0.0000	0.0000	0.0000	0.0000	401.8316	700.4327	979.8365	(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	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435	(64)
Efficiency of water heater (217)m	82.0613	81.9264	81.5855	80.7775	79.1937	75.0000	75.0000	75.0000	75.0000	80.7675	81.6962	75.0000	(216)
Fuel for water heating, kWh/month	234.4833	206.7000	219.3887	193.6022	190.0273	179.1938	176.4170	184.9746	188.4830	196.6837	208.0564	82.0566	(217)
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	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938	(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												5153.3975	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												75.0000	
Water heating fuel used												2409.9762	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												100.4615	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												7749.8351	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5153.3975	3.6400	187.5837	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2409.9762	3.6400	87.7231	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	86.0000	16.4900	14.1814	(249)
Energy for lighting	100.4615	16.4900	16.5661	(250)
Additional standing charges			92.0000	(251)
Total energy cost			398.0543	(255)

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11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12): 0.3600 (256)
 Energy cost factor (ECF) [(255) x (256)] / [(4) + 45.0] = 1.6101 (257)
 SAP value 73.9002
 SAP rating (Section 12) 74 (258)
 SAP band C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	5153.3975	0.2100	1082.2135 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2409.9762	0.2100	506.0950 (264)
Space and water heating			1588.3085 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	100.4615	0.1443	14.4997 (268)
Total CO2, kg/year			1614.7374 (272)
CO2 emissions per m2			36.7000 (273)
EI value			75.6882
EI rating			76 (274)
EI band			C

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	44.0000 (1b)	2.5000 (2b)	110.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 110.0000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1818 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9318 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.9318 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.6000	4.3000	4.4000	4.0000	4.0000	3.5000	3.6000	3.8000	3.7000	3.9000	3.9000	4.3000 (22)
Wind factor	1.1500	1.0750	1.1000	1.0000	1.0000	0.8750	0.9000	0.9500	0.9250	0.9750	0.9750	1.0750 (22a)
Adj infilt rate	1.0716	1.0017	1.0250	0.9318	0.9318	0.8153	0.8386	0.8852	0.8619	0.9085	0.9085	1.0017 (22b)
Effective ac	1.0716	1.0017	1.0250	0.9341	0.9341	0.8324	0.8517	0.8918	0.8715	0.9127	0.9127	1.0017 (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							
Windows			5.5800	1.1450	6.3893		(27)
Rooflights			2.0000	1.1450	2.2901		(27a)
Heatloss Floor			44.0000	0.1300	5.7200	110.0000	4840.0000 (28a)
Solid Brick	58.7500	5.5800	53.1700	0.2400	12.7608	190.0000	10102.3000 (29a)
Flat Roof	44.0000	2.0000	42.0000	0.1100	4.6200	9.0000	378.0000 (30)
Total net area of external elements Aum (A, m2)			146.7500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 31.7802		(33)
Main dwelling							
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000 (32)
Internal Wall 1			55.0000			9.0000	495.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	18290.3000 (34)

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Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 415.6886 (35)
 Thermal bridges (Default value 0.200 * total exposed area) 29.3500 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 61.1302 (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 38.8987 36.3619 37.2075 33.9094 33.9094 30.2158 30.9151 32.3728 31.6341 33.1313 33.1313 36.3619 (38)
 Average = Sum(39)m / 12 = 100.0289 97.4921 98.3377 95.0396 95.0396 91.3460 92.0453 93.5030 92.7643 94.2614 94.2614 97.4921 (39)
 31.7451 30.5907 29.4363 28.2820 27.1276 25.9732 25.9732 27.1276 28.2820 29.4363 30.5907 31.7451 (40)
 84.6507 (43)

HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 HLP (average) 2.2734 2.2157 2.2349 2.1600 2.1600 2.0760 2.0919 2.1251 2.1083 2.1423 2.1423 2.2157 (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 1.5162 (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 60.1748 59.2811 58.0226 55.7022 53.9647 52.0381 50.9974 52.2471 53.6078 55.6693 58.0376 59.9714 (42b)
 Hot water usage for other uses 31.7451 30.5907 29.4363 28.2820 27.1276 25.9732 25.9732 27.1276 28.2820 29.4363 30.5907 31.7451 (42c)
 Average daily hot water use (litres/day) 84.6507 (43)
 Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 Energy conte 91.9199 89.8718 87.4590 83.9842 81.0923 78.0113 76.9707 79.3747 81.8897 85.1057 88.6282 91.7164 (44)
 Energy content (annual) 145.5786 127.9763 134.4212 114.9701 109.1658 95.9240 93.0893 98.2825 100.9782 115.4876 126.2672 143.6058 (45)
 Distribution loss (46)m = 0.15 x (45)m Total = Sum(45)m = 1405.7467
 21.8368 19.1964 20.1632 17.2455 16.3749 14.3886 13.9634 14.7424 15.1467 17.3231 18.9401 21.5409 (46)
 Water storage loss (or HIU 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 46.8414 41.3657 44.5681 41.4169 41.3237 38.4713 39.2234 40.4485 40.3840 43.3689 43.7071 46.7377 (61)
 Total heat required for water heating calculated for each month
 WWHRs 192.4200 169.3419 178.9893 156.3870 150.4896 134.3953 132.3127 138.7309 141.3622 158.8565 169.9743 190.3435 (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 192.4200 169.3419 178.9893 156.3870 150.4896 134.3953 132.3127 138.7309 141.3622 158.8565 169.9743 190.3435 (64)
 Total per year (kWh/year) = Sum(64)m = 1913.6033 (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 60.1152 52.8935 55.8371 48.5818 46.6286 41.5126 40.7581 42.7910 43.6713 49.2419 52.9106 59.4333 (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 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 90.9743 (66)
 Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 14.2214 12.6313 10.2725 7.7769 5.8133 4.9079 5.3031 6.8932 9.2520 11.7476 13.7112 14.6166 (67)
 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 196.5794 198.6193 193.4789 182.5355 168.7215 155.7382 147.0646 145.0248 150.1652 161.1086 174.9226 187.9058 (68)
 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 45.6137 (69)
 Pumps, fans 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 3.0000 (70)
 Losses e.g. evaporation (negative values) (Table 5) -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 -60.6496 (71)
 Water heating gains (Table 5) 80.8000 78.7106 75.0498 67.4747 62.6728 57.6563 54.7823 57.5148 60.6545 66.1853 73.4870 79.8835 (72)
 Total internal gains 370.5393 368.8997 357.7396 336.7256 316.1461 294.2409 283.0885 285.3712 296.0102 317.9799 341.0591 361.3444 (73)

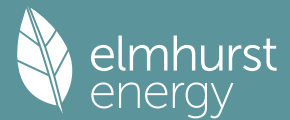
6. Solar gains

[Jan] Area Solar flux g FF Access Gains
 m2 Table 6a Specific data factor
 W/m2 or Table 6b or Table 6c Table 6d W
 West 5.5800 21.5869 0.7600 0.7000 0.7700 44.4089 (80)
 North 2.0000 29.0000 0.6300 0.7000 1.0000 23.0202 (82)
 Solar gains 67.4291 120.8166 204.7934 317.2652 381.2222 420.9592 400.8937 347.9755 266.1141 158.1145 87.3427 56.4637 (83)
 Total gains 437.9684 489.7163 562.5330 653.9908 697.3683 715.2001 683.9823 633.3467 562.1243 476.0943 428.4019 417.8081 (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 50.7917 52.1134 51.6652 53.4581 53.4581 55.6197 55.1972 54.3366 54.7693 53.8994 53.8994 52.1134
 alpha 4.3861 4.4742 4.4443 4.4569 4.5639 4.7080 4.6798 4.6224 4.6513 4.5933 4.5933 4.4742
 util living area 0.9973 0.9953 0.9861 0.9479 0.8344 0.5667 0.3351 0.3952 0.7726 0.9665 0.9943 0.9978 (86)

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MIT	19.4162	19.5898	19.9480	20.4337	20.7997	20.9786	20.9987	20.9969	20.9044	20.4587	19.8978	19.4345 (87)
Th 2	19.1573	19.1934	19.1813	19.2288	19.2288	19.2831	19.2727	19.2513	19.2621	19.2402	19.2402	19.1934 (88)
util rest of house	0.9955	0.9922	0.9761	0.9087	0.7153	0.3661	0.1040	0.1404	0.5799	0.9303	0.9896	0.9963 (89)
MIT 2	17.8322	18.0308	18.3744	18.8661	19.1501	19.2809	19.2727	19.2512	19.2425	18.9112	18.3722	17.8767 (90)
Living area fraction										fLA = Living area / (4) =		0.6136 (91)
MIT	18.8042	18.9874	19.3400	19.8280	20.1623	20.3227	20.3318	20.3224	20.2623	19.8608	19.3084	18.8326 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8042	18.9874	19.3400	19.8280	20.1623	20.3227	20.3318	20.3224	20.2623	19.8608	19.3084	18.8326 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9950	0.9917	0.9772	0.9248	0.7852	0.4912	0.2462	0.2978	0.7016	0.9466	0.9898	0.9959 (94)	
Useful gains	435.7836	485.6576	549.7123	604.8092	547.6082	351.2776	168.4298	188.6064	394.3625	450.6799	424.0476	416.0901 (95)	
Ext temp.	5.4000	5.8000	7.8000	10.3000	13.4000	16.4000	18.5000	18.3000	15.6000	12.1000	8.3000	5.4000 (96)	
Heat loss rate W	1340.8111	1285.6699	1134.8208	905.5397	642.6900	358.3200	168.6110	189.1037	432.4935	731.5444	1037.6671	1309.5730 (97)	
Space heating kWh	673.3405	537.6082	435.3207	216.5260	70.7409	0.0000	0.0000	0.0000	0.0000	208.9632	441.8060	664.7513 (98a)	
Space heating requirement - total per year (kWh/year)												3249.0568	
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	673.3405	537.6082	435.3207	216.5260	70.7409	0.0000	0.0000	0.0000	0.0000	208.9632	441.8060	664.7513 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												3249.0568	
Space heating per m2										(98c) / (4) =		73.8422 (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 %)													79.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	673.3405	537.6082	435.3207	216.5260	70.7409	0.0000	0.0000	0.0000	0.0000	208.9632	441.8060	664.7513 (98)	
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000 (210)	
Space heating fuel (main heating system)	852.3297	680.5167	551.0389	274.0835	89.5454	0.0000	0.0000	0.0000	0.0000	264.5104	559.2481	841.4573 (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	192.4200	169.3419	178.9893	156.3870	150.4896	134.3953	132.3127	138.7309	141.3622	158.8565	169.9743	190.3435 (64)	
Efficiency of water heater (217)m	81.8179	81.6529	81.1622	79.9753	77.6607	75.0000	75.0000	75.0000	75.0000	79.8611	81.2898	81.8146 (216)	
Fuel for water heating, kWh/month	235.1809	207.3924	220.5327	195.5441	193.7784	179.1938	176.4170	184.9746	188.4830	198.9160	209.0967	232.6523 (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	7.0685	7.3041	7.0685	7.3041	7.3041 (231)	
Lighting	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938 (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												4112.7301 (211)	
Space heating fuel - main system 2												0.0000 (213)	
Space heating fuel - secondary												0.0000 (215)	
Efficiency of water heater												75.0000	
Water heating fuel used												2422.1618 (219)	
Space cooling fuel												0.0000 (221)	
Electricity for pumps and fans:													
central heating pump												41.0000 (230c)	
main heating flue fan												45.0000 (230e)	
Total electricity for the above, kWh/year												86.0000 (231)	
Electricity for lighting (calculated in Appendix L)												100.4615 (232)	
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000 (233)	
Wind generation												0.0000 (234)	
Hydro-electric generation (Appendix N)												0.0000 (235a)	
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)	
Appendix Q - special features													
Energy saved or generated												-0.0000 (236)	
Energy used												0.0000 (237)	
Total delivered energy for all uses												6721.3534 (238)	

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10a. Fuel costs - using BEDF prices (590)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	4112.7301	6.5500	269.3838 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2422.1618	6.5500	158.6516 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	86.0000	28.4300	24.4498 (249)
Energy for lighting	100.4615	28.4300	28.5612 (250)
Additional standing charges			104.0000 (251)
Total energy cost			585.0464 (255)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4112.7301	0.2100	863.6733 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2422.1618	0.2100	508.6540 (264)
Space and water heating			1372.3273 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	100.4615	0.1443	14.4997 (268)
Total CO2, kg/year			1398.7563 (272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	4112.7301	1.1300	4647.3850 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2422.1618	1.1300	2737.0429 (278)
Space and water heating			7384.4279 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	100.4615	1.5338	154.0913 (282)
Total Primary energy kWh/year			7668.6199 (286)

Appendix 3

SAP Calculations – Be Clean

Appendix 4

SAP Calculations – Be Green

Full SAP Calculation Printout



Plot Reference	Be Green			Issued on Date	10/02/2026
Assessment Reference	Be Green	Plot Type Ref	Notional Dwelling		
Plot Address	Garden Flat, 6 Turnpike Lane, LONDON, N8 0PT			SAP Version	10.2
SAP Rating	73 C	DER	8.75	TER	
Environmental	94 A	% DER < TER			N/A
CO ₂ Emissions (t/year)	0.33	DFEE	101.37	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	91.28	TPER	
Assessor Details	Mr. Andreas Andreou			Assessor ID	AC35-0001
Client	Atlas Licensing, Atlas Licensing				

SAP 10 WORKSHEET FOR Conversion (As Built) (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	44.0000 (1b)	2.5000 (2b)	110.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		110.0000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 110.0000 (5)

2. Ventilation rate

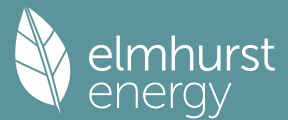
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1818 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9318 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.9318 (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	1.1881	1.1648	1.1415	1.0250	1.0017	0.8852	0.8852	0.8619	0.9318	1.0017	1.0483	1.0949 (22b)
Effective ac	1.1881	1.1648	1.1415	1.0250	1.0017	0.8918	0.8918	0.8715	0.9341	1.0017	1.0483	1.0949 (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												
Windows			5.5800	1.1450	6.3893		(27)					
Rooflights			2.0000	1.1450	2.2901		(27a)					
Heatloss Floor			44.0000	0.1300	5.7200	110.0000	4840.0000 (28a)					
Solid Brick	58.7500	5.5800	53.1700	0.2400	12.7608	190.0000	10102.3000 (29a)					
Flat Roof	44.0000	2.0000	42.0000	0.1100	4.6200	9.0000	378.0000 (30)					
Total net area of external elements Aum(A, m2)			146.7500				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.7802		(33)					
Main dwelling												
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000 (32)					
Internal Wall 1			55.0000			9.0000	495.0000 (32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		18290.3000 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							415.6886 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							29.3500 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	61.1302 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 43.1269	Feb 42.2812	Mar 41.4356	Apr 37.2075	May 36.3619	Jun 32.3728	Jul 32.3728	Aug 31.6341	Sep 33.9094	Oct 36.3619	Nov 38.0531	Dec 39.7444 (38)

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Heat transfer coeff
104.2571 103.4114 102.5658 98.3377 97.4921 93.5030 93.5030 92.7643 95.0396 97.4921 99.1833 100.8746 (39)
Average = Sum(39)m / 12 = 98.2020

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	2.3695	2.3503	2.3310	2.2349	2.2157	2.1251	2.1251	2.1083	2.1600	2.2157	2.2542	2.2926 (40)
HLP (average)												2.2319
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.5162 (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 60.1748 59.2811 58.0226 55.7022 53.9647 52.0381 50.9974 52.2471 53.6078 55.6693 58.0376 59.9714 (42b)
Hot water usage for other uses 31.7451 30.5907 29.4363 28.2820 27.1276 25.9732 25.9732 27.1276 28.2820 29.4363 30.5907 31.7451 (42c)
Average daily hot water use (litres/day) 84.6507 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	91.9199	89.8718	87.4590	83.9842	81.0923	78.0113	76.9707	79.3747	81.8897	85.1057	88.6282	91.7164 (44)
Energy conte	145.5786	127.9763	134.4212	114.9701	109.1658	95.9240	93.0893	98.2825	100.9782	115.4876	126.2672	143.6058 (45)
Energy content (annual)												1405.7467
Distribution loss (46)m = 0.15 x (45)m	21.8368	19.1964	20.1632	17.2455	16.3749	14.3886	13.9634	14.7424	15.1467	17.3231	18.9401	21.5409 (46)
Water storage loss (or HIU loss):												210.0000 (47)
Store volume												1.0900 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.5886 (55)
Enter (49) or (54) in (55)												
Total storage loss	18.2466	16.4808	18.2466	17.6580	18.2466	17.6580	18.2466	18.2466	17.6580	18.2466	17.6580	18.2466 (56)
If cylinder contains dedicated solar storage	18.2466	16.4808	18.2466	17.6580	18.2466	17.6580	18.2466	18.2466	17.6580	18.2466	17.6580	18.2466 (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	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148 (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)
FV 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	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148 (64)
12Total per year (kWh/year)												1894.4817 (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	81.6121	72.5457	77.9022	70.3636	69.5048	64.0307	64.1594	65.8861	65.7113	71.6068	74.1198	80.9561 (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	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	67.7567	75.0164	67.7567	70.0153	67.7567	70.0153	67.7567	67.7567	70.0153	67.7567	70.0153	67.7567 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	131.7082	133.0749	129.6309	122.2988	113.0434	104.3446	98.5333	97.1666	100.6107	107.9427	117.1981	125.8969 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812 (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)	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496 (71)
Water heating gains (Table 5)	109.6937	107.9549	104.7073	97.7272	93.4205	88.9316	86.2358	88.5566	91.2656	96.2457	102.9442	108.8120 (72)
Total internal gains	354.9022	361.7898	347.8385	335.7848	319.9642	309.0351	298.2694	299.2235	307.6352	317.6888	335.9012	348.2092 (73)

6. Solar gains

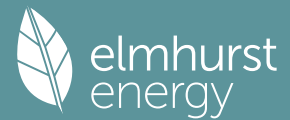
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
West	5.5800	19.6403	0.7600	0.7000	0.7700	40.4042 (80)						
North	2.0000	26.0000	0.6300	0.7000	1.0000	20.6388 (82)						
Solar gains	61.0430	121.9044	206.3710	308.9097	385.0653	396.9245	376.7705	319.3949	242.6757	146.1774	76.5747	49.8962 (83)
Total gains	415.9452	483.6942	554.2095	644.6946	705.0295	705.9596	675.0399	618.6184	550.3109	463.8662	412.4759	398.1054 (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	48.7318	49.1303	49.5354	51.6652	52.1134	54.3366	54.3366	54.7693	53.4581	52.1134	51.2247	50.3659
alpha	4.2488	4.2754	4.3024	4.4443	4.4742	4.6224	4.6224	4.6513	4.5639	4.4742	4.4150	4.3577
util living area	0.9983	0.9964	0.9910	0.9688	0.9035	0.7483	0.5837	0.6464	0.8840	0.9834	0.9966	0.9986 (86)
Living	19.5398	19.6873	19.9426	20.3304	20.6440	20.8577	20.9144	20.9046	20.7511	20.3377	19.9051	19.5606
Non living	17.4903	17.6871	18.0202	18.5459	18.9078	19.1391	19.1632	19.1726	19.0523	18.5735	18.0096	17.5512

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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	20.2530	19.6873	19.9426	20.3304	20.6440	20.8577	20.9144	20.9046	20.7511	20.3377	19.9051	19.7620 (87)
Th 2	19.0984	19.1101	19.1218	19.1813	19.1934	19.2513	19.2513	19.2621	19.2288	19.1934	19.1693	19.1454 (88)
util rest of house												
	0.9972	0.9942	0.9850	0.9463	0.8315	0.5891	0.3650	0.4244	0.7672	0.9670	0.9940	0.9978 (89)
MIT 2	18.4573	17.6871	18.0202	18.5459	18.9078	19.1391	19.1632	19.1726	19.0523	18.5735	18.0096	17.8385 (90)
Living area fraction									FLA = Living area / (4) =			0.6136 (91)
MIT	19.5592	18.9145	19.1998	19.6410	19.9732	20.1937	20.2378	20.2354	20.0947	19.6561	19.1727	19.0188 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5592	18.9145	19.1998	19.6410	19.9732	20.1937	20.2378	20.2354	20.0947	19.6561	19.1727	19.0188 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9975	0.9939	0.9853	0.9534	0.8677	0.6820	0.4931	0.5556	0.8342	0.9725	0.9941	0.9977 (94)
Useful gains	414.9161	480.7293	546.0632	614.6547	611.7663	481.4479	332.8931	343.7256	459.0686	451.1277	410.0218	397.1894 (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	1590.8792	1449.2557	1302.5699	1056.2412	806.5727	523.0285	340.1479	355.7919	569.7380	882.8938	1197.4153	1494.8415 (97)
Space heating kWh	874.9165	650.8498	562.8410	317.9423	144.9359	0.0000	0.0000	0.0000	0.0000	321.2340	566.9233	816.6532 (98a)
Space heating requirement - total per year (kWh/year)												4256.2960
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	874.9165	650.8498	562.8410	317.9423	144.9359	0.0000	0.0000	0.0000	0.0000	321.2340	566.9233	816.6532 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4256.2960
Space heating per m2										(98c) / (4) =		96.7340 (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 %)												303.3648 (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	874.9165	650.8498	562.8410	317.9423	144.9359	0.0000	0.0000	0.0000	0.0000	321.2340	566.9233	816.6532 (98)
Space heating efficiency (main heating system 1)	303.3648	303.3648	303.3648	303.3648	303.3648	0.0000	0.0000	0.0000	0.0000	303.3648	303.3648	303.3648 (210)
Space heating fuel (main heating system)	288.4041	214.5436	185.5327	104.8053	47.7761	0.0000	0.0000	0.0000	0.0000	105.8903	186.8784	269.1984 (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	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148 (64)
Efficiency of water heater (217)m	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976 (216)
Fuel for water heating, kWh/month	107.3996	94.9888	100.9946	89.0598	86.4965	78.1262	77.2676	80.2488	81.0276	90.1255	95.5450	106.2671 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938 (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												1403.0291 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												174.1976
Water heating fuel used												1087.5472 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												100.4615 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												2591.0378 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1403.0291	0.1550	217.5160 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1087.5472	0.1408	153.1406 (264)
Space and water heating			370.6566 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	100.4615	0.1443	14.4997 (268)
Total CO2, kg/year			385.1563 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			8.7500 (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	1403.0291	1.5740	2208.3118 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1087.5472	1.5207	1653.8008 (278)
Space and water heating			3862.1127 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	100.4615	1.5338	154.0913 (282)
Total Primary energy kWh/year			4016.2039 (286)
Dwelling Primary energy Rate (DPER)			91.2800 (287)

SAP 10 WORKSHEET FOR Conversion (As Built) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	44.0000	2.5000	110.0000
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		110.0000 (1b) - (3b)
Dwelling volume			110.0000 (4)

2. Ventilation rate

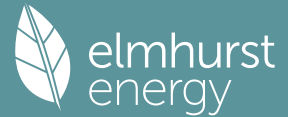
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1818 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9318 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.9318 (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	1.1881	1.1648	1.1415	1.0250	1.0017	0.8852	0.8852	0.8619	0.9318	1.0017	1.0483	1.0949 (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	1.1881	1.1648	1.1415	1.0250	1.0017	0.8918	0.8918	0.8715	0.9341	1.0017	1.0483	1.0949 (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							
Windows			5.5800	1.1450	6.3893		(27)
Rooflights			2.0000	1.1450	2.2901		(27a)
Heatloss Floor			44.0000	0.1300	5.7200	110.0000	4840.0000 (28a)
Solid Brick	58.7500	5.5800	53.1700	0.2400	12.7608	190.0000	10102.3000 (29a)
Flat Roof	44.0000	2.0000	42.0000	0.1100	4.6200	9.0000	378.0000 (30)
Total net area of external elements Aum(A, m2)			146.7500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.7802	(33)
Main dwelling							
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000 (32)
Internal Wall 1			55.0000			9.0000	495.0000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 18290.3000 (34)

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Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 415.6886 (35)
 Thermal bridges (Default value 0.200 * total exposed area) 29.3500 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 61.1302 (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	43.1269	42.2812	41.4356	37.2075	36.3619	32.3728	32.3728	31.6341	33.9094	36.3619	38.0531	39.7444	(38)
Heat transfer coeff	104.2571	103.4114	102.5658	98.3377	97.4921	93.5030	93.5030	92.7643	95.0396	97.4921	99.1833	100.8746	(39)
Average = Sum(39)m / 12 =												98.2020	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.3695	2.3503	2.3310	2.2349	2.2157	2.1251	2.1251	2.1083	2.1600	2.2157	2.2542	2.2926	(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													1.5162 (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													
21.4708	21.1519	20.7029	19.8750	19.2550	18.5676	18.1963	18.6422	19.1277	19.8632	20.7082	21.3982	21.3982	(42b)
Hot water usage for other uses													
30.1578	29.0612	27.9645	26.8679	25.7712	24.6746	24.6746	25.7712	26.8679	27.9645	29.0612	30.1578	30.1578	(42c)
Average daily hot water use (litres/day)												47.3230	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
51.6286	50.2131	48.6674	46.7428	45.0262	43.2421	42.8708	44.4134	45.9955	47.8277	49.7694	51.5560	51.5560	(44)
Energy conte	81.7671	71.5028	74.8000	63.9886	60.6139	53.1713	51.8485	54.9930	56.7171	64.9018	70.9056	80.7243	(45)
Energy content (annual)												785.9340	
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 (or HIU 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													
69.5020	60.7774	63.5800	54.3903	51.5219	45.1956	44.0713	46.7441	48.2095	55.1665	60.2698	68.6156	68.6156	(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	69.5020	60.7774	63.5800	54.3903	51.5219	45.1956	44.0713	46.7441	48.2095	55.1665	60.2698	68.6156	(64)
12Total per year (kWh/year)												668.0439	(64)
Electric shower(s)												668	(64)
39.7548	35.4218	38.6793	36.9112	37.6038	35.8704	37.0661	37.6038	36.9112	38.6793	37.9520	39.7548	39.7548	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												452.2084	(64a)
Heat gains from water heating, kWh/month													
27.3142	24.0498	25.5648	22.8254	22.2814	20.2665	20.2843	21.0870	21.2802	23.4615	24.5554	27.0926	27.0926	(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	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	75.8119	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
67.7567	75.0164	67.7567	70.0153	67.7567	70.0153	67.7567	67.7567	70.0153	67.7567	70.0153	67.7567	67.7567	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
131.7082	133.0749	129.6309	122.2988	113.0434	104.3446	98.5333	97.1666	100.6107	107.9427	117.1981	125.8969	125.8969	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	30.5812	(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)													
-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	(71)
Water heating gains (Table 5)													
36.7126	35.7884	34.3613	31.7019	29.9481	28.1479	27.2639	28.3427	29.5558	31.5342	34.1048	36.4148	36.4148	(72)
Total internal gains													
281.9212	289.6233	277.4925	269.7596	256.4918	248.2514	239.2975	239.0096	245.9253	252.9772	267.0618	275.8120	275.8120	(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	
West						5.5800	19.6403	0.7600	0.7000			0.7700			40.4042	(80)
North						2.0000	26.0000	0.6300	0.7000			1.0000			20.6388	(82)
Solar gains	61.0430	121.9044	206.3710	308.9097	385.0653	396.9245	376.7705	319.3949	242.6757	146.1774	76.5747			49.8962	(83)	
Total gains	342.9642	411.5277	483.8635	578.6693	641.5571	645.1759	616.0680	558.4045	488.6011	399.1547	343.6364	325.7083			(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
48.7318	49.1303	49.5354	51.6652	52.1134	54.3366	54.3366	54.7693	53.4581	52.1134	51.2247	50.3659	50.3659	
alpha	4.2488	4.2754	4.3024	4.4443	4.4742	4.6224	4.6224	4.6513	4.5639	4.4742	4.4150	4.3577	
util living area													

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	0.9992	0.9981	0.9946	0.9787	0.9268	0.7899	0.6295	0.6982	0.9174	0.9906	0.9984	0.9994 (86)
MIT	19.0488	19.2465	19.5907	20.1176	20.5574	20.8728	20.9662	20.9471	20.7039	20.1229	19.5375	19.0741 (87)
Th 2	19.0984	19.1101	19.1218	19.1813	19.1934	19.2513	19.2513	19.2621	19.2288	19.1934	19.1693	19.1454 (88)
util rest of house												
	0.9987	0.9969	0.9909	0.9624	0.8661	0.6343	0.3988	0.4675	0.8193	0.9807	0.9971	0.9990 (89)
MIT 2	17.4236	17.6291	17.9798	18.5386	18.9454	19.2145	19.2481	19.2557	19.1045	18.5605	17.9626	17.4825 (90)
Living area fraction									fLA = Living area / (4) =			0.6136 (91)
MIT	18.4209	18.6216	18.9683	19.5075	19.9346	20.2321	20.3024	20.2936	20.0860	19.5192	18.9290	18.4592 (92)
Temperature adjustment												0.0000
adjusted MIT	18.4209	18.6216	18.9683	19.5075	19.9346	20.2321	20.3024	20.2936	20.0860	19.5192	18.9290	18.4592 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9984	0.9964	0.9904	0.9662	0.8958	0.7300	0.5441	0.6139	0.8766	0.9832	0.9969	0.9988	(94)
Useful gains	342.4247	410.0555	479.2419	559.0972	574.7145	471.0060	335.1935	342.8103	428.3037	392.4328	342.5607	325.3187	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1472.1986	1418.9699	1278.8255	1043.1203	802.8077	526.6193	346.1864	361.1901	568.9051	869.5536	1173.2366	1438.3867	(97)
Space heating kWh	840.5518	677.9905	594.8902	348.4966	169.7013	0.0000	0.0000	0.0000	0.0000	354.9779	598.0867	828.1226	(98a)
Space heating requirement - total per year (kWh/year)												4412.8175	
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	840.5518	677.9905	594.8902	348.4966	169.7013	0.0000	0.0000	0.0000	0.0000	354.9779	598.0867	828.1226	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4412.8175	
Space heating per m2											(98c) / (4) =	100.2913	(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	878.9284	691.9224	705.0087	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7200	0.8097	0.7587	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	632.8530	560.2839	534.9067	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	702.8871	671.7245	609.9104	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	50.4245	82.9118	55.8027	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	12.6061	20.7280	13.9507	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												47.2848	(107)
Energy for space heating												100.2913	(99)
Energy for space cooling												1.0747	(108)
Total												101.3660	(109)
Fabric Energy Efficiency (DFEE)												101.4	(109)

SAP 10 WORKSHEET FOR Conversion (As Built) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

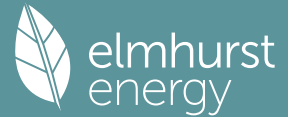
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	44.0000 (1b)	x 2.5000 (2b)	= 110.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	110.0000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1818 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9318 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.9318 (21)

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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	1.1881	1.1648	1.1415	1.0250	1.0017	0.8852	0.8852	0.8619	0.9318	1.0017	1.0483	1.0949	(22b)
Effective ac	1.1881	1.1648	1.1415	1.0250	1.0017	0.8918	0.8918	0.8715	0.9341	1.0017	1.0483	1.0949	(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								
Windows			5.5800	1.1450	6.3893			(27)
Rooflights			2.0000	1.1450	2.2901			(27a)
Heatloss Floor			44.0000	0.1300	5.7200	110.0000	4840.0000	(28a)
Solid Brick	58.7500	5.5800	53.1700	0.2400	12.7608	190.0000	10102.3000	(29a)
Flat Roof	44.0000	2.0000	42.0000	0.1100	4.6200	9.0000	378.0000	(30)
Total net area of external elements Aum(A, m2)			146.7500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.7802			(33)
Main dwelling								
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000	(32)
Internal Wall 1			55.0000			9.0000	495.0000	(32c)
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) = 18290.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								415.6886 (35)
Thermal bridges (Default value 0.200 * total exposed area)								29.3500 (36)
Point Thermal bridges								(36a) = 0.0000
Total fabric heat loss								(33) + (36) + (36a) = 61.1302 (37)

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

(38)m	Jan 43.1269	Feb 42.2812	Mar 41.4356	Apr 37.2075	May 36.3619	Jun 32.3728	Jul 32.3728	Aug 31.6341	Sep 33.9094	Oct 36.3619	Nov 38.0531	Dec 39.7444	(38)
Heat transfer coeff	104.2571	103.4114	102.5658	98.3377	97.4921	93.5030	93.5030	92.7643	95.0396	97.4921	99.1833	100.8746	(39)
Average = Sum(39)m / 12 =												98.2020	
HLP	Jan 2.3695	Feb 2.3503	Mar 2.3310	Apr 2.2349	May 2.2157	Jun 2.1251	Jul 2.1251	Aug 2.1083	Sep 2.1600	Oct 2.2157	Nov 2.2542	Dec 2.2926	(40)
HLP (average)												2.2319	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

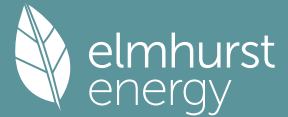
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.5162 (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	60.1748	59.2811	58.0226	55.7022	53.9647	52.0381	50.9974	52.2471	53.6078	55.6693	58.0376	59.9714	(42b)
Hot water usage for other uses	31.7451	30.5907	29.4363	28.2820	27.1276	25.9732	25.9732	27.1276	28.2820	29.4363	30.5907	31.7451	(42c)
Average daily hot water use (litres/day)													84.6507 (43)
Daily hot water use	Jan 91.9199	Feb 89.8718	Mar 87.4590	Apr 83.9842	May 81.0923	Jun 78.0113	Jul 76.9707	Aug 79.3747	Sep 81.8897	Oct 85.1057	Nov 88.6282	Dec 91.7164	(44)
Energy conte	145.5786	127.9763	134.4212	114.9701	109.1658	95.9240	93.0893	98.2825	100.9782	115.4876	126.2672	143.6058	(45)
Energy content (annual)										Total = Sum(45)m =		1405.7467	
Distribution loss (46)m = 0.15 x (45)m	21.8368	19.1964	20.1632	17.2455	16.3749	14.3886	13.9634	14.7424	15.1467	17.3231	18.9401	21.5409	(46)
Water storage loss (or HIU loss):													
Store volume													210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0900 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.5886 (55)
Total storage loss	18.2466	16.4808	18.2466	17.6580	18.2466	17.6580	18.2466	18.2466	17.6580	18.2466	17.6580	18.2466	(56)
If cylinder contains dedicated solar storage	18.2466	16.4808	18.2466	17.6580	18.2466	17.6580	18.2466	18.2466	17.6580	18.2466	17.6580	18.2466	(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	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148	(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	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148	(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) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month	81.6121	72.5457	77.9022	70.3636	69.5048	64.0307	64.1594	65.8861	65.7113	71.6068	74.1198	80.9561	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 90.9743	Feb 90.9743	Mar 90.9743	Apr 90.9743	May 90.9743	Jun 90.9743	Jul 90.9743	Aug 90.9743	Sep 90.9743	Oct 90.9743	Nov 90.9743	Dec 90.9743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.2214	12.6313	10.2725	7.7769	5.8133	4.9079	5.3031	6.8932	9.2520	11.7476	13.7112	14.6166	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	196.5794	198.6193	193.4789	182.5355	168.7215	155.7382	147.0646	145.0248	150.1652	161.1086	174.9226	187.9058	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	(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)	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	(71)
Water heating gains (Table 5)													

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Total internal gains	109.6937	107.9549	104.7073	97.7272	93.4205	88.9316	86.2358	88.5566	91.2656	96.2457	102.9442	108.8120 (72)
	396.4329	395.1440	384.3971	363.9781	343.8937	325.5161	314.5420	316.4130	326.6213	345.0403	367.5164	387.2729 (73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
West	5.5800		19.6403		0.7600		0.7000		0.7700		40.4042 (80)	
North	2.0000		26.0000		0.6300		0.7000		1.0000		20.6388 (82)	
Solar gains	61.0430	121.9044	206.3710	308.9097	385.0653	396.9245	376.7705	319.3949	242.6757	146.1774	76.5747	49.8962 (83)
Total gains	457.4759	517.0484	590.7682	672.8878	728.9590	722.4406	691.3125	635.8079	569.2970	491.2177	444.0911	437.1691 (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	48.7318	49.1303	49.5354	51.6652	52.1134	54.3366	54.3366	54.7693	53.4581	52.1134	51.2247	50.3659
alpha	4.2488	4.2754	4.3024	4.4443	4.4742	4.6224	4.6224	4.6513	4.5639	4.4742	4.4150	4.3577
util living area	0.9975	0.9953	0.9886	0.9639	0.8941	0.7372	0.5720	0.6326	0.8730	0.9795	0.9954	0.9980 (86)
Living	19.5828	19.7215	19.9792	20.3559	20.6597	20.8623	20.9159	20.9071	20.7624	20.3642	19.9379	19.6015
Non living	17.5451	17.7305	18.0656	18.5751	18.9217	19.1411	19.1634	19.1731	19.0599	18.6048	18.0512	17.6034
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	20.2750	19.7215	19.9792	20.3559	20.6597	20.8623	20.9159	20.9071	20.7624	20.3642	19.9379	19.7971 (87)
Th 2	19.0984	19.1101	19.1218	19.1813	19.1934	19.2513	19.2513	19.2621	19.2288	19.1934	19.1693	19.1454 (88)
util rest of house	0.9960	0.9925	0.9811	0.9385	0.8182	0.5776	0.3566	0.4134	0.7514	0.9599	0.9921	0.9968 (89)
MIT 2	18.4792	17.7305	18.0656	18.5751	18.9217	19.1411	19.1634	19.1731	19.0599	18.6048	18.0512	17.8813 (90)
Living area fraction	19.5811	18.9523	19.2399	19.6679	19.9882	20.1973	20.2388	20.2371	20.1046	19.6845	19.2089	19.0569 (92)
MIT	19.5811	18.9523	19.2399	19.6679	19.9882	20.1973	20.2388	20.2371	20.1046	19.6845	19.2089	19.0569 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5811	18.9523	19.2399	19.6679	19.9882	20.1973	20.2388	20.2371	20.1046	19.6845	19.2089	19.0569 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9964	0.9922	0.9817	0.9469	0.8568	0.6707	0.4826	0.5426	0.8213	0.9668	0.9922	0.9967 (94)
Useful gains	455.8481	513.0147	579.9695	637.1605	624.5407	484.5247	333.5952	344.9862	467.5402	474.9172	440.6127	435.7243 (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	1593.1677	1453.1672	1306.6733	1058.8880	808.0348	523.3670	340.2395	355.9469	570.6744	885.6631	1201.0044	1498.6838 (97)
Space heating kWh	846.1658	631.7825	540.6676	303.6437	136.5196	0.0000	0.0000	0.0000	0.0000	305.5949	547.4820	790.8418 (98a)
Space heating requirement - total per year (kWh/year)												4102.6979
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	846.1658	631.7825	540.6676	303.6437	136.5196	0.0000	0.0000	0.0000	0.0000	305.5949	547.4820	790.8418 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4102.6979
Space heating per m2										(98c) / (4) =		93.2431 (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 %)												303.3648 (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	846.1658	631.7825	540.6676	303.6437	136.5196	0.0000	0.0000	0.0000	0.0000	305.5949	547.4820	790.8418 (98)
Space heating efficiency (main heating system 1)	303.3648	303.3648	303.3648	303.3648	303.3648	0.0000	0.0000	0.0000	0.0000	303.3648	303.3648	303.3648 (210)
Space heating fuel (main heating system)	278.9268	208.2584	178.2236	100.0920	45.0018	0.0000	0.0000	0.0000	0.0000	100.7351	180.4699	260.6901 (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	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148 (64)
Efficiency of water heater (217)m	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976 (216)
Fuel for water heating, kWh/month	107.3996	94.9888	100.9946	89.0598	86.4965	78.1262	77.2676	80.2488	81.0276	90.1255	95.5450	106.2671 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)

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Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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	(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	(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	(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	(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											1352.3976	(211)
Space heating fuel - main system 2											0.0000	(213)
Space heating fuel - secondary											0.0000	(215)
Efficiency of water heater											174.1976	
Water heating fuel used											1087.5472	(219)
Space cooling fuel											0.0000	(221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year											0.0000	(231)
Electricity for lighting (calculated in Appendix L)											100.4615	(232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation											0.0000	(233)
Wind generation											0.0000	(234)
Hydro-electric generation (Appendix N)											0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)											0.0000	(235)
Appendix Q - special features												
Energy saved or generated											-0.0000	(236)
Energy used											0.0000	(237)
Total delivered energy for all uses											2540.4064	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1352.3976	16.4900	223.0104	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1087.5472	16.4900	179.3365	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	100.4615	16.4900	16.5661	(250)
Additional standing charges			0.0000	(251)
Total energy cost			418.9130	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		1.6945	(257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	72.5325	
SAP rating (Section 12)		73	(258)
SAP band		C	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1352.3976	0.1551	209.7514	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1087.5472	0.1408	153.1406	(264)
Space and water heating			362.8920	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	100.4615	0.1443	14.4997	(268)
Total CO2, kg/year			377.3917	(272)
CO2 emissions per m2			8.5800	(273)
EI value			94.3179	
EI rating			94	(274)
EI band			A	

SAP 10 WORKSHEET FOR Conversion (As Built) (Version 10.2, February 2022) CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

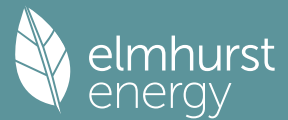
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	44.0000	x	110.0000	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	44.0000			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	110.0000	(5)

2. Ventilation rate

m3 per hour

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Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000	Air changes per hour	0.1818 (8)
Pressure test			No	
Pressure Test Method			Blower Door	
Measured/design AP50			15.0000	(17)
Infiltration rate			0.9318	(18)
Number of sides sheltered			0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000		(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.9318		(21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	4.6000	4.3000	4.4000	4.0000	4.0000	3.5000	3.6000	3.8000	3.7000	3.9000	3.9000	4.3000	(22)
Wind factor	1.1500	1.0750	1.1000	1.0000	1.0000	0.8750	0.9000	0.9500	0.9250	0.9750	0.9750	1.0750	(22a)
Adj infilt rate	1.0716	1.0017	1.0250	0.9318	0.9318	0.8153	0.8386	0.8852	0.8619	0.9085	0.9085	1.0017	(22b)
Effective ac	1.0716	1.0017	1.0250	0.9341	0.9341	0.8324	0.8517	0.8918	0.8715	0.9127	0.9127	1.0017	(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								
Windows			5.5800	1.1450	6.3893			(27)
Rooflights			2.0000	1.1450	2.2901			(27a)
Heatloss Floor			44.0000	0.1300	5.7200	110.0000	4840.0000	(28a)
Solid Brick	58.7500	5.5800	53.1700	0.2400	12.7608	190.0000	10102.3000	(29a)
Flat Roof	44.0000	2.0000	42.0000	0.1100	4.6200	9.0000	378.0000	(30)
Total net area of external elements Aum(A, m2)			146.7500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.7802		(33)
Main dwelling								
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000	(32)
Internal Wall 1			55.0000			9.0000	495.0000	(32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =	18290.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								415.6886 (35)
Thermal bridges (Default value 0.200 * total exposed area)								29.3500 (36)
Point Thermal bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	61.1302 (37)

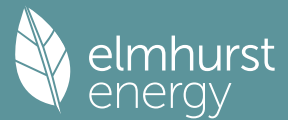
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	38.8987	36.3619	37.2075	33.9094	33.9094	30.2158	30.9151	32.3728	31.6341	33.1313	33.1313	36.3619	(38)
Heat transfer coeff	100.0289	97.4921	98.3377	95.0396	95.0396	91.3460	92.0453	93.5030	92.7643	94.2614	94.2614	97.4921	(39)
Average = Sum(39)m / 12 =												95.1343	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	2.2734	2.2157	2.2349	2.1600	2.1600	2.0760	2.0919	2.1251	2.1083	2.1423	2.1423	2.2157	(40)
HLP (average)												2.1621	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.5162 (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													
	60.1748	59.2811	58.0226	55.7022	53.9647	52.0381	50.9974	52.2471	53.6078	55.6693	58.0376	59.9714	(42b)
Hot water usage for other uses													
	31.7451	30.5907	29.4363	28.2820	27.1276	25.9732	25.9732	27.1276	28.2820	29.4363	30.5907	31.7451	(42c)
Average daily hot water use (litres/day)													84.6507 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	91.9199	89.8718	87.4590	83.9842	81.0923	78.0113	76.9707	79.3747	81.8897	85.1057	88.6282	91.7164	(44)
Energy conte	145.5786	127.9763	134.4212	114.9701	109.1658	95.9240	93.0893	98.2825	100.9782	115.4876	126.2672	143.6058	(45)
Energy content (annual)										Total = Sum(45)m =		1405.7467	
Distribution loss (46)m = 0.15 x (45)m													
	21.8368	19.1964	20.1632	17.2455	16.3749	14.3886	13.9634	14.7424	15.1467	17.3231	18.9401	21.5409	(46)
Water storage loss (or HIU loss):													
Store volume													210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0900 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.5886 (55)
Total storage loss													
	18.2466	16.4808	18.2466	17.6580	18.2466	17.6580	18.2466	18.2466	17.6580	18.2466	17.6580	18.2466	(56)
If cylinder contains dedicated solar storage													
	18.2466	16.4808	18.2466	17.6580	18.2466	17.6580	18.2466	18.2466	17.6580	18.2466	17.6580	18.2466	(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													
	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148	(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													
	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148	(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													

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81.6121 72.5457 77.9022 70.3636 69.5048 64.0307 64.1594 65.8861 65.7113 71.6068 74.1198 80.9561 (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	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.2214	12.6313	10.2725	7.7769	5.8133	4.9079	5.3031	6.8932	9.2520	11.7476	13.7112	14.6166	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	196.5794	198.6193	193.4789	182.5355	168.7215	155.7382	147.0646	145.0248	150.1652	161.1086	174.9226	187.9058	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	(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)	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	(71)
Water heating gains (Table 5)	109.6937	107.9549	104.7073	97.7272	93.4205	88.9316	86.2358	88.5566	91.2656	96.2457	102.9442	108.8120	(72)
Total internal gains	396.4329	395.1440	384.3971	363.9781	343.8937	325.5161	314.5420	316.4130	326.6213	345.0403	367.5164	387.2729	(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		
West					5.5800	21.5869	0.7600	0.7000	0.7700	44.4089	(80)	
North					2.0000	29.0000	0.6300	0.7000	1.0000	23.0202	(82)	
Solar gains	67.4291	120.8166	204.7934	317.2652	381.2222	420.9592	400.8937	347.9755	266.1141	158.1145	87.3427	56.4637 (83)
Total gains	463.8620	515.9606	589.1905	681.2433	725.1159	746.4754	715.4357	664.3885	592.7354	503.1548	454.8592	443.7366 (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	50.7917	52.1134	51.6652	53.4581	53.4581	55.6197	55.1972	54.3366	54.7693	53.8994	53.8994	52.1134	
alpha	4.3861	4.4742	4.4443	4.5639	4.5639	4.7080	4.6798	4.6224	4.6513	4.5933	4.5933	4.4742	
util living area	0.9966	0.9942	0.9835	0.9406	0.8187	0.5458	0.3206	0.3773	0.7476	0.9594	0.9927	0.9971	(86)
Living	19.7686	19.9004	20.1677	20.5298	20.7946	20.9205	20.9330	20.9311	20.8713	20.5509	20.1335	19.7839	
Non living	17.8259	18.0201	18.3475	18.8161	19.0742	19.1970	19.1879	19.1654	19.1610	18.8629	18.3527	17.8722	
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	20.3701	19.9004	20.1677	20.5298	20.7946	20.9205	20.9330	20.9311	20.8713	20.5509	20.1335	19.9540	(87)
Th 2	19.1573	19.1934	19.1813	19.2288	19.2288	19.2831	19.2727	19.2513	19.2621	19.2402	19.2402	19.1934	(88)
util rest of house	0.9944	0.9904	0.9718	0.8974	0.6960	0.3511	0.0994	0.1339	0.5539	0.9174	0.9868	0.9953	(89)
MIT 2	18.6265	18.0201	18.3475	18.8161	19.0742	19.1970	19.1879	19.1654	19.1610	18.8629	18.3527	18.1103	(90)
Living area fraction	19.6964	19.1739	19.4644	19.8677	20.1299	20.2546	20.2588	20.2489	20.2105	19.8987	19.4454	19.2417	(92)
MIT	19.6964	19.1739	19.4644	19.8677	20.1299	20.2546	20.2588	20.2489	20.2105	19.8987	19.4454	19.2417	(93)
Temperature adjustment												0.0000	
adjusted MIT	19.6964	19.1739	19.4644	19.8677	20.1299	20.2546	20.2588	20.2489	20.2105	19.8987	19.4454	19.2417	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9951	0.9904	0.9741	0.9160	0.7653	0.4643	0.2261	0.2738	0.6693	0.9372	0.9878	0.9954	(94)
Useful gains	461.6106	511.0038	573.9489	624.0279	554.9436	346.6176	161.7671	181.8932	396.6884	471.5354	449.2922	441.6771	(95)
Ext temp.	5.4000	5.8000	7.8000	10.3000	13.4000	16.4000	18.5000	18.3000	15.6000	12.1000	8.3000	5.4000	(96)
Heat loss rate W	1430.0564	1303.8504	1147.0543	909.3080	639.6026	352.1020	161.8867	182.2280	427.6910	735.1160	1050.5856	1349.4538	(97)
Space heating kWh	720.5236	532.7929	426.3904	205.4016	62.9863	0.0000	0.0000	0.0000	0.0000	196.1040	432.9313	675.3859	(98a)
Space heating requirement - total per year (kWh/year)												3252.5160	
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	720.5236	532.7929	426.3904	205.4016	62.9863	0.0000	0.0000	0.0000	0.0000	196.1040	432.9313	675.3859	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3252.5160	
Space heating per m ²										(98c) / (4) =		73.9208	(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 %)

304.8907 (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	720.5236	532.7929	426.3904	205.4016	62.9863	0.0000	0.0000	0.0000	0.0000	196.1040	432.9313	675.3859	(98)
Space heating efficiency (main heating system 1)	304.8907	304.8907	304.8907	304.8907	304.8907	0.0000	0.0000	0.0000	0.0000	304.8907	304.8907	304.8907	(210)
Space heating fuel (main heating system)	236.3220	174.7488	139.8503	67.3689	20.6586	0.0000	0.0000	0.0000	0.0000	64.3194	141.9956	221.5174	(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)

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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	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148 (64)
Efficiency of water heater	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979 (216)
Fuel for water heating, kWh/month	107.0308	94.6626	100.6478	88.7540	86.1994	77.8579	77.0023	79.9732	80.7494	89.8161	95.2169	105.9022 (217)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938 (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												1066.7811 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												174.7979
Water heating fuel used												1083.8126 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												100.4615 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												2251.0552 (238)

10a. Fuel costs - using BEDF prices (590)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1066.7811	28.4300	303.2859 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1083.8126	28.4300	308.1279 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	100.4615	28.4300	28.5612 (250)
Additional standing charges			0.0000 (251)
Total energy cost			639.9750 (255)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1066.7811	0.1561	166.5342 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1083.8126	0.1408	152.6147 (264)
Space and water heating			319.1489 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	100.4615	0.1443	14.4997 (268)
Total CO2, kg/year			333.6486 (272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1066.7811	1.5779	1683.3213 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1083.8126	1.5207	1648.1217 (278)
Space and water heating			3331.4429 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	100.4615	1.5338	154.0913 (282)
Total Primary energy kWh/year			3485.5342 (286)

SAP 10 EPC IMPROVEMENTS

Be Green

Current energy efficiency rating:
Current environmental impact rating:

C 73
A 94

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N Solar water heating Not applicable
 U Solar photovoltaic panels Not applicable
 V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
 (none)

Recommended measures Typical annual savings Energy Environmental
 (none) efficiency impact
 Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: C 73
 Potential environmental impact rating: A 94

Fuel prices for cost data on this page from database revision number 590 TEST (30 Jan 2026)
 Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£640	£640	£0
Space heating	£303	£303	£0
Water heating	£308	£308	£0
Lighting	£29	£29	£0
Total cost of fuels	£640	£640	£0
Total cost of uses	£640	£640	£0
Delivered energy	51 kWh/m²	51 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	8 kg/m²	8 kg/m²	0 kg/m²
Primary energy	79 kWh/m²	79 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR Conversion (As Built) (Version 10.2, February 2022)
 CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m²)	Storey height (m)	Volume (m³)
Main dwelling	44.0000 (1b)	2.5000 (2b)	110.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		110.0000 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 110.0000 (5)

2. Ventilation rate

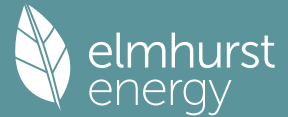
	m³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1818 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9318 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.9318 (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	1.1881	1.1648	1.1415	1.0250	1.0017	0.8852	0.8852	0.8619	0.9318	1.0017	1.0483	1.0949 (22b)
Effective ac	1.1881	1.1648	1.1415	1.0250	1.0017	0.8918	0.8918	0.8715	0.9341	1.0017	1.0483	1.0949 (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							
Windows			5.5800	1.1450	6.3893		(27)
Rooflights			2.0000	1.1450	2.2901		(27a)
Heatloss Floor			44.0000	0.1300	5.7200	110.0000	4840.0000 (28a)
Solid Brick	58.7500	5.5800	53.1700	0.2400	12.7608	190.0000	10102.3000 (29a)
Flat Roof	44.0000	2.0000	42.0000	0.1100	4.6200	9.0000	378.0000 (30)

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Total net area of external elements Aum(A, m2)	146.7500												(31)
Fabric heat loss, W/K = Sum (A x U)	(26)...(30) + (32) =	31.7802											(33)
Main dwelling													
Party Wall	13.7500	0.0000	0.0000	180.0000	2475.0000	(32)							
Internal Wall 1	55.0000			9.0000	495.0000	(32c)							
Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	18290.3000	(34)										
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		415.6886	(35)										
Thermal bridges (Default value 0.200 * total exposed area)		29.3500	(36)										
Point Thermal Bridges		0.0000	(36a)										
Total fabric heat loss	(33) + (36) + (36a) =	61.1302	(37)										

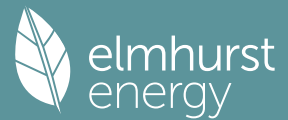
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	43.1269	42.2812	41.4356	37.2075	36.3619	32.3728	32.3728	31.6341	33.9094	36.3619	38.0531	39.7444	(38)
Average = Sum(39)m / 12 =	104.2571	103.4114	102.5658	98.3377	97.4921	93.5030	93.5030	92.7643	95.0396	97.4921	99.1833	100.8746	(39)
												98.2020	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	2.3695	2.3503	2.3310	2.2349	2.2157	2.1251	2.1251	2.1083	2.1600	2.2157	2.2542	2.2926	(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													1.5162 (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													
60.1748	59.2811	58.0226	55.7022	53.9647	52.0381	50.9974	52.2471	53.6078	55.6693	58.0376	59.9714	59.9714	(42b)
Hot water usage for other uses													
31.7451	30.5907	29.4363	28.2820	27.1276	25.9732	25.9732	27.1276	28.2820	29.4363	30.5907	31.7451	31.7451	(42c)
Average daily hot water use (litres/day)													84.6507 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	91.9199	89.8718	87.4590	83.9842	81.0923	78.0113	76.9707	79.3747	81.8897	85.1057	88.6282	91.7164	(44)
Energy content (annual)	145.5786	127.9763	134.4212	114.9701	109.1658	95.9240	93.0893	98.2825	100.9782	115.4876	126.2672	143.6058	(45)
Distribution loss (46)m = 0.15 x (45)m													
21.8368	19.1964	20.1632	17.2455	16.3749	14.3886	13.9634	14.7424	15.1467	17.3231	18.9401	21.5409	21.5409	(46)
Water storage loss (or HIU loss):													
Store volume													210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0900 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.5886 (55)
Total storage loss													
18.2466	16.4808	18.2466	17.6580	18.2466	17.6580	18.2466	18.2466	17.6580	18.2466	17.6580	18.2466	18.2466	(56)
If cylinder contains dedicated solar storage													
18.2466	16.4808	18.2466	17.6580	18.2466	17.6580	18.2466	18.2466	17.6580	18.2466	17.6580	18.2466	18.2466	(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													
187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148	185.1148	(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	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148	(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	0.0000	(64a)
Heat gains from water heating, kWh/month													
81.6121	72.5457	77.9022	70.3636	69.5048	64.0307	64.1594	65.8861	65.7113	71.6068	74.1198	80.9561	80.9561	(65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)

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	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	90.9743	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	14.2214	12.6313	10.2725	7.7769	5.8133	4.9079	5.3031	6.8932	9.2520	11.7476	13.7112	14.6166	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	196.5794	198.6193	193.4789	182.5355	168.7215	155.7382	147.0646	145.0248	150.1652	161.1086	174.9226	187.9058	(68)
Pumps, fans	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	(69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	(71)
Total internal gains	109.6937	107.9549	104.7073	97.7272	93.4205	88.9316	86.2358	88.5566	91.2656	96.2457	102.9442	108.8120	(72)
	396.4329	395.1440	384.3971	363.9781	343.8937	325.5161	314.5420	316.4130	326.6213	345.0403	367.5164	387.2729	(73)

6. Solar gains													
[Jan]													
West			Area	Solar flux	g	FF	Access	Gains					
North			m2	Table 6a	Specific data	Specific data	factor	W					
				W/m2	or Table 6b	or Table 6c	Table 6d						
West			5.5800	19.6403	0.7600	0.7000	0.7700	40.4042	(80)				
North			2.0000	26.0000	0.6300	0.7000	1.0000	20.6388	(82)				
Solar gains	61.0430	121.9044	206.3710	308.9097	385.0653	396.9245	376.7705	319.3949	242.6757	146.1774	76.5747	49.8962	(83)
Total gains	457.4759	517.0484	590.7682	672.8878	728.9590	722.4406	691.3125	635.8079	569.2970	491.2177	444.0911	437.1691	(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	48.7318	49.1303	49.5354	51.6652	52.1134	54.3366	54.3366	54.7693	53.4581	52.1134	51.2247	50.3659
alpha	4.2488	4.2754	4.3024	4.4443	4.4742	4.6224	4.6224	4.6513	4.5639	4.4742	4.4150	4.3577
util living area	0.9975	0.9953	0.9886	0.9639	0.8941	0.7372	0.5720	0.6326	0.8730	0.9795	0.9954	0.9980 (86)
Living	19.5828	19.7215	19.9792	20.3559	20.6597	20.8623	20.9159	20.9071	20.7624	20.3642	19.9379	19.6015
Non living	17.5451	17.7305	18.0656	18.5751	18.9217	19.1411	19.1634	19.1731	19.0599	18.6048	18.0512	17.6034
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	20.2750	19.7215	19.9792	20.3559	20.6597	20.8623	20.9159	20.9071	20.7624	20.3642	19.9379	19.7971 (87)
Th 2	19.0984	19.1101	19.1218	19.1813	19.1934	19.2513	19.2513	19.2621	19.2288	19.1934	19.1693	19.1454 (88)
util rest of house	0.9960	0.9925	0.9811	0.9385	0.8182	0.5776	0.3566	0.4134	0.7514	0.9599	0.9921	0.9968 (89)
MIT 2	18.4792	17.7305	18.0656	18.5751	18.9217	19.1411	19.1634	19.1731	19.0599	18.6048	18.0512	17.8813 (90)
Living area fraction									fLA = Living area / (4) =			0.6136 (91)
MIT	19.5811	18.9523	19.2399	19.6679	19.9882	20.1973	20.2388	20.2371	20.1046	19.6845	19.2089	19.0569 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5811	18.9523	19.2399	19.6679	19.9882	20.1973	20.2388	20.2371	20.1046	19.6845	19.2089	19.0569 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9964	0.9922	0.9817	0.9469	0.8568	0.6707	0.4826	0.5426	0.8213	0.9668	0.9922	0.9967 (94)
Useful gains	455.8481	513.0147	579.9695	637.1605	624.5407	484.5247	333.5952	344.9862	467.5402	474.9172	440.6127	435.7243 (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	1593.1677	1453.1672	1306.6733	1058.8880	808.0348	523.3670	340.2395	355.9469	570.6744	885.6631	1201.0044	1498.6838 (97)
Space heating kWh	846.1658	631.7825	540.6676	303.6437	136.5196	0.0000	0.0000	0.0000	0.0000	305.5949	547.4820	790.8418 (98a)
Space heating requirement - total per year (kWh/year)												4102.6979
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	846.1658	631.7825	540.6676	303.6437	136.5196	0.0000	0.0000	0.0000	0.0000	305.5949	547.4820	790.8418 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4102.6979
Space heating per m2										(98c) / (4) =		93.2431 (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 %)													303.3648 (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	846.1658	631.7825	540.6676	303.6437	136.5196	0.0000	0.0000	0.0000	0.0000	305.5949	547.4820	790.8418 (98)	
Space heating efficiency (main heating system 1)	303.3648	303.3648	303.3648	303.3648	303.3648	0.0000	0.0000	0.0000	0.0000	303.3648	303.3648	303.3648 (210)	
Space heating fuel (main heating system)	278.9268	208.2584	178.2236	100.0920	45.0018	0.0000	0.0000	0.0000	0.0000	100.7351	180.4699	260.6901 (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	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148 (64)	
Efficiency of water heater	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976	174.1976 (216)	
Fuel for water heating, kWh/month	107.3996	94.9888	100.9946	89.0598	86.4965	78.1262	77.2676	80.2488	81.0276	90.1255	95.5450	106.2671 (219)	
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)	
Lighting	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938 (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													1352.3976 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													174.1976
Water heating fuel used													1087.5472 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													0.0000 (231)

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Electricity for lighting (calculated in Appendix L)	100.4615 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2540.4064 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1352.3976	16.4900	223.0104 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1087.5472	16.4900	179.3365 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	100.4615	16.4900	16.5661 (250)
Additional standing charges			0.0000 (251)
Total energy cost			418.9130 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	1.6945 (257)
SAP value	72.5325
SAP rating (Section 12)	73 (258)
SAP band	C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1352.3976	0.1551	209.7514 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1087.5472	0.1408	153.1406 (264)
Space and water heating			362.8920 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	100.4615	0.1443	14.4997 (268)
Total CO2, kg/year			377.3917 (272)
CO2 emissions per m2			8.5800 (273)
EI value			94.3179
EI rating			94 (274)
EI band			A

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

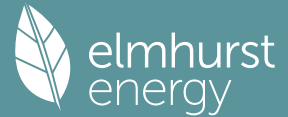
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	44.0000 (1b)	x 2.5000 (2b)	= 110.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	44.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	110.0000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1818 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.9318 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.9318 (21)

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Wind speed	Jan 4.6000	Feb 4.3000	Mar 4.4000	Apr 4.0000	May 4.0000	Jun 3.5000	Jul 3.6000	Aug 3.8000	Sep 3.7000	Oct 3.9000	Nov 3.9000	Dec 4.3000 (22)
Wind factor	1.1500	1.0750	1.1000	1.0000	1.0000	0.8750	0.9000	0.9500	0.9250	0.9750	0.9750	1.0750 (22a)
Adj infilt rate												
Effective ac	1.0716	1.0017	1.0250	0.9318	0.9318	0.8153	0.8386	0.8852	0.8619	0.9085	0.9085	1.0017 (22b)
	1.0716	1.0017	1.0250	0.9341	0.9341	0.8324	0.8517	0.8918	0.8715	0.9127	0.9127	1.0017 (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								
Windows			5.5800	1.1450	6.3893			(27)
Rooflights			2.0000	1.1450	2.2901			(27a)
Heatloss Floor			44.0000	0.1300	5.7200	110.0000	4840.0000	(28a)
Solid Brick	58.7500	5.5800	53.1700	0.2400	12.7608	190.0000	10102.3000	(29a)
Flat Roof	44.0000	2.0000	42.0000	0.1100	4.6200	9.0000	378.0000	(30)
Total net area of external elements Aum(A, m2)			146.7500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.7802			(33)
Main dwelling								
Party Wall			13.7500	0.0000	0.0000	180.0000	2475.0000	(32)
Internal Wall 1			55.0000			9.0000	495.0000	(32c)
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) = 18290.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								415.6886 (35)
Thermal bridges (Default value 0.200 * total exposed area)								29.3500 (36)
Point Thermal bridges								(36a) = 0.0000
Total fabric heat loss								(33) + (36) + (36a) = 61.1302 (37)

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

(38)m	Jan 38.8987	Feb 36.3619	Mar 37.2075	Apr 33.9094	May 33.9094	Jun 30.2158	Jul 30.9151	Aug 32.3728	Sep 31.6341	Oct 33.1313	Nov 33.1313	Dec 36.3619 (38)
Heat transfer coeff	100.0289	97.4921	98.3377	95.0396	95.0396	91.3460	92.0453	93.5030	92.7643	94.2614	94.2614	97.4921 (39)
Average = Sum(39)m / 12 =												95.1343

HLP	Jan 2.2734	Feb 2.2157	Mar 2.2349	Apr 2.1600	May 2.1600	Jun 2.0760	Jul 2.0919	Aug 2.1251	Sep 2.1083	Oct 2.1423	Nov 2.1423	Dec 2.2157 (40)
HLP (average)												2.1621
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

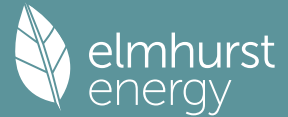
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.5162 (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	60.1748	59.2811	58.0226	55.7022	53.9647	52.0381	50.9974	52.2471	53.6078	55.6693	58.0376	59.9714 (42b)
Hot water usage for other uses	31.7451	30.5907	29.4363	28.2820	27.1276	25.9732	25.9732	27.1276	28.2820	29.4363	30.5907	31.7451 (42c)
Average daily hot water use (litres/day)												84.6507 (43)
Daily hot water use	Jan 91.9199	Feb 89.8718	Mar 87.4590	Apr 83.9842	May 81.0923	Jun 78.0113	Jul 76.9707	Aug 79.3747	Sep 81.8897	Oct 85.1057	Nov 88.6282	Dec 91.7164 (44)
Energy conte	145.5786	127.9763	134.4212	114.9701	109.1658	95.9240	93.0893	98.2825	100.9782	115.4876	126.2672	143.6058 (45)
Energy content (annual)										Total = Sum(45)m =		1405.7467
Distribution loss (46)m = 0.15 x (45)m	21.8368	19.1964	20.1632	17.2455	16.3749	14.3886	13.9634	14.7424	15.1467	17.3231	18.9401	21.5409 (46)
Water storage loss (or HIU loss):												
Store volume												210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0900 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.5886 (55)
Total storage loss	18.2466	16.4808	18.2466	17.6580	18.2466	17.6580	18.2466	18.2466	17.6580	18.2466	17.6580	18.2466 (56)
If cylinder contains dedicated solar storage	18.2466	16.4808	18.2466	17.6580	18.2466	17.6580	18.2466	18.2466	17.6580	18.2466	17.6580	18.2466 (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	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148 (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	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148 (64)
								Total per year (kWh/year) = Sum(64)m =				1894.4817 (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	81.6121	72.5457	77.9022	70.3636	69.5048	64.0307	64.1594	65.8861	65.7113	71.6068	74.1198	80.9561 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan 90.9743	Feb 90.9743	Mar 90.9743	Apr 90.9743	May 90.9743	Jun 90.9743	Jul 90.9743	Aug 90.9743	Sep 90.9743	Oct 90.9743	Nov 90.9743	Dec 90.9743 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.2214	12.6313	10.2725	7.7769	5.8133	4.9079	5.3031	6.8932	9.2520	11.7476	13.7112	14.6166 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	196.5794	198.6193	193.4789	182.5355	168.7215	155.7382	147.0646	145.0248	150.1652	161.1086	174.9226	187.9058 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137	45.6137 (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)	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496	-60.6496 (71)
Water heating gains (Table 5)	109.6937	107.9549	104.7073	97.7272	93.4205	88.9316	86.2358	88.5566	91.2656	96.2457	102.9442	108.8120 (72)
Total internal gains												

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396.4329 395.1440 384.3971 363.9781 343.8937 325.5161 314.5420 316.4130 326.6213 345.0403 367.5164 387.2729 (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		
West					5.5800	21.5869	0.7600	0.7000	0.7700	44.4089 (80)		
North					2.0000	29.0000	0.6300	0.7000	1.0000	23.0202 (82)		
Solar gains	67.4291	120.8166	204.7934	317.2652	381.2222	420.9592	400.8937	347.9755	266.1141	158.1145	87.3427	56.4637 (83)
Total gains	463.8620	515.9606	589.1905	681.2433	725.1159	746.4754	715.4357	664.3885	592.7354	503.1548	454.8592	443.7366 (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	50.7917	52.1134	51.6652	53.4581	53.4581	55.6197	55.1972	54.3366	54.7693	53.8994	53.8994	52.1134
alpha	4.3861	4.4742	4.4443	4.5639	4.5639	4.7080	4.6798	4.6224	4.6513	4.5933	4.5933	4.4742
util living area	0.9966	0.9942	0.9835	0.9406	0.8187	0.5458	0.3206	0.3773	0.7476	0.9594	0.9927	0.9971 (86)
Living	19.7686	19.9004	20.1677	20.5298	20.7946	20.9205	20.9330	20.9311	20.8713	20.5509	20.1335	19.7839
Non living	17.8259	18.0201	18.3475	18.8161	19.0742	19.1970	19.1879	19.1654	19.1610	18.8629	18.3527	17.8722
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	20.3701	19.9004	20.1677	20.5298	20.7946	20.9205	20.9330	20.9311	20.8713	20.5509	20.1335	19.9540 (87)
Th 2	19.1573	19.1934	19.1813	19.2288	19.2288	19.2831	19.2727	19.2513	19.2621	19.2402	19.2402	19.1934 (88)
util rest of house	0.9944	0.9904	0.9718	0.8974	0.6960	0.3511	0.0994	0.1339	0.5539	0.9174	0.9868	0.9953 (89)
MIT 2	18.6265	18.0201	18.3475	18.8161	19.0742	19.1970	19.1879	19.1654	19.1610	18.8629	18.3527	18.1103 (90)
Living area fraction									fLA = Living area / (4) =			0.6136 (91)
MIT	19.6964	19.1739	19.4644	19.8677	20.1299	20.2546	20.2588	20.2489	20.2105	19.8987	19.4454	19.2417 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6964	19.1739	19.4644	19.8677	20.1299	20.2546	20.2588	20.2489	20.2105	19.8987	19.4454	19.2417 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9951	0.9904	0.9741	0.9160	0.7653	0.4643	0.2261	0.2738	0.6693	0.9372	0.9878	0.9954 (94)
Useful gains	461.6106	511.0038	573.9489	624.0279	554.9436	346.6176	161.7671	181.8932	396.6884	471.5354	449.2922	441.6771 (95)
Ext temp.	5.4000	5.8000	7.8000	10.3000	13.4000	16.4000	18.5000	18.3000	15.6000	12.1000	8.3000	5.4000 (96)
Heat loss rate W	1430.0564	1303.8504	1147.0543	909.3080	639.6026	352.1020	161.8867	182.2280	427.6910	735.1160	1050.5856	1349.4538 (97)
Space heating kWh	720.5236	532.7929	426.3904	205.4016	62.9863	0.0000	0.0000	0.0000	0.0000	196.1040	432.9313	675.3859 (98a)
Space heating requirement - total per year (kWh/year)												3252.5160
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	720.5236	532.7929	426.3904	205.4016	62.9863	0.0000	0.0000	0.0000	0.0000	196.1040	432.9313	675.3859 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3252.5160
Space heating per m2										(98c) / (4) =		73.9208 (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 %)												304.8907 (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	720.5236	532.7929	426.3904	205.4016	62.9863	0.0000	0.0000	0.0000	0.0000	196.1040	432.9313	675.3859 (98)
Space heating efficiency (main heating system 1)	304.8907	304.8907	304.8907	304.8907	304.8907	0.0000	0.0000	0.0000	0.0000	304.8907	304.8907	304.8907 (210)
Space heating fuel (main heating system)	236.3220	174.7488	139.8503	67.3689	20.6586	0.0000	0.0000	0.0000	0.0000	64.3194	141.9956	221.5174 (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	187.0876	165.4683	175.9302	155.1401	150.6748	136.0940	134.5983	139.7915	141.1482	156.9966	166.4372	185.1148 (64)
Efficiency of water heater (217)m	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979	174.7979 (216)
Fuel for water heating, kWh/month	107.0308	94.6626	100.6478	88.7540	86.1994	77.8579	77.0023	79.9732	80.7494	89.8161	95.2169	105.9022 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	12.4479	9.9862	8.9914	6.5875	5.0884	4.1572	4.6418	6.0336	7.8370	10.2826	11.6142	12.7938 (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)

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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	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	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	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	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	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													1066.7811	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													174.7979	
Water heating fuel used													1083.8126	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													0.0000	(231)
Electricity for lighting (calculated in Appendix L)													100.4615	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													2251.0552	(238)

10a. Fuel costs - using BEDF prices (590)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1066.7811	28.4300	303.2859	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1083.8126	28.4300	308.1279	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	100.4615	28.4300	28.5612	(250)
Additional standing charges			0.0000	(251)
Total energy cost			639.9750	(255)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1066.7811	0.1561	166.5342	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1083.8126	0.1408	152.6147	(264)
Space and water heating			319.1489	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	100.4615	0.1443	14.4997	(268)
Total CO2, kg/year			333.6486	(272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1066.7811	1.5779	1683.3213	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1083.8126	1.5207	1648.1217	(278)
Space and water heating			3331.4429	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	100.4615	1.5338	154.0913	(282)
Total Primary energy kWh/year			3485.5342	(286)