

Energy Statement

2 Caversham Road,
London,
N15 3QP

Job number: 13703

Date: February 2026

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Revision	Issue Date	Author	Checked	Description
0	28.02.2026	ROB	PK	First Issue

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Contents

1	Executive Summary.....	3
2	Existing and Proposed Development	5
3	Planning Policy.....	6
4	Methodology	7
5	Baseline Energy & CO2	8
6	Low Carbon Design – Fabric First – Be Lean	9
7	Low Carbon Technology Review & Recommendations	11
8	Low Carbon Technology – Renewable Energy Generation - Be Green	15
9	Zero Carbon Standard Summary – New Build	17
10	Conclusion	18
11	Appendix 1 – Solar PV, ASHP and MVHR information	Error! Bookmark not defined.
12	Appendix 2 - Be Lean DER/TER SAP Worksheets.....	19
13	Appendix 3 – Be Green DER/TER SAP Worksheets.....	20

1 Executive Summary

This report has been produced by Base Energy on behalf of Aygul Boyraz and in support of the planning application for the development named as 2 Caversham Road, London, N15 3QP comprising the subdivision of the rear garden to facilitate the construction of a new two-bedroom dwelling falling under the requirements of Haringey Council.

- National Planning Policy.
- The London Plan Policy SI 2: Minimising greenhouse gas emissions
- The Haringey Council Local Plan Policy SP4: Working Towards a Low Carbon Haringey

The above policies require:

- A minimum 35% CO2 reduction over Part L1 2021 with an aim to achieve zero carbon were feasible
- A 10% CO2 reduction over Part L1 2021 through energy saving measures
- A 20% CO2 reduction from on-site renewable technology sources

The design of the development will incorporate energy efficient building fabric and services in addition to low carbon technology:

- Thermal specification exceeding Part L 2021 notional U-values
- A design which limits air permeability
- A design which limits thermal bridging
- Energy saving building services including MVHR, low energy lighting and heating controls
- Low carbon Air Source Heat Pump

Table 1.1: Carbon emissions summary - New Build

	Total CO2 Emission (Tonnes CO2/year)	CO2 saving (Tonnes CO2/year)	Percentage savings (%)
Part L Baseline	0.9	N/A	
Be Lean Design	0.8	0.1	11%
Be Clean	0.8	0.0	0%
Be Green	0.3	0.5	53%
Cumulative saving	0.6		64%

This results in an 64% saving in CO2 emissions over Part L building regulations.

For the carbon off set contribution, please see the GLA spreadsheet provided.

2 Existing and Proposed Development

The development site is located at 2 Caversham Road, London, N15 3QP.

The development proposals are for the subdivision of the rear garden to facilitate the construction of a new two-bedroom dwelling.

The development proposals constitute a minor development.

Aspects of the site location, shape, and surroundings (in particular the adjacent buildings), along with any other requirements of planning, use type, and scale will naturally constrain the development proposals in terms of the layout, positioning, and orientation of the proposed development. Subsequently, these constraints will impact on the feasibility of certain renewable technologies (as discussed in Section 4 of this report).

Figure 2.1: Site Location and proposals



3 Planning Policy

National Planning Policy Framework 2025

The NPPF was updated in February 2025 to place greater emphasis on beauty, place-making, the environment, and sustainable development. The strengthened environmental objectives aim to protect and enhance the natural, built, and historic environment, and encourage effective land use, greater biodiversity, prudent use of natural resources, minimisation of waste and pollution, and adaptation to climate change alongside a move to a low carbon economy.

Local Planning Policy

The Haringey Local Planning Policy requirements are as follows.

The development should target:

- Haringey Local plan - Policy SP4: Working Towards a Low Carbon Haringey
 - A 20% CO2 reduction from on-site renewable technology sources
- The London Plan Policy SI 2 Minimising greenhouse gas emissions
 - A minimum 35% CO2 reduction over Part L1 2021 with an aim to achieve zero carbon where feasible
 - A 10% CO2 reduction over Part L1 2021 through energy saving measures

4 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.

¹ U-values (Thermal Transmittance) - the measure of the overall rate of heat transfer by all mechanisms under standard conditions, through a particular section of a construction. Lower u-values mean better thermal insulation

5 Baseline Energy & CO2

Energy modelling software has been used to calculate a baseline for the development. This forms the basis from which compliance with planning policy has been measured.

Table 5.1: Baseline CO2 – New Build

	CO2 Emission Rate (kg CO2/m2/year)	Floor Area (m2)	Total Baseline Emissions (kg CO2/year)
Baseline	12.93	70	905

The **Total Baseline CO2 Emissions** for the development are shown to be 905 kg/year.

Table 5.2: Baseline Energy Demand – New Build

	Energy Demand (kWh/m2/year)	Floor Area (m2)	Total Baseline Energy Demand (kWh/year)
Baseline	67.69	70	4,738

The **Baseline Energy Demand** for the development is shown to be 4,738 kWh per year.

6 Low Carbon Design – Fabric First – Be Lean

Before considering low carbon energy generating technology the development has been designed to reduce energy demand through the first step of the energy hierarchy by considering 'fabric first'. A thermally efficient building envelope will follow the design standards as set out below.

Table 6.0: Building Fabric Standards (including u-values W/m²K)

	Part L 2013 Limiting Parameters	Part L 2021 Limiting Parameters	Part L 2021 Notional Targets	Proposed Development Full Demolition
New external walls	0.30	0.26	0.18	0.16
Ground floor	0.25	0.18	0.13	0.10
Roofs	0.20	0.16	0.11	0.11
Windows	2.00	1.6	1.2	1.2, G-value 0.45
Doors	2.00	1.6	1.0	1.1
Air permeability	10.00	8.00	5.00	3.00

- Insulation: The specified building envelope is designed to exceed the notional Part L targets and will help to limit the energy demand of the dwelling for space heating
- Thermal bridging: The design will seek to limit heat loss through thermal bridging by targeting a global 'y-value' of 0.04

Once heat retention has been addressed the next step is to ensure energy consuming building services are efficient

- Lighting: Low energy LED lighting throughout with a minimum efficacy of 80 lumens per watt
- Space & Water Heating: Condensing gas boiler 89.5% efficiency for new build GLA baseline
- Heating Controls: Comprising time & temperature zone control
- Ventilation: MVHR to basement, Model: Nuaire MRXBOX ECO2 (SFP 0.6 and 90% efficiency)
- Air tightness test 3.0@50Pa

The specifications outlined above and with the heating provided by a gas boiler as required by the GLA guidance, have been incorporated into the calculation to generate a dwelling emission rate to be measured against the baseline data.

Table 6.1: Baseline vs Be Lean CO₂

	CO ₂ Emission Rate (kg CO ₂ /m ² /year)	Floor Area (m ²)	Total Baseline Emissions (kg CO ₂ /year)	Reduction in CO ₂
Baseline	12.93	70	905	N/A
Be Lean	14.71	70	806 (1030 minus PV -224)	11%

The **CO₂ Emissions reduction** as a result of energy efficient fabric and services is shown to be 806 kg/year which is 11% saving. The notional PV for the dwelling is -224 and this is deducted from the be lean figure of 1030 kgCO₂/year.

7 Low Carbon Technology Review & Recommendations

Having set out an energy efficient design, the next step is to incorporate low carbon technology for energy generation. A number of technologies exist and should be specified where they:

- Comply with planning policy
- Are feasible for the site
- Are cost efficient
- Are appropriate for proposed development form and function
- Protect against fuel poverty
- Promote fuel security
- Reduce reliance on fossil fuels
- Reduce carbon emissions
- Reduce resource depletion
- Reduce pollution

Site location and development form and function will influence the suitability of different technologies through:

- Orientation
- Space (inside and outside of the buildings)
- Surrounding topography, structures, and natural features
- Wind speed
- Overshading
- Geology and ground conditions
- Building form, function, and density

In determining the most feasible renewable technologies for the dwelling, the following have been reviewed:

- Wind turbines
- Ground Source Heat Pumps
- Air Source Heat Pumps
- Biomass
- Combined Heat and Power
- Photovoltaic Panels
- Solar water heating

WIND TURBINES

Wind turbines are used to produce electricity. They can be either pole mounted (in a suitably exposed position) or building mounted; building mounted systems need a sufficient wind speed at the structural height and both a structural survey and planning permission.

- Wind speed can be too low on low rise buildings
- Taller systems need sufficient space
- Wind resources very variable and unpredictable
- May need planning permission

Wind turbines technology is **not recommended** for this development

GROUND SOURCE HEAT PUMP (GSHP)

GSHPs use naturally occurring underground low-level heat in areas with appropriate geological features. Heat is transferred from the ground by either extracting and discharging (re-charging) water from/to the ground directly (open loop) or circulating water through pipes buried within the ground, (closed loop). The water is passed through a heat pump to transfer the heat from this water into a higher temperature water circuit to provide heating. The loop can be fitted horizontally (laid in a shallow trench) or vertically (in a borehole).

- Feasibility analysis is costly
- Suitable ground conditions required
- More capital intensive than air source heat pumps
- Can be more efficient and lower running costs than ASHPs
- Well suited to highly insulated buildings

Ground source heat pump technology is not **recommended** for this development

AIR SOURCE HEAT PUMP (ASHP)

ASHP systems absorb heat from outside air at a low temperature into a fluid which is then passed through an electrically driven compressor where its temperature is increased. There are two main types of ASHP systems: Air to Water systems distribute heat through wet central heating; Air to air produce warm air which is circulated by fans. For an ASHP system to be installed, there needs to be ample outdoor space for the external condensing unit; these units can also be noisy and blow out colder air to the neighbouring environment.

- Requires space for external plant and internal hot water tank for wet systems supplying DHW
- Can generate noise though quieter systems have been developed
- Least efficient when most needed
- Longer life than fossil fuel boilers
- High capital costs vs gas systems but lower than GSHPs
- Well suited to highly insulated buildings

Air source heat pump technology **is recommended** for this development

BIOMASS

Biomass systems burn wood pellets, chips, or logs to provide heat in a single room, or to power central heating and hot water boilers. There needs to be ample space available for both the boiler and the storage of fuel. There will also be regular deliveries of fuel and therefore adequate site access is required.

- Carbon emissions are cyclical unlike fossil fuel
- Requires fuel storage space and bulk delivery
- Carbon 'neutral' fuel in isolation but supply side emissions are still present so not neutral overall
- Harmful particulate emissions impact air quality and health

Biomass technology **is not recommended** for this development

COMBINED HEAT AND POWER (CHP)

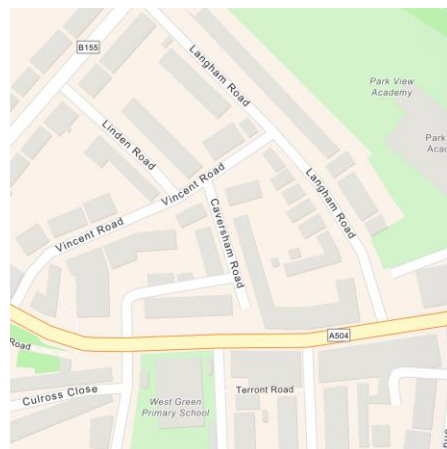
CHP is effectively an on-site small power plant providing both electrical power and thermal heat energy. It is an energy efficiency and low carbon measure rather than a renewable energy technology. A CHP system operates by burning a primary fuel (normally natural gas) by use of either a reciprocating engine or turbine, which in turn drives an alternator to generate electrical power. The heat emitted by the engine and exhaust gases is recovered and used to heat the building or to provide hot water.

- Reduces consumption of and reliance on grid electricity
- Works best with high and consistent heat and hot water demand
- Recovers waste energy
- Can export to the grid
- Uses fossil fuel
- Emissions on site rather than upstream
- Efficiency is sensitive to sizing

CHP **is not recommended** for this development

DISTRICT HEATING

District Heating systems provide multiple buildings or dwellings with heat and hot water from a central boiler house, or 'energy centre'. The system can provide heating or cooling which is transferred from the energy centre through a network of highly insulated pipes carrying the heated water to each dwelling.



- Economies of scale
- Frees up space in habitable areas of development
- Variety of systems
- Can make use of waste heat from industry
- Can be fossil fuel based and dependent

With reference to the Local Heat Map it has been determined that there are no existing heat networks or energy centres within a suitable radius from the development and there are no existing networks local to the site

District heating **is not recommended** for this development

SOLAR PHOTOVOLTAIC (PV)

Solar PV cells (which are mounted together in panels or tiles on the roof) convert sunlight into electricity. The cells are made from layers of semi-conducting material; when the light shines on the cell, an electric field is created across the layers. Although PV cells are most effective in bright sunlight, they can still generate electricity on a cloudy day. The power of a PV cell is measured in kilowatts peak (kWp). Each PV panel produces 350 Watts to 450 Watts depending on the manufacture.

- Passive technology, requires no energy input from grid
- Does not require sunny days to generate power
- Capital costs can be high although payback is effective
- Needs sufficient roof space and orientation
- Zero site or upstream emissions
- Can export to the grid

Solar PV technology **is recommended** for this development

SOLAR HOT WATER

Solar hot water systems absorb energy from the sun and transfer this energy using heat exchangers to heat water which can then be stored. Systems should be roof mounted and oriented to face between a south-east and south-west direction.

- Mostly passive technology but requires pump energy
- Not suitable for combi boilers and developments without roof space
- Lower CO2 reductions than other technologies

Solar hot water technology **is not recommended** for this development

Low Carbon Technology Summary

The low carbon technology review indicates that Air Source Heat Pump and Solar PV would be potentially feasible. The following low carbon technology is recommended:

Air Source Heat Pump (ASHP) – Model: Mitsubishi Ecodan 8.5kW PUZ-WM85VAA with a SCOP of 4.84.

These technologies are deemed optimal for meeting the needs of the development and achieving policy compliance. It has been incorporated into the energy model and the results are presented in the next section.

8 Low Carbon Technology – Renewable Energy Generation - Be Green

The selected Low Carbon Technology has been incorporated into the calculation and the results are set out below.

Table 8.1: Baseline vs Be Green CO2 – New Build

	CO2 Emission Rate (kg CO2/m2/year)	Floor Area (m2)	Total Baseline Emissions (kg CO2/year)	Reduction in CO2
Baseline	12.93	70	905	N/A
Be Lean & Green Design	4.63	70	324	64%

The **CO2 Emissions reduction** as a result of energy efficient fabric and services is shown to be 581 kg/year.

Table 8.2: Baseline vs Be Green Energy Demand - New Build

	Energy Demand (kWh/m2/year)	Floor Area (m2)	Total Baseline Energy Demand (kWh/year)	Reduction in Energy Demand
Baseline	67.69	70	4,738	N/A
Be Lean & Green Design	49.41	70	3,458	27%

The **Energy Demand reduction** as a result of energy efficient fabric and services is shown to be 1,280 kWh per year

Table 8.3: Fabric Efficiency – New Build

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development total	42.23	37.30	12%

9 Energy Use Intensity and Space Heating Demand

In accordance with the Greater London Authority's Energy Assessment Guidance, the Energy Use Intensity (EUI) and Space Heating demand has been calculated and reported in this section of the report.

The guidance states that residential developments should aim to achieve a total energy use intensity and space heating demand of no more than 35 kWh/m²/year and 15kWh/m²/year respectively.

An additional energy modelling exercise has been carried out using Design Builder dynamic simulation software and the CIBSE TM54 methodology. An overview of the results is shown in table 9.1 below while a full breakdown of the monthly results for each flat can be found in Appendix 3 of this report.

Table 9.1: Energy Use Intensity and Space Heating Demand

Dwelling	Total Energy Use Intensity EUI (kWh/m ²)	Space Heating Demand (kWh/m ²)
2 Caversham Road	54.00	15.84

The results above show that both dwellings achieve the target for space heating demand but are exceeding the 35 kWh/m² target for total Energy Use Intensity.

It is important to note that with any modelling exercise there are assumptions and approximations which influence the overall results. It should also be noted from the detailed results that one of the largest energy end-uses is equipment use (from appliances) which is unregulated energy and has been based entirely on assumptions of what equipment is used and how often.

It is recommended that additional modelling is carried out as the design progresses to help inform any design choices that may impact the energy use intensity or the space heating demand.

10 Zero Carbon Standard Summary – New Build

As previously detailed, this project falls under the London Plan's 2021 'Zero Carbon Policy' which states that major developments (10 dwellings or more) must achieve a minimum reduction of 35% in CO₂ emissions over Part L1 2021 Building Regulations with the view to achieving 'zero carbon'. The remaining amount of CO₂ is subject to a cash in lieu contribution which acts as the alternative to offsetting the zero carbon emissions.

Haringey Council have stipulated that their price is £95 per tonne of carbon charged over a 30-year period. With the specification, we have used to achieve the average 64% reduction in CO₂ emissions over the baseline, this leaves the following tonnes /year for the development.

Image 9.1 has been taken from the GLA spread sheet shows the total on site CO₂ reduction following the energy hierarchy with the required carbon off set payment.

Image 9.1 Carbon Off set payment

	Regulated residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.1	11%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.5	53%
Cumulative on site savings	0.6	64%
Annual savings from off-set payment	0.3	-
(Tonnes CO₂)		
Cumulative savings for off-set payment	10	-
Cash in-lieu contribution (£)	924	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab

However, it must be noted that this figure can change depending on the construction specifications, drawings, heating system type or fuel changes, all of which are decided at the Building Regulations design stage. Where SAP calculations will need to be undertaken after planning approval to determine the exact specification that will be incorporated. Only when this is carried out can a more accurate figure of the remaining tonnage of CO₂ be calculated. An 'As Built' SAP calculation and EPC will then be carried out at the post construction stage which will then state the exact amount of CO₂ emissions for each dwelling, in turn only then can the official cash contribution sum be determined.

This energy statement is to provide the feasibility of how the near zero carbon can be achieved with a minimum 35% reduction in CO₂ emissions, what will actually be used to achieve this figure will be decided by a combination of the SAP assessor and the client at building regulations

11 Conclusion

Proposals are for the development named as 2 Caversham Road, London, N15 3QP comprising the subdivision of the rear garden to facilitate the construction of a new two-bedroom dwelling falling under the requirements of Haringey Council.

The Haringey Local Planning Policy requirements are as follows.

- A minimum 35% CO2 reduction over Part L1 2021 with an aim to achieve zero carbon.
- A 10% CO2 reduction over Part L1 2021 through energy saving measures.
- A 20% CO2 reduction from on-site renewable technology sources

Energy modelling software has been used to calculate a baseline against which compliance with the above can be measured.

The proposed development will be designed to limit energy demand through the inclusion of a thermally efficient building fabric and energy efficient services.

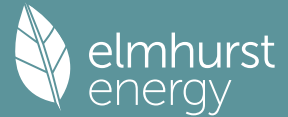
Low and zero carbon technology will be incorporated and is to comprise ASHP system (SCOP of 4.84).

This results in an 64% reduction in CO2 emissions over Part L1 2021 with a 11% reduction in CO2 emissions through the use of energy efficiency measures and a 53% CO2 reduction from on-site renewable technology sources

This Energy Statement and the calculations on which it is based demonstrate that the proposed development complies with the local planning policy requirements.

11 Appendix 1 - Be Lean DER/TER SAP Worksheets

Full SAP Calculation Printout



Plot Reference	13703				Issued on Date	04/03/2026	
Assessment Reference	Be Lean			Plot Type Ref	ES		
Plot Address	2, Caversham Road, London, N15 3QP				SAP Version	10.2	
SAP Rating	84 B	DER	14.71	TER	12.93		
Environmental	88 B	% DER < TER				-13.77	
CO ₂ Emissions (t/year)	0.92	DFEE	37.30	TFEE	42.23		
Compliance Check	See BREL	% DFEE < TFEE				11.68	
% DPER < TPER	-23.03	DPER	83.28	TPER	67.69		
Assessor Details	Mr. Peter Kinsella				Assessor ID	L770-0002	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	35.0000 (1b)	x 2.3000 (2b)	= 80.5000 (1b) - (3b)
First floor	35.0000 (1c)	x 2.7000 (2c)	= 94.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.0000 (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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

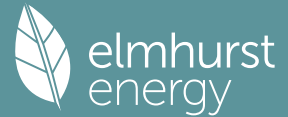
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.0000	(17)
Infiltration rate		0.1500	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1162	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.0000 (23c)
Effective ac	0.2882	0.2853	0.2824	0.2679	0.2650	0.2504	0.2504	0.2475	0.2562	0.2650	0.2708	0.2766 (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			12.3500	1.1450	14.1412		(27)
Door			1.8900	1.1000	2.0790		(26a)
Roof Light			4.2800	1.1450	4.9008		(27a)
Heat Loss Floor 1			35.0000	0.1000	3.5000		(28a)
External Wall 1	118.5000	14.2400	104.2600	0.1600	16.6816		(29a)
External Roof 1	35.0000	4.2800	30.7200	0.1100	3.3792		(30)
Total net area of external elements A _{um} (A, m ²)			188.5000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.6818		(33)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)							7.5400 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	52.2218 (37)

Full SAP Calculation Printout



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	16.6446	16.4768	16.3090	15.4698	15.3019	14.4628	14.4628	14.2949	14.7984	15.3019	15.6376	15.9733 (38)
Average = Sum(39)m / 12 =	68.8664	68.6986	68.5307	67.6916	67.5237	66.6846	66.6846	66.5167	67.0202	67.5237	67.8594	68.1951 (39)
												67.6496
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9838	0.9814	0.9790	0.9670	0.9646	0.9526	0.9526	0.9502	0.9574	0.9646	0.9694	0.9742 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

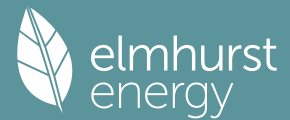
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.2461 (42)
Hot water usage for mixer showers												
	77.3497	76.1873	74.4934	71.2525	68.8608	66.1936	64.6776	66.3586	68.2013	71.0651	74.3756	77.0534 (42a)
Hot water usage for baths												
	26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432 (42b)
Hot water usage for other uses												
	37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326 (42c)
Average daily hot water use (litres/day)												130.3115 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.7158	138.7879	135.1665	129.5263	124.9942	120.1026	118.1242	121.7289	125.5446	130.6927	136.4238	141.3291 (44)
Energy conte	224.4432	197.6322	207.7459	177.3150	168.2662	147.6801	142.8610	150.7258	154.8090	177.3488	194.3607	221.2872 (45)
Energy content (annual)										Total = Sum(45)m =		2164.4751
Distribution loss (46)m = 0.15 x (45)m												
	33.6665	29.6448	31.1619	26.5972	25.2399	22.1520	21.4291	22.6089	23.2214	26.6023	29.1541	33.1931 (46)
Water storage loss (or HIU loss):												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8900 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.0206 (55)
Total storage loss												
	31.6386	28.5768	31.6386	30.6180	31.6386	30.6180	31.6386	31.6386	30.6180	31.6386	30.6180	31.6386 (56)
If cylinder contains dedicated solar storage												
	31.6386	28.5768	31.6386	30.6180	31.6386	30.6180	31.6386	31.6386	30.6180	31.6386	30.6180	31.6386 (57)
Primary loss	37.2980	33.6885	37.2980	36.0948	37.2980	36.0948	37.2980	37.2980	36.0948	37.2980	36.0948	37.2980 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	293.3798	259.8974	276.6824	244.0278	237.2027	214.3929	211.7975	219.6624	221.5218	246.2853	261.0735	290.2238 (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												
	293.3798	259.8974	276.6824	244.0278	237.2027	214.3929	211.7975	219.6624	221.5218	246.2853	261.0735	290.2238 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2976.1475 (64)
Electric shower(s)												2976 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	129.7766	115.5249	124.2248	112.3275	111.0978	102.4739	102.6505	105.2656	104.8442	114.1177	117.9952	128.7272 (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	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	99.5137	110.1759	99.5137	102.8308	99.5137	102.8308	99.5137	99.5137	102.8308	99.5137	102.8308	99.5137 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918 (68)
Pumps, fans	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306 (69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Water heating gains (Table 5)	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450 (71)
Total internal gains	174.4310	171.9121	166.9688	156.0104	149.3249	142.3248	137.9711	141.4860	145.6170	153.3840	163.8822	173.0205 (72)
	530.9336	541.1242	520.3595	501.7350	477.8679	458.1543	441.7782	443.2457	455.8531	474.2863	501.9661	520.8179 (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			
East			0.9600	19.6403	0.4500	0.0000			0.7700		6.5331 (76)	
West			11.3900	19.6403	0.4500	0.0000			0.7700		77.5130 (80)	
Southeast			4.2800	26.0000	0.6300	0.7000			1.0000		44.1670 (82)	
Solar gains	128.2131	256.1435	433.8414	649.7017	810.1113	835.1603	792.7145	671.8449	510.2629	307.2050	160.8537	104.7888 (83)
Total gains	659.1467	797.2678	954.2009	1151.4366	1287.9793	1293.3146	1234.4928	1115.0906	966.1160	781.4913	662.8198	625.6067 (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 from living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	70.5875	70.7600	70.9333	71.8127	71.9912	72.8971	72.8971	73.0810	72.5320	71.9912	71.6350	71.2824
util living area	5.7058	5.7173	5.7289	5.7875	5.7994	5.8598	5.8598	5.8721	5.8355	5.7994	5.7757	5.7522

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	0.9817	0.9517	0.8681	0.6796	0.4837	0.3297	0.2376	0.2743	0.4752	0.8037	0.9574	0.9858 (86)
MIT	20.2057	20.4513	20.7386	20.9421	20.9920	20.9993	20.9999	20.9998	20.9948	20.8825	20.5112	20.1632 (87)
Th 2	20.0969	20.0989	20.1009	20.1109	20.1129	20.1230	20.1230	20.1250	20.1190	20.1129	20.1089	20.1049 (88)
util rest of house												
	0.9766	0.9396	0.8412	0.6377	0.4389	0.2846	0.1903	0.2222	0.4160	0.7582	0.9444	0.9817 (89)
MIT 2	19.3954	19.6327	19.8964	20.0719	20.1085	20.1227	20.1230	20.1250	20.1167	20.0340	19.7023	19.3606 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	19.7219	19.9625	20.2357	20.4225	20.4645	20.4759	20.4763	20.4774	20.4704	20.3758	20.0281	19.6839 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7219	19.9625	20.2357	20.4225	20.4645	20.4759	20.4763	20.4774	20.4704	20.3758	20.0281	19.6839 (93)

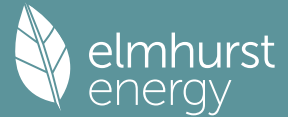
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9740	0.9375	0.8455	0.6527	0.4567	0.3028	0.2094	0.2432	0.4398	0.7725	0.9431	0.9793	(94)
Useful gains	642.0033	747.4066	806.8129	751.5442	588.2723	391.5796	258.4650	271.1647	424.9093	603.6731	625.0769	612.6746	(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	1062.0493	1034.7704	941.3155	779.9735	591.8087	391.8294	258.4865	271.2157	426.9470	660.0985	877.2964	1055.9250	(97)
Space heating kWh	312.5142	193.1085	100.0699	20.4691	2.6311	0.0000	0.0000	0.0000	0.0000	41.9805	181.5980	329.7783	(98a)
Space heating requirement - total per year (kWh/year)												1182.1497	
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	312.5142	193.1085	100.0699	20.4691	2.6311	0.0000	0.0000	0.0000	0.0000	41.9805	181.5980	329.7783	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1182.1497	
Space heating per m2										(98c) / (4) =		16.8879	(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 %)													89.5000 (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	312.5142	193.1085	100.0699	20.4691	2.6311	0.0000	0.0000	0.0000	0.0000	41.9805	181.5980	329.7783	(98)
Space heating efficiency (main heating system 1)	89.5000	89.5000	89.5000	89.5000	89.5000	0.0000	0.0000	0.0000	0.0000	89.5000	89.5000	89.5000	(210)
Space heating fuel (main heating system)	349.1779	215.7637	111.8099	22.8705	2.9398	0.0000	0.0000	0.0000	0.0000	46.9056	202.9028	368.4674	(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	293.3798	259.8974	276.6824	244.0278	237.2027	214.3929	211.7975	219.6624	221.5218	246.2853	261.0735	290.2238	(64)
Efficiency of water heater (217)m	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	(216)
Fuel for water heating, kWh/month	327.7987	290.3882	309.1424	272.6567	265.0310	239.5452	236.6453	245.4328	247.5104	275.1791	291.7022	324.2724	(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	18.7138	16.9028	18.7138	18.1101	18.7138	18.1101	18.7138	18.7138	18.1101	18.7138	18.1101	18.7138	(231)
Lighting	19.8787	15.9474	14.3589	10.5199	8.1259	6.6389	7.4127	9.6353	12.5153	16.4208	18.5473	20.4312	(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												1320.8376	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												89.5000	
Water heating fuel used												3325.3045	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)												179.3400	(230a)
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												220.3400	(231)
Electricity for lighting (calculated in Appendix L)												160.4324	(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												5026.9145	(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	1320.8376	0.2100	277.3759 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3325.3045	0.2100	698.3139 (264)
Space and water heating			975.6898 (265)
Pumps, fans and electric keep-hot	220.3400	0.1387	30.5639 (267)
Energy for lighting	160.4324	0.1443	23.1554 (268)
Total CO2, kg/year			1029.4091 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			14.7100 (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	1320.8376	1.1300	1492.5465 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3325.3045	1.1300	3757.5940 (278)
Space and water heating			5250.1406 (279)
Pumps, fans and electric keep-hot	220.3400	1.5128	333.3304 (281)
Energy for lighting	160.4324	1.5338	246.0766 (282)
Total Primary energy kWh/year			5829.5475 (286)
Dwelling Primary energy Rate (DPER)			83.2800 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	35.0000 (1b)	x 2.3000 (2b)	= 80.5000 (1b) - (3b)
First floor	35.0000 (1c)	x 2.7000 (2c)	= 94.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.0000 (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) = 0.1143 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3643 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2823 (21)

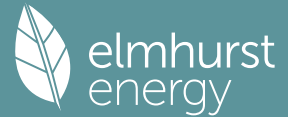
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3600	0.3529	0.3458	0.3106	0.3035	0.2682	0.2682	0.2611	0.2823	0.3035	0.3176	0.3317 (22b)
Effective ac	0.5648	0.5623	0.5598	0.5482	0.5461	0.5360	0.5360	0.5341	0.5399	0.5461	0.5504	0.5550 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Semi-glazed door			1.8900	1.0000	1.8900		(26a)
TER Opening Type			11.5900	1.1450	13.2710		(27)
TER Roof Window			4.0100	1.1450	6.3830		(27a)
Heat Loss Floor 1			35.0000	0.1300	4.5500		(28a)
External Wall 1	118.5000	13.4800	105.0200	0.1800	18.9036		(29a)
External Roof 1	35.0000	4.0100	30.9900	0.1100	3.4089		(30)
Total net area of external elements Aum(A, m2)			188.5000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		48.4065		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000 (35)
List of Thermal Bridges							

SAP 10 Online 2.26.17 Page 5 of 7

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)
Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	54.7189	54.8086	54.8967	55.3145	55.3934	55.7636	55.7636	55.8327	55.6204	55.3934	55.2341	55.0685	21.0000 (85)
alpha	4.6479	4.6539	4.6598	4.6876	4.6929	4.7176	4.7176	4.7222	4.7080	4.6929	4.6823	4.6712	
util living area	0.9907	0.9782	0.9424	0.8354	0.6609	0.4748	0.3465	0.3984	0.6513	0.9108	0.9807	0.9926	(86)
MIT	19.6775	19.9272	20.2941	20.7005	20.9174	20.9858	20.9974	20.9951	20.9430	20.5977	20.0572	19.6331	(87)
Th 2	19.8651	19.8667	19.8684	19.8759	19.8773	19.8839	19.8839	19.8851	19.8814	19.8773	19.8745	19.8715	(88)
util rest of house	0.9877	0.9714	0.9254	0.7942	0.5957	0.3957	0.2594	0.3035	0.5623	0.8765	0.9735	0.9901	(89)
MIT 2	18.3585	18.6741	19.1270	19.6000	19.8166	19.8769	19.8832	19.8836	19.8479	19.5043	18.8472	18.3067	(90)
Living area fraction									fLA = Living area / (4) =				0.4029 (91)
MIT	18.8898	19.1789	19.5972	20.0434	20.2600	20.3236	20.3321	20.3314	20.2891	19.9448	19.3347	18.8410	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8898	19.1789	19.5972	20.0434	20.2600	20.3236	20.3321	20.3314	20.2891	19.9448	19.3347	18.8410	(93)

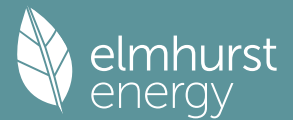
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9841	0.9661	0.9205	0.8009	0.6188	0.4273	0.2946	0.3418	0.5962	0.8789	0.9689	0.9871	(94)
Useful gains	597.2869	703.7294	794.4214	828.4030	712.6503	493.4968	324.6105	340.8450	517.3094	622.4337	588.5475	569.2033	(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	1296.1301	1266.4339	1159.7569	979.2935	751.1950	498.9459	325.3370	342.2904	540.9105	820.0626	1076.7649	1292.4210	(97)
Space heating kWh	519.9393	378.1374	271.8096	108.6411	28.6772	0.0000	0.0000	0.0000	0.0000	147.0359	351.5165	538.0740	(98a)
Space heating requirement - total per year (kWh/year)												2343.8312	
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	519.9393	378.1374	271.8096	108.6411	28.6772	0.0000	0.0000	0.0000	0.0000	147.0359	351.5165	538.0740	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2343.8312	
Space heating per m2										(98c) / (4) =		33.4833	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	519.9393	378.1374	271.8096	108.6411	28.6772	0.0000	0.0000	0.0000	0.0000	147.0359	351.5165	538.0740	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	563.3146	409.6830	294.4850	117.7044	31.0696	0.0000	0.0000	0.0000	0.0000	159.3021	380.8413	582.9621	(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	218.2487	193.0011	205.2437	181.2053	176.1038	159.1933	157.5954	163.6433	165.1817	183.5553	194.3549	215.9878	(64)
Efficiency of water heater (217)m	85.9346	85.5399	84.6906	82.9512	80.9489	79.8000	79.8000	79.8000	79.8000	83.5670	85.3719	79.8000	(216)
Fuel for water heating, kWh/month	253.9708	225.6269	242.3453	218.4480	217.5493	199.4903	197.4880	205.0668	206.9946	219.6505	227.6569	251.0868	(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	20.6770	16.5878	14.9355	10.9424	8.4522	6.9055	7.7104	10.0223	13.0179	17.0802	19.2921	21.2517	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-32.8612	-46.3909	-66.7853	-75.2280	-81.2553	-75.9097	-74.9794	-70.7158	-63.2130	-53.1101	-36.1517	-28.4037	(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	-18.3857	-38.6957	-76.9383	-115.5931	-152.8718	-153.5969	-151.7817	-128.4965	-94.1674	-55.3436	-24.5508	-14.5371	(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													2539.3620 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													79.8000
Water heating fuel used													2665.3742 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													86.0000 (231)
Electricity for lighting (calculated in Appendix L)													166.8751 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-1729.9627 (233)

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Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	3727.6487 (238)

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

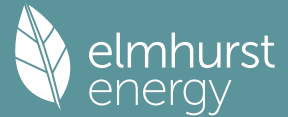
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2539.3620	0.2100	533.2660 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2665.3742	0.2100	559.7286 (264)
Space and water heating			1092.9946 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	166.8751	0.1443	24.0852 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-705.0040	0.1345	-94.8561
PV Unit electricity exported	-1024.9587	0.1259	-129.0303
Total			-223.8864 (269)
Total CO2, kg/year			905.1228 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.9300 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2539.3620	1.1300	2869.4791 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2665.3742	1.1300	3011.8729 (278)
Space and water heating			5881.3520 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	166.8751	1.5338	255.9586 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-705.0040	1.4973	-1055.5744
PV Unit electricity exported	-1024.9587	0.4621	-473.6298
Total			-1529.2042 (283)
Total Primary energy kWh/year			4738.2073 (286)
Target Primary Energy Rate (TPER)			67.6900 (287)

12 Appendix 2 – Be Green DER/TER SAP Worksheets

Full SAP Calculation Printout



Plot Reference	13703				Issued on Date	04/03/2026	
Assessment Reference	Be Green			Plot Type Ref	ES		
Plot Address	2, Caversham Road, London, N15 3QP				SAP Version	10.2	
SAP Rating	81 B	DER	4.63	TER	13.10		
Environmental	96 A	% DER < TER				64.66	
CO ₂ Emissions (t/year)	0.3	DFEE	37.30	TFEE	42.23		
Compliance Check	See BREL	% DFEE < TFEE				11.68	
% DPER < TPER	27.95	DPER	49.41	TPER	68.58		
Assessor Details	Mr. Peter Kinsella				Assessor ID	L770-0002	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	35.0000 (1b)	x 2.3000 (2b)	= 80.5000 (1b) - (3b)
First floor	35.0000 (1c)	x 2.7000 (2c)	= 94.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.0000 (5)

2. Ventilation rate

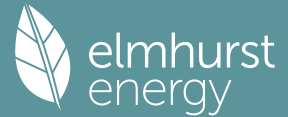
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1162 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												81.0000 (23c)
Effective ac	0.2432	0.2403	0.2374	0.2229	0.2200	0.2054	0.2054	0.2025	0.2112	0.2200	0.2258	0.2316 (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			12.3500	1.1450	14.1412		(27)
Door			1.8900	1.1000	2.0790		(26a)
Roof Light			4.2800	1.1450	4.9008		(27a)
Heat Loss Floor 1			35.0000	0.1000	3.5000		(28a)
External Wall 1	118.5000	14.2400	104.2600	0.1600	16.6816		(29a)
External Roof 1	35.0000	4.2800	30.7200	0.1100	3.3792		(30)
Total net area of external elements A _{um} (A, m ²)			188.5000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.6818		(33)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							250.0000 (35)
Thermal bridges (User defined value 0.040 * total exposed area)							7.5400 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	52.2218 (37)

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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	14.0459	13.8780	13.7102	12.8710	12.7032	11.8640	11.8640	11.6962	12.1997	12.7032	13.0389	13.3745	(38)
Heat transfer coeff	66.2677	66.0998	65.9320	65.0928	64.9250	64.0858	64.0858	63.9180	64.4215	64.9250	65.2607	65.5963	(39)
Average = Sum(39)m / 12 =												65.0509	
HLP	0.9467	0.9443	0.9419	0.9299	0.9275	0.9155	0.9155	0.9131	0.9203	0.9275	0.9323	0.9371	(40)
HLP (average)												0.9293	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2461 (42)
Hot water usage for mixer showers													
77.3497	76.1873	74.4934	71.2525	68.8608	66.1936	64.6776	66.3586	68.2013	71.0651	74.3756	77.0534	(42a)	
Hot water usage for baths													
26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432	(42b)	
Hot water usage for other uses													
37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326	(42c)	
Average daily hot water use (litres/day)												130.3115	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	141.7158	138.7879	135.1665	129.5263	124.9942	120.1026	118.1242	121.7289	125.5446	130.6927	136.4238	141.3291	(44)
Energy content	224.4432	197.6322	207.7459	177.3150	168.2662	147.6801	142.8610	150.7258	154.8090	177.3488	194.3607	221.2872	(45)
Energy content (annual)										Total = Sum(45)m =		2164.4751	
Distribution loss (46)m = 0.15 x (45)m													
33.6665	29.6448	31.1619	26.5972	25.2399	22.1520	21.4291	22.6089	23.2214	26.6023	29.1541	33.1931	(46)	
Water storage loss (or HIU loss):													
Store volume												210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5300	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8262	(55)
Total storage loss													
25.6122	23.1336	25.6122	24.7860	25.6122	24.7860	25.6122	25.6122	24.7860	25.6122	24.7860	25.6122	(56)	
If cylinder contains dedicated solar storage													
25.6122	23.1336	25.6122	24.7860	25.6122	24.7860	25.6122	25.6122	24.7860	25.6122	24.7860	25.6122	(57)	
Primary loss	37.2980	33.6885	37.2980	36.0948	37.2980	36.0948	37.2980	37.2980	36.0948	37.2980	36.0948	37.2980	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
287.3534	254.4542	270.6560	238.1958	231.1763	208.5609	205.7711	213.6360	215.6898	240.2589	255.2415	284.1974	(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													
287.3534	254.4542	270.6560	238.1958	231.1763	208.5609	205.7711	213.6360	215.6898	240.2589	255.2415	284.1974	(64)	
12Total per year (kWh/year)												2905.1915	(64)
Electric shower(s)												2905	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
124.9555	111.1704	119.4036	107.6619	106.2766	97.8083	97.8294	100.4445	100.1786	109.2966	113.3296	123.9061	(65)	

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

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.5137	110.1759	99.5137	102.8308	99.5137	102.8308	99.5137	99.5137	102.8308	99.5137	102.8308	99.5137	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	(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)	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	(71)
Water heating gains (Table 5)	167.9510	165.4321	160.4888	149.5304	142.8449	135.8448	131.4911	135.0060	139.1370	146.9040	157.4022	166.5405	(72)
Total internal gains	521.4536	531.6442	510.8795	492.2550	468.3879	451.6743	435.2982	436.7657	449.3731	464.8063	492.4861	511.3379	(73)

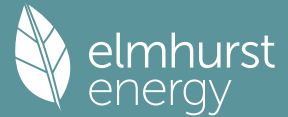
6. Solar gains

[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					
East			0.9600	19.6403	0.4500	0.0000	0.7700	6.5331 (76)					
West			11.3900	19.6403	0.4500	0.0000	0.7700	77.5130 (80)					
Southeast			4.2800	26.0000	0.6300	0.7000	1.0000	44.1670 (82)					
Solar gains	128.2131	256.1435	433.8414	649.7017	810.1113	835.1603	792.7145	671.8449	510.2629	307.2050	160.8537	104.7888	(83)
Total gains	649.6667	787.7878	944.7209	1141.9566	1278.4993	1286.8346	1228.0128	1108.6106	959.6360	772.0113	653.3398	616.1267	(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	73.3557	73.5420	73.7292	74.6797	74.8727	75.8532	75.8532	76.0523	75.4579	74.8727	74.4876	74.1065	
alpha	5.8904	5.9028	5.9153	5.9786	5.9915	6.0569	6.0569	6.0702	6.0305	5.9915	5.9658	5.9404	
util living area													

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	0.9816	0.9497	0.8604	0.6646	0.4695	0.3185	0.2296	0.2652	0.4608	0.7938	0.9560	0.9858 (86)
Living	20.3880	20.5703	20.7766	20.9138	20.9439	20.9484	20.9487	20.9488	20.9457	20.8735	20.6101	20.3567
Non living	19.4260	19.6518	19.8937	20.0460	20.0747	20.0884	20.0885	20.0907	20.0827	20.0136	19.7128	19.3937
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	20.6869	20.5703	20.7766	20.9138	20.9439	20.9484	20.9487	20.9488	20.9457	20.8735	20.6101	20.4467 (87)
Th 2	20.1280	20.1300	20.1320	20.1422	20.1442	20.1543	20.1543	20.1564	20.1503	20.1442	20.1401	20.1361 (88)
util rest of house												
	0.9765	0.9373	0.8332	0.6240	0.4273	0.2765	0.1855	0.2166	0.4051	0.7486	0.9430	0.9818 (89)
MIT 2	19.8481	19.6518	19.8937	20.0460	20.0747	20.0884	20.0885	20.0907	20.0827	20.0136	19.7128	19.5275 (90)
Living area fraction									FLA = Living area /	(4) =		0.4029 (91)
MIT	20.1861	20.0218	20.2494	20.3956	20.4249	20.4349	20.4351	20.4364	20.4304	20.3600	20.0743	19.8978 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1861	20.0218	20.2494	20.3956	20.4249	20.4349	20.4351	20.4364	20.4304	20.3600	20.0743	19.8978 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9769	0.9356	0.8372	0.6362	0.4412	0.2905	0.2001	0.2327	0.4236	0.7606	0.9418	0.9804	(94)
Useful gains	634.6401	737.0378	790.8835	726.5379	564.0497	373.7827	245.7620	257.9691	406.4621	587.2049	615.3190	604.0765	(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	1052.7316	999.5476	906.5264	748.2805	566.4611	373.9316	245.7735	257.9975	407.8110	633.6687	846.7114	1029.7180	(97)
Space heating kWh	311.0600	176.4066	86.0383	15.6546	1.7940	0.0000	0.0000	0.0000	0.0000	34.5691	166.6025	316.6773	(98a)
Space heating requirement - total per year (kWh/year)												1108.8025	
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	311.0600	176.4066	86.0383	15.6546	1.7940	0.0000	0.0000	0.0000	0.0000	34.5691	166.6025	316.6773	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1108.8025	
Space heating per m2											(98c) / (4) =	15.8400	(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 %)		340.4733 (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	311.0600	176.4066	86.0383	15.6546	1.7940	0.0000	0.0000	0.0000	0.0000	34.5691	166.6025	316.6773	(98)
Space heating efficiency (main heating system 1)	340.4733	340.4733	340.4733	340.4733	340.4733	0.0000	0.0000	0.0000	0.0000	340.4733	340.4733	340.4733	(210)
Space heating fuel (main heating system)	91.3611	51.8122	25.2702	4.5979	0.5269	0.0000	0.0000	0.0000	0.0000	10.1532	48.9326	93.0109	(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	287.3534	254.4542	270.6560	238.1958	231.1763	208.5609	205.7711	213.6360	215.6898	240.2589	255.2415	284.1974 (64)	
Efficiency of water heater (217)m	182.2481	182.2481	182.2481	182.2481	182.2481	182.2481	182.2481	182.2481	182.2481	182.2481	182.2481	182.2481 (216)	
Fuel for water heating, kWh/month	157.6715	139.6197	148.5097	130.6986	126.8470	114.4379	112.9071	117.2226	118.3496	131.8307	140.0517	155.9398 (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	15.2316	13.7576	15.2316	14.7403	15.2316	14.7403	15.2316	15.2316	14.7403	15.2316	14.7403	15.2316 (231)
Lighting	19.8787	15.9474	14.3589	10.5199	8.1259	6.6389	7.4127	9.6353	12.5153	16.4208	18.5473	20.4312 (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											325.6651	(211)
Space heating fuel - main system 2											0.0000	(213)
Space heating fuel - secondary											0.0000	(215)
Efficiency of water heater											182.2481	
Water heating fuel used											1594.0859	(219)
Space cooling fuel											0.0000	(221)

Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8400)													
mechanical ventilation fans (SFP = 0.8400)													179.3400 (230a)
Total electricity for the above, kWh/year													179.3400 (231)
Electricity for lighting (calculated in Appendix L)													160.4324 (232)

Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													0.0000 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (235)
Appendix Q - special features													

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Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2259.5233 (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	325.6651	0.1588	51.7056 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1594.0859	0.1408	224.5231 (264)
Space and water heating			276.2287 (265)
Pumps, fans and electric keep-hot	179.3400	0.1387	24.8767 (267)
Energy for lighting	160.4324	0.1443	23.1554 (268)
Total CO2, kg/year			324.2607 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6300 (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	325.6651	1.5876	517.0363 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1594.0859	1.5208	2424.2869 (278)
Space and water heating			2941.3232 (279)
Pumps, fans and electric keep-hot	179.3400	1.5128	271.3056 (281)
Energy for lighting	160.4324	1.5338	246.0766 (282)
Total Primary energy kWh/year			3458.7053 (286)
Dwelling Primary energy Rate (DPER)			49.4100 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	35.0000 (1b)	x 2.3000 (2b)	= 80.5000 (1b) - (3b)
First floor	35.0000 (1c)	x 2.7000 (2c)	= 94.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	175.0000 (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) = 0.1143 (8)
Pressure Test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3643 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2823 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3600	0.3529	0.3458	0.3106	0.3035	0.2682	0.2682	0.2611	0.2823	0.3035	0.3176	0.3317 (22b)
Effective ac	0.5648	0.5623	0.5598	0.5482	0.5461	0.5360	0.5360	0.5341	0.5399	0.5461	0.5504	0.5550 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Semi-glazed door			1.8900	1.0000	1.8900		(26a)
TER Opening Type			11.5900	1.1450	13.2710		(27)
TER Roof Window			4.0100	1.1450	6.3830		(27a)
Heat Loss Floor 1			35.0000	0.1300	4.5500		(28a)
External Wall 1	118.5000	13.4800	105.0200	0.1800	18.9036		(29a)
External Roof 1	35.0000	4.0100	30.9900	0.1100	3.4089		(30)
Total net area of external elements Aum(A, m2)			188.5000				(31)

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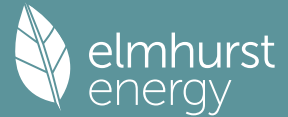
Fabric heat loss, W/K = Sum (A x U)												(26)...(30) + (32) =	48.4065	(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K													250.0000	(35)
List of Thermal Bridges														
K1 Element												Length	Psi-value	Total
E2 Other lintels (including other steel lintels)												0.9000	0.0500	0.0450
E4 Jamb												4.2000	0.0500	0.2100
E5 Ground floor (normal)												23.7000	0.1600	3.7920
E6 Intermediate floor within a dwelling												23.7000	0.0000	0.0000
E14 Flat roof												23.7000	0.0800	1.8960
E16 Corner (normal)												20.8000	0.0900	1.8720
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													7.8150	(36)
Point Thermal Bridges													(36a) =	0.0000
Total fabric heat loss												(33) + (36) + (36a) =	56.2215	(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	32.6164	32.4711	32.3287	31.6598	31.5347	30.9521	30.9521	30.8442	31.1765	31.5347	31.7878	32.0525	(38)	
Average = Sum(39)m / 12 =	88.8378	88.6925	88.5501	87.8813	87.7561	87.1735	87.1735	87.0657	87.3979	87.7561	88.0093	88.2740	(39)	87.8807
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	1.2691	1.2670	1.2650	1.2554	1.2537	1.2453	1.2453	1.2438	1.2485	1.2537	1.2573	1.2611	(40)	1.2554
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		31

4. Water heating energy requirements (kWh/year)														
Assumed occupancy													2.2461	(42)
Hot water usage for mixer showers														
	61.8798	60.9498	59.5947	57.0020	55.0887	52.9549	51.7420	53.0869	54.5611	56.8521	59.5005	61.6427	(42a)	
Hot water usage for baths														
	26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432	(42b)	
Hot water usage for other uses														
	37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326	(42c)	
Average daily hot water use (litres/day)														116.0487 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	126.2459	123.5505	120.2678	115.2758	111.2220	106.8639	105.1887	108.4572	111.9043	116.4797	121.5487	125.9184	(44)	
Energy content (annual)	199.9426	175.9342	184.8472	157.8067	149.7262	131.4016	127.2166	134.2926	137.9892	158.0618	173.1684	197.1578	(45)	
Distribution loss (46)m = 0.15 x (45)m														
	29.9914	26.3901	27.7271	23.6710	22.4589	19.7102	19.0825	20.1439	20.6984	23.7093	25.9753	29.5737	(46)	
Water storage loss (or HIU loss):														
Store volume													210.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.7016	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.9188	(55)
Total storage loss														
	28.4842	25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842	(56)	
If cylinder contains dedicated solar storage														
	28.4842	25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842	(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														
	251.6892	222.6731	236.5937	207.8841	201.4728	181.4789	178.9632	186.0392	188.0666	209.8084	223.2457	248.9044	(62)	
WWHRS	-28.2888	-25.0189	-26.1983	-21.6933	-20.2173	-17.3001	-16.2161	-17.2442	-17.8994	-21.1014	-23.9053	-27.7650	(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														
	223.4004	197.6542	210.3954	186.1908	181.2555	164.1788	162.7471	168.7950	170.1672	188.7070	199.3404	221.1394	(64)	
12Total per year (kWh/year)													2273.9712	(64)
Electric shower(s)													2274	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month														
	107.8782	95.8892	102.8590	92.5326	91.1812	83.7529	83.6968	86.0496	85.9433	93.9528	97.6404	106.9523	(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	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	(66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	99.5137	110.1759	99.5137	102.8308	99.5137	102.8308	99.5137	99.5137	102.8308	99.5137	102.8308	99.5137	(67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918	(68)	
Pumps, fans	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	(69)	
Losses e.g. evaporation (negative values) (Table 5)	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)	
	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	(71)	
Water heating gains (Table 5)	144.9976	142.6923	138.2513	128.5175	122.5554	116.3235	112.4957	115.6580	119.3657	126.2807	135.6116	143.7530	(72)	
Total internal gains	501.5002	511.9044	491.6421	474.2421	451.0984	432.1530	416.3028	417.4178	429.6018	447.1830	473.6955	491.5504	(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													
East	0.9000												5.4021	(76)
West	10.6900												64.1648	(80)
Southeast	4.0100												41.3808	(82)

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Solar gains	110.9477	222.0323	376.9075	565.5965	706.1618	728.3793	691.2056	585.2233	443.6876	266.5229	139.2635	90.6314 (83)
Total gains	612.4479	733.9368	868.5496	1039.8386	1157.2602	1160.5322	1107.5084	1002.6411	873.2894	713.7059	612.9590	582.1818 (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	54.7189	54.8086	54.8967	55.3145	55.3934	55.7636	55.7636	55.8327	55.6204	55.3934	55.2341	55.0685
alpha	4.6479	4.6539	4.6598	4.6876	4.6929	4.7176	4.7176	4.7222	4.7080	4.6929	4.6823	4.6712
util living area	0.9903	0.9775	0.9412	0.8333	0.6585	0.4727	0.3448	0.3963	0.6480	0.9087	0.9800	0.9923 (86)
MIT	19.6854	19.9347	20.3003	20.7042	20.9186	20.9860	20.9975	20.9952	20.9441	20.6031	20.0648	19.6411 (87)
Th 2	19.8651	19.8667	19.8684	19.8759	19.8773	19.8839	19.8839	19.8851	19.8814	19.8773	19.8745	19.8715 (88)
util rest of house	0.9872	0.9706	0.9239	0.7919	0.5933	0.3938	0.2582	0.3019	0.5592	0.8739	0.9726	0.9898 (89)
MIT 2	18.3685	18.6833	19.1344	19.6037	19.8176	19.8770	19.8832	19.8837	19.8487	19.5100	18.8565	18.3168 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.8990	19.1874	19.6041	20.0470	20.2611	20.3238	20.3321	20.3315	20.2900	19.9504	19.3433	18.8503 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.8990	19.1874	19.6041	20.0470	20.2611	20.3238	20.3321	20.3315	20.2900	19.9504	19.3433	18.8503 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9836	0.9653	0.9191	0.7987	0.6164	0.4253	0.2931	0.3400	0.5930	0.8765	0.9680	0.9866 (94)
Useful gains	602.4179	708.4570	798.2722	830.5501	713.3441	493.6157	324.6286	340.8838	517.8903	625.5972	593.3303	574.4038 (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	1296.9435	1267.1883	1160.3693	979.6162	751.2919	498.9622	325.3397	342.2961	540.9912	820.5528	1077.5224	1293.2395 (97)
Space heating kWh	516.7270	375.4675	269.4002	107.3276	28.2332	0.0000	0.0000	0.0000	0.0000	145.0470	348.6183	534.8138 (98a)
Space heating requirement - total per year (kWh/year)	2325.6345											
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	516.7270	375.4675	269.4002	107.3276	28.2332	0.0000	0.0000	0.0000	0.0000	145.0470	348.6183	534.8138 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2325.6345											
Space heating per m2	(98c) / (4) = 33.2234 (99)											

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	516.7270	375.4675	269.4002	107.3276	28.2332	0.0000	0.0000	0.0000	0.0000	145.0470	348.6183	534.8138 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	559.8343	406.7903	291.8746	116.2812	30.5885	0.0000	0.0000	0.0000	0.0000	157.1474	377.7013	579.4299 (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	223.4004	197.6542	210.3954	186.1908	181.2555	164.1788	162.7471	168.7950	170.1672	188.7070	199.3404	221.1394 (64)
Efficiency of water heater (217)m	85.8766	85.4754	84.6153	82.8712	80.9051	79.8000	79.8000	79.8000	79.8000	83.4769	85.3002	79.8000 (216)
Fuel for water heater, kWh/month	260.1412	231.2410	248.6495	224.6749	224.0346	205.7378	203.9437	211.5226	213.2421	226.0591	233.6926	257.2470 (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	20.6770	16.5878	14.9355	10.9424	8.4522	6.9055	7.7104	10.0223	13.0179	17.0802	19.2921	21.2517 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-32.8612	-46.3909	-66.7853	-75.2280	-81.2553	-75.9097	-74.9794	-70.7158	-63.2130	-53.1101	-36.1517	-28.4037 (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	-18.3857	-38.6957	-76.9383	-115.5931	-152.8718	-153.5969	-151.7817	-128.4965	-94.1674	-55.3436	-24.5508	-14.5371 (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	2519.6474 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	79.8000											
Water heating fuel used	2740.1862 (219)											
Space cooling fuel	0.0000 (221)											
Electricity for pumps and fans:												
Total electricity for the above, kWh/year	86.0000 (231)											

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Electricity for lighting (calculated in Appendix L)	166.8751 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1729.9627 (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	3782.7460 (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	2519.6474	0.2100	529.1260 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2740.1862	0.2100	575.4391 (264)
Space and water heating			1104.5651 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	166.8751	0.1443	24.0852 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-705.0040	0.1345	-94.8561
PV Unit electricity exported	-1024.9587	0.1259	-129.0303
Total			-223.8864 (269)
Total CO2, kg/year			916.6932 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.1000 (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	2519.6474	1.1300	2847.2016 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2740.1862	1.1300	3096.4104 (278)
Space and water heating			5943.6120 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	166.8751	1.5338	255.9586 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-705.0040	1.4973	-1055.5744
PV Unit electricity exported	-1024.9587	0.4621	-473.6298
Total			-1529.2042 (283)
Total Primary energy kWh/year			4800.4672 (286)
Target Primary Energy Rate (TPER)			68.5800 (287)