



create
CONSULTING
ENGINEERS LTD

HORNSEY POLICE STATION
Energy Strategy

HORNSEY POLICE STATION

Energy Strategy

Client: Archanaeum Ltd

Engineer: Create Consulting Engineers Limited
15 Princes Street
Norwich
Norfolk
NR3 1AF

Tel: 020 7822 2300
Email: enquiries@createce.co.uk
Web: www.createce.co.uk

Report By: Pooja Nair, MSc, BTech Civil., Sustainability Consultant
Mirza Baig, MSc., BEng. Mech, NDEA, OCDEA, Sustainability Consultant

Checked By: Sunanda Swain, MSc. (Env Mgt.), MSc. (Chem), BREEAM AP,
Technical Director, Sustainability

Reference: PN/VL/P22-2562/09

Date: October 2024

HORNSEY POLICE STATION
Energy Strategy

HORNSEY POLICE STATION

Energy Strategy

Contents

- 1.0 Introduction
- 2.0 Energy Efficiency and Renewable Energy Plan
- 3.0 Conclusion
- 4.0 Disclaimer

Appendices

- A Email Confirmation and U value Calculators
- B SAP Work Sheets and BRUKL
- C GLA Spreadsheet
- D Roof Plan- ASHP Location
- E Manufacture Cut-Sheet of ASHP
- F Mechanical Schematic of Heating Strategy
- G Manufacture Cut-Sheet of MVHR
- H Mechanical Schematic of Ventilation Strategy
- I PV Roof Plan
- J Solar PV – Tender Document

Registration of Amendments

Revision	Amendment Details	Revision Prepared By	Revision Approved By

1.0 INTRODUCTION

- 1.1 Create Consulting Engineers Ltd has been commissioned by Archanaeum Ltd to prepare this Energy strategy to response on discharge sections 24, and 25 of planning Condition 32, of Planning Permission notice issued on 29.02.2024 having Case Reference HGY/20222/2116.
- 1.2 This report discusses the package of measures taken by the Hornsey Police Station project with respect to the Energy Efficiency and Renewable Energy Plan obligations set forth.
- 1.3 This document provides a detailed review of the energy efficiency strategies for the proposed development, focusing on compliance with the Greater London Authority (GLA) Energy Assessment Guidance and other regulatory requirements.

Proposed Development

- 1.4 The proposed development located at Hornsey Police Station, 98 Tottenham Lane, London, N8 7EJ comprises the retention and refurbishment of the historic police station building and its conversion into residential flats, the demolition of the modern extensions to the police station and the redevelopment of the land around the retained building to provide new residential buildings and ancillary space. The whole conversion and the new development are to provide 29 residential units. The project is currently at RIBA Plan of Work Stage 4 Technical Design stage.



Figure 1.1: Floor plan of the proposed development

- 1.5 The Table below highlights the different types of flats and houses in the proposed development.

Blocks	Unit ID	Dwelling Types
Houses(refurb) in Block A	AH1	3B6P
	AH2	3B6P
	AH3	3B6P
	AH4	3B6P
	AH5	3B6P
	AH6	3B6P
Flats (refurb) in Block A	FLAT A1	2B4P
	FLAT A2	1B2P
	FLAT A3	2B4P
	FLAT A4	3B5P
BLOCK B - FLATS	FLAT B1	2B4P
	FLAT B2	2B4P
	FLAT B3	2B3P
	FLAT B4	2B4P
	FLAT B5	2B3P
	FLAT B6	2B4P
	FLAT B7	2B3P
BLOCK B -HOUSES	MH 1	4B8P
	MH 2	4B8P
	MH 3	4B8P
	MH 4	4B8P
BLOCK C FLATS	FLAT C1	2B3P
	FLAT C2	1B2P
	FLAT C3	1B2P
	FLAT C4	2B3P
	FLAT C5	1B2P
	FLAT C6	1B2P
	FLAT C7	1B2P
	FLAT C8	3B5P

Table 1.1: Overview of Residential Units in Blocks A, B, and C

2.0 ENERGY EFFICIENCY AND RENEWABLE ENERGY PLAN

- 2.1 The energy strategy underwent revision based on planning conditions received from the Haringey Council. This section outlines conditions drawn by the council in the Planning permission notice and their corresponding responses, detailing how they are addressed:

Condition 32

Section 24:

"The development hereby approved shall be constructed in accordance with the Energy & Sustainability Strategy by Create Consulting Engineers (dated July 2023) delivering a minimum 80% improvement on carbon emissions over 2021 Building Regulations Part L, high fabric efficiencies, air source heat pumps (ASHPs) and a minimum 36.8 kWp solar photovoltaic (PV) array.

(a) Prior to above-ground construction, details of the Energy Strategy shall be submitted to and approved by the Local Planning Authority. This must include:

- Confirmation of how this development will meet the zero-carbon policy requirement in line with the Energy Hierarchy following the GLA Energy Assessment Guidance; "*

Response:

- 2.2 The Project was simulated as per London Plan Energy Hierarchy using Stage -4 design inputs. The first simulation used notional building specifications from Part L to establish the Target Emission Rate (TER) and Target Primary Energy Rate (TPER). The second one was improved thermal performance through fabric efficiency ("Be Lean"), the third one included evaluating potential to connect the site to clean energy sources such as decentralised energy centres ("Be Clean"), and the fourth incorporated Low and Zero Carbon Technologies such as Air Source Heat Pump and roof mount Solar PVs as onsite renewable technology ("Be Green"). These combined strategies achieved over an 84% reduction beyond Part L requirements, in line with the London Plan.
- 2.3 The projected carbon emissions and primary energy figures, following the application of all strategies based on the Energy Hierarchy, are summarized in Table 2.1 below:

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	52.6		
Be lean	34.5	18.1	34%
Be clean	34.5	0.0	0%
Be green	8.4	26	50%
Total Savings	-	44.1	84%

Table 2.1: Carbon Emission Savings Analysis

- 2.4 Results of the simulations show that the development is able to meet the overall criteria of the national and local policies (i.e., >35% reduction over Part L 2021 requirements).
- 2.5 Since the targeted carbon saving is a 100% reduction over the Building Regulations Part L baseline (net-zero carbon) and the building is able to achieve an 84% reduction through the implemented strategies, the shortfall needs to be compensated through a carbon offset payment.

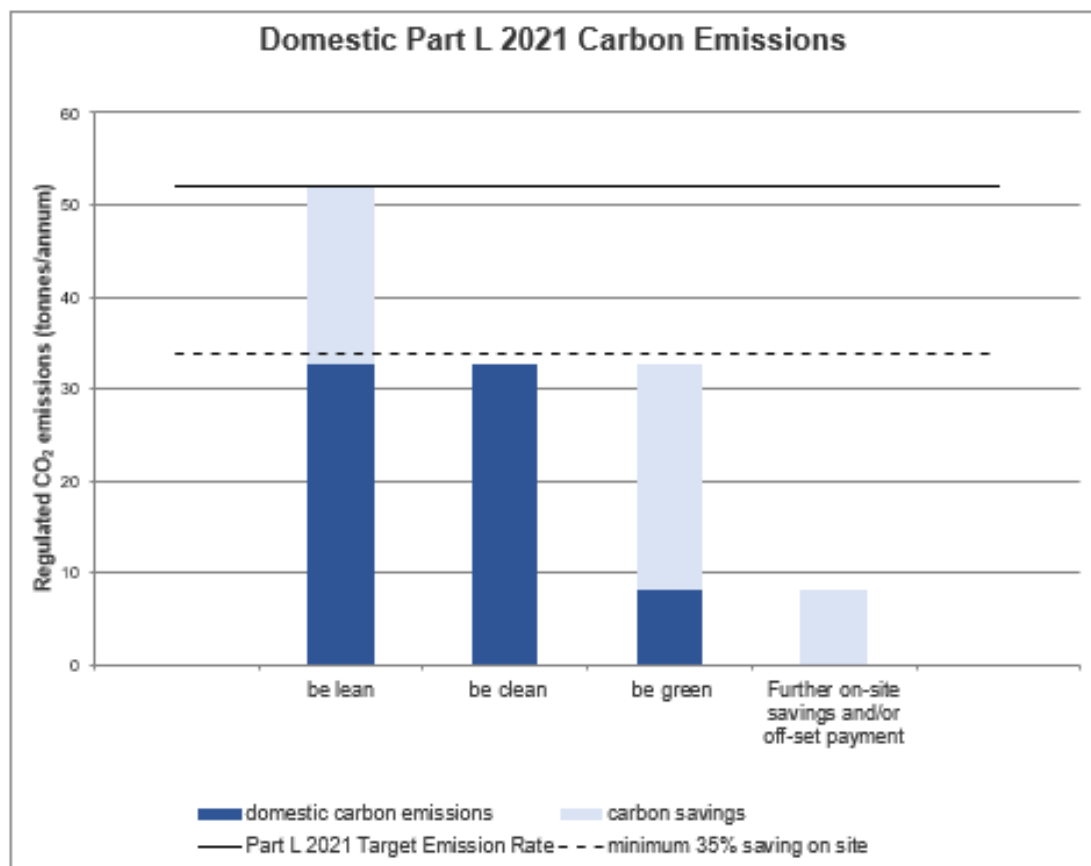


Figure 2.1: Carbon Emission Analysis and Savings Across Different Stages

CARBON SHORTFALL			
	Total Regulated Emissions (Tonnes CO ₂ /year)	CO ₂ savings (Tonnes CO ₂ /year)	Percentage Savings (%)
Part L 2021 Baseline	52.6	-	
BeLean	34.5	18.1	34%
BeClean	34.5	0.0	0%
BeGreen	8.4	26.0	50%
Total savings		44.1	84%
CARBON OFFSET CALCULATION			
Carbon Shortfall (Tonnes CO ₂ /annum)	8.4		
Total carbon offset price	95£ x 30 years = £2,850/ tCO2		
‘Zero carbon’ offset payment	8.4 x 2,850£		24,074£
Note: The Carbon Offset Calculation is based on the GLA Carbon Calculation Sheet - Appendix C			

Table 2.2: Carbon Shortfall and Offset Calculation

- 2.6 As the zero-carbon target cannot be fully achieved on-site, A carbon offset payment of £24,074 is required to be provided through a cash-lieu contribution to Haringey's carbon offset fund.
- 2.7 The carbon savings from each stage are illustrated in Table 2.2 above. Given the total cumulative carbon savings, the proposed development met the planning requirements.

Section 24:

- Confirmation of the necessary fabric efficiencies to achieve a minimum 26% reduction;
- Details to reduce thermal bridging;

Response:

- 2.8 The project successfully achieved a 26% reduction in carbon emissions through enhanced fabric efficiencies and the mitigation of thermal bridging as outlined in Stage 2 of the project (Ref MB/VL/P22-2532/05 Rev B). Following the post-application review, additional details and strategies have been identified to further reduce thermal bridging.

Building Parameters	Stage 2	Stage 4 (post-application)		Reference
	New Built & Refurbish	New Built	Refurbish	
Wall U value (W/m ² K)	0.14	0.18	0.17	Appendix A is the confirmation email and u value calculator of Building envelope elements.
Window U value (W/m ² K)	1.2	1.20 (g-value: 0.25 for South-east-west facing windows and 0.52 for North facing windows)		
Floor U value (W/m ² K)	0.10	0.07	0.07	
Roof U value (W/m ² K)	0.10	0.07	0.07	
Air permeability (m ³ /h.m ² at 50 Pa)	Flats & houses: 3	Flats: 4 Houses: 3.5	Flats: 4 Houses: 3.5	

Table 2.3: Building Parameters Comparison Between Stage 2 and Stage 4

- 2.9 The appendix A contains email confirmation from the design team, verifying the revised U-values and their justification. Initially, the U-value for the external wall was proposed at 0.14 W/m²K. However, after consultation with the vendor, this was revised to 0.18 W/m²K due to challenges in achieving the original value. To counterbalance this adjustment, the U-values for the roof and floor have been optimized to 0.07 W/m²K and 0.07 W/m²K, respectively.
- 2.10 There has been no change in the building layout or internal configuration between Stage 2 and Stage 4; the design remains consistent

- 2.11 The project has adopted the specified LABC Psi values to minimise thermal bridging. Below are the details of the linear thermal bridges and their corresponding Psi values (W/mK).

SAP Ref	Junction	Calculated Psi-value (W/mK)	Source drawing
E2	Lintel	0.041	LABC-E2MCFF6
E3	Sill	0.021	LABC-E3MCFF3
E4	Jamb	0.016	LABC-E4MCFF3
E5	Ground Floor	0.164	LABC-E5MCFF15
E6	Party Floor	0.000	LABC-E6MCFF3
E11	Eaves (insulation at rafter level)	0.008	LABC-E11MCFF3
E13	Gable (insulation at rafter level)	0.090	LABC-E13MCFF3
E16	Corner (normal)	0.054	LABC-E16MCFF3
E18	Party wall between dwellings	0.060	LABC-E18MCFF6
P5	Party wall - Roof (insulation at rafter level)	0.045	LABC-P5MCFF2

Table 2.4: Building Parameters Comparison Between Stage 2 and Stage 4

- 2.12 The design team of the Hornsey project confirmed the revised U-values for the external wall, roof, and floor at Stage 4, along with the adoption of LABC Psi values. Consequently, an energy simulation was conducted again to validate the energy savings achieved through fabric efficiency.
- 2.13 During the 'Be Lean' stage of the energy hierarchy, energy-efficient building fabric elements were integrated into the design. Heat loss through building fabric and envelop were influenced by their U-values and air tightness. Thus, improved U-values and air permeability better than those required by Part L 2021 have been proposed at this assessment stage.
- 2.14 The following table presents the 'Be Lean' active design measures incorporated into the project to enhance the energy strategy:

No	Measure	Explanation
1	Heat recovery ventilation	All Houses and Flats are provided with MVHR Make: Vent- Axia Model Number: Sentinel Kinetic Plus B Capacity: 400m ³ /hr at 150Pa Specific Fan Power: 0.63 W/l/s Heat Recovery Efficiency: 90% Duct type: Rigid
2	On-demand control	Room thermostat only
3	Lighting Efficiency	100 (lm/W)

Table 2.5: Energy Efficiency Measures and Specifications

2.15 The impact of the measures implemented at the Be Lean stage is summarized below:

Energy Hierarchy Stage	Total Regulated Emissions (Tonnes CO ₂ /year)
Part L 2021 Baseline	52.6
Be Lean	34.5

Table 2.6: Carbon Emission Comparison between Notional and Be Lean Stage

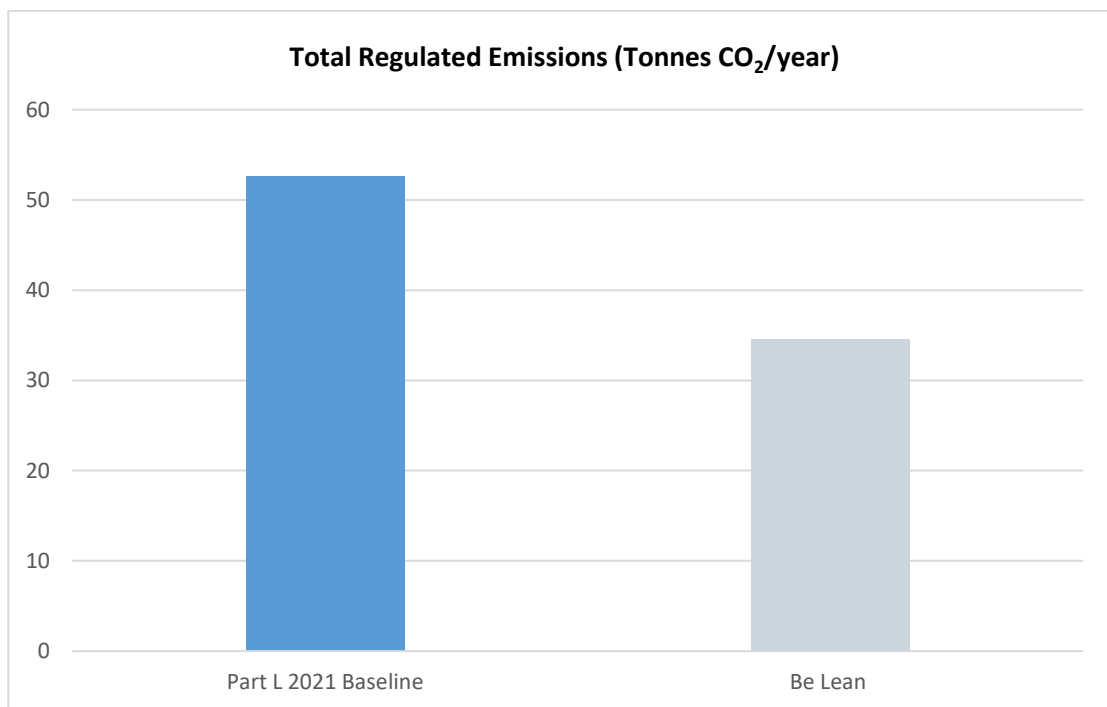


Figure 2.2: Carbon Emission comparison between Baseline and Be Lean Stage

- 2.16 The optimized building fabric specified for all dwellings, both new builds and refurbishments, has resulted in an overall projected improvement over the Part L Target Emission Rate (TER) standard of approximately 34%. This demonstrates the high standard of building fabric achieved in the development.
- 2.17 Please refer to the SAP Worksheets in Appendix B for detailed SAP calculations and the GLA spreadsheet in Appendix C for the calculation methodology.
- 2.18 The project's approach to reducing thermal bridging, particularly through the careful selection of materials and adherence to specified Psi values, is expected to significantly enhance fabric efficiency.

Section 24:

- *Location, specification and efficiency of the proposed ASHPs (Coefficient of Performance, Seasonal Coefficient of Performance, and the Seasonal Performance Factor), with plans showing the ASHP pipework and noise and visual mitigation measures;*

2.19 Response:

Requirement	Description	Reference
Location of Proposed ASHPs	The ASHP units are located in the gardens of the houses. For the Block B and Block, A have their units on the roof, while Block C's ASHP is positioned on top of the bin store and bike store.	Refer to the roof plans in Appendix D, drawing number [044_A-114C_R4], showing ASHP locations.
Specification of ASHPs	<u>For Houses in Block A & B:</u> Make: Mitsubishi Electric Model: PUZ-WM85VAA(-BS) Capacity: 8.5KW Coefficient of Performance (COP) – 2.60 Seasonal Coefficient of Performance (SCOP)-4.84 Make and model Hot water heating tank: EHPT15-21X-UKHDW1S Capacity: 210 litres <u>For Flats in Block A & B</u> 1B2P Make: Mitsubishi Electric Model: PUZ-WM50VHA(-BS) Capacity: 5KW Coefficient of Performance (COP) – 3 Seasonal Coefficient of Performance (SCOP)-4.62 Make and model Hot water heating tank: EHPT15-21X-UKHDW1S Capacity: 150 litres 2B4P & 3B5P Make: Mitsubishi Electric Model: PUZ-WM60VAA(-BS) Capacity: 6KW Coefficient of Performance (COP) –3.20 Seasonal Coefficient of Performance (SCOP)-4.81 Make and model Hot water heating tank: EHPT15-21X-UKHDW1S	Cite the manufacturer's technical datasheets in Appendix E.

Requirement	Description	Reference
	Capacity: 170 litres <u>For Flats in Block C</u> 1B2P Make: Logic Air Source Heat pump Model: AH750665 Capacity: 5KW Coefficient of Performance (COP) –3.04 Seasonal Coefficient of Performance (SCOP)-3.65 Make and model Hot water heating tank: EHPT15-21X-UKHDW1S Capacity: 150 litres 2B4P & 3B5P Make: Logic Air Source Heat pump Model: AH750666 Capacity: 8KW Coefficient of Performance (COP) –3.07 Seasonal Coefficient of Performance (SCOP)-3.7 Make and model Hot water heating tank: EHPT15-21X-UKHDW1S Capacity: 170 litres	
ASHP Pipework Plans	Please note that all houses and flats in Blocks A and B will follow the same heating strategy. Typical dwellings, such as Flat B2 and the Mews house, are considered reference examples. The heating service plans detail the exact routing of pipework from the ASHP units to the internal heating distribution systems, including connections to underfloor heating and hot water cylinders. For the flats in Block C, the heating services outline the specific routing of pipework from the ASHP units to the internal heating distribution systems, connected through radiators and hot water cylinders.	Refer to mechanical schematics in Appendix F, drawing number [1982/M/101F; 1982/M/102H; 1982/M/103 H], detailing the pipework layout.
Noise Mitigation Measures	To address potential noise concerns associated with the operation of the Air Source Heat Pumps (ASHPs), an ultra-quiet product has been selected. This choice significantly reduces operational noise, ensuring minimal disturbance to residents and neighbouring properties.	Cite the manufacturer's technical datasheets in Appendix E.

Requirement	Description	Reference
Visual Impact Mitigation	The visual impact of the Air Source Heat Pumps (ASHPs) has been carefully mitigated through strategic placement and design: 1. Houses (Gardens): ASHP units are screened with landscaping, such as hedges or decorative fencing, ensuring they blend into the garden environment. 2. Block A and Block B (Rooftops): Rooftop ASHP units are concealed with parapet walls or enclosures that match the building's design, keeping them out of sight from the ground and neighbouring properties. 3. Block C (Above Bin and Bike Stores): The ASHP units are hidden by extending the store's roofline or adding screening elements consistent with the building's design, minimizing their visual presence. These measures ensure the ASHPs are unobtrusive and integrated seamlessly into the site's overall aesthetic.	

Table 2.7: ASHP requirements and references

- 2.20 While Mitsubishi and Ideal Air Source Heat Pump systems serve as our standard default products and are currently assessed ASHPs, contractors have the flexibility to propose similar-performing alternatives during the construction phase. These alternatives must meet specific criteria, including Coefficient of Performance (COP) and Energy-Related Products (ErP) ratings, comparable to the current assessed ASHPs. This approach ensures that any change in ASHP selection does not adversely impact emissions reduction or SAP ratings.

For instance:

- The Mitsubishi Ecodan R32 Monobloc maintains an ErP rating of A+++ at 35°C (with a COP of 4.62-4.84) and A++ at 55°C (with a COP of 3.24-3.48).
- Similarly, Ideal Logic Air systems achieve an ErP rating of A+++ at 35°C (COP: 4.96-5.19) and A++ at 55°C (COP: 3.48-3.73).

Additionally, alternative products like the Dream Heat Pump, Samsung EHS Monobloc, or Daikin Altherma 3 H HT can also be considered, as their performance standards align with or exceed those of the above-mentioned systems.

Section 24:

- *Specification and efficiency of the proposed Mechanical Ventilation and Heat Recovery (MVHR), with plans showing the rigid MVHR ducting and location of the unit;*

Response:

2.21 For Ventilation, All Houses and Flats are provided with MVHR

Requirement	Description	Reference
MVHR Specifications	Make: Vent- Axia Model Number: Sentinel Kinetic Plus B Capacity: 400m ³ /hr at 150Pa	Cite the manufacturer's technical datasheets in Appendix G.
Efficiency Metrics	Specific Fan Power: 0.63 W/l/s Heat Recovery Efficiency: 90% Duct type: Rigid	
MVHR Ducting and Unit Location	The plan illustrates the location of the MVHR and its return, supply and exhaust ducts.	Refer to mechanical schematics in Appendix H, drawing number [1982/M/202_T2; 1982/M/203_T3; 1982/M/201F_T2], detailing the pipework layout.

Table 2.8: MVHR requirements and references

Section 24:

- *Details of the PV, demonstrating the roof area has been maximised, with the following details: a roof plan; the number, angle, orientation, type, and efficiency level of the PVs; how overheating of the panels will be minimised; their peak output (kWp); and how the energy will be used on-site before exporting to the grid;*

Response:

Requirement	Description	Reference
Roof Plan	Appendix I contains the Roof Plan, which highlights the location of the Solar PV panels.	Refer to the roof plan in Appendix I, PDF page 01, sheet number [A.00], indicating the PV panel layout.
Number of PV Panels	70 Nos of panels will be placed on the roof of Block B	Refer to the roof plan in Appendix I, PDF page 01, sheet number [A.00], detailing the number of panels.
Angle of PV Panels	10° degree	Refer to the Framing details in Appendix I, PDF page 03, sheet number [S.00]
Orientation of PV Panels	East and West	Refer to the layout plan in Appendix I, PDF page 02, sheet number [A.01]
Type of PV Panels	Make: Hi Mo Explorer Model: LR5-66HTH-520-540M	Refer to the specification sheet in Appendix I, PDF page 04, sheet number [D.00]
Efficiency Level of PV Panels	22.5	Refer to the specification sheet in Appendix I, PDF page 04, sheet number [D.00]
Overheating Mitigation	The efficiency of photovoltaic (PV) panels decreases as their operating temperature increases. To counteract	

Requirement	Description	Reference
	this, cooling methods are implemented to reduce the negative impact of overheating on power output and enhance the operational reliability of PV systems. A viable strategy for mitigating overheating in solar panels is the use of passive cooling, which relies on natural convection and heat conduction to dissipate heat without the need for mechanical components. This method works by transporting heat away from the photovoltaic (PV) modules and releasing it into the environment. To enhance heat transfer efficiency, materials with high thermal conductivity, such as pipes or fins, are integrated into the design of the PV panels. Passive cooling systems can employ natural circulation with air, water, or phase-change materials as the cooling medium.	
Peak Output (kWp)	37.45 kW	Refer to the roof plan in Appendix I, PDF page 01, sheet number [A.00], indicating the PV peak output.
On-Site Energy Usage	The project will be installing PV panels with a total capacity of 37.45 kWp. Each of the four houses (MH1, MH2, MH3, and MH4) in Block B will be provided with a separate PV array for individual use, while the remaining electricity generated from the solar panels will be used in the landlord-supplied communal areas. Any excess energy will be supplied to the grid.	

Table 2.9: Solar PV Requirement and Reference**Section 24:**

- *Specification of any additional equipment installed to reduce carbon emissions.*

Response:

- 2.22 To further reduce carbon emissions, the strategy focuses on specifying and implementing additional energy-efficient equipment, particularly LED lighting and sensor-activated systems. By adopting high-efficiency LED fixtures and integrating sensor-activated lighting in communal areas, the building can achieve significant energy savings and lower operational costs. These measures not only enhance the building's environmental performance but also contribute to overall carbon reduction goals. The use of advanced LEDs and sensors ensures that lighting is

both effective and sustainable, optimizing energy use and minimizing unnecessary consumption.

Section 24:

- *Six months following the first occupation of that block, evidence that the solar PV arrays have been installed correctly and are operational shall be submitted to and approved by the Local Planning Authority, including photographs of the solar array, installer confirmation, an energy generation statement for the period that the solar PV array has been installed, and a Microgeneration Certification Scheme certificate.*

Response:

- 2.23 The project team would like to confirm that the project is currently at Stage 4. The requested information pertains to the post-occupancy stage and will be submitted to the council at the appropriate time following the timeline specified in the condition. The Project team assure the Council that all necessary documentation and evidence will be compiled and provided to demonstrate compliance with the installation and operational requirements of the solar PV arrays.

Section 24:

- *Within six months of the first occupation, evidence shall be submitted to the Local Planning Authority that the development has been registered on the GLA's Be Seen energy monitoring platform.*

Response:

- 2.24 The project team acknowledge the requirement that, within six months of the first occupation, evidence must be submitted to the Local Planning Authority demonstrating that the development has been registered on the GLA's Be Seen energy monitoring platform. The project team confirm their commitment to fulfilling this requirement. Although the project is currently at Stage 4, the project team will ensure that all necessary steps are taken to register the development on the Be Seen platform once the specified timeline is reached. The required evidence, including proof of registration, will be compiled and submitted to the Local Planning Authority within the stipulated six-month period post-occupation.

Section 25:

Prior to the commencement of any works to retrofit the existing building other than demolition and strip-out, an Energy Strategy shall be submitted to and approved in writing by the Local Planning Authority. This strategy shall:

- *Set out how the development will aim for PAS 2035:2019 & 2030:2017 compliance, with all documentation lodged on the Trustmark data warehouse as appropriate.*

Response:

- 2.25 The project entails converting Hornsey Police Station into new residential houses and flats. PAS 2035 focuses on the retrofitting of existing dwellings. Since this project involves converting a commercial building into residential units rather than retrofitting existing homes, PAS 2035 is not applicable.

- *Set out how it will reduce the development's carbon emissions prioritising improvements to the fabric, using SAP or Passive House Planning Package calculations.*

Response:

- 2.26 See sections 2.8 to 2.18 of the report which explains the carbon emission improvements to fabric using SAP software.

- *Set out the existing air tightness level (measured), and the air tightness strategy on how and where air tightness will be improved to a maximum of 3 m³/m²h @ 50Pa*

Response:

- 2.27 The project entails converting a police station into residential homes and flats, along with the construction of new houses and flats. All units will feature enhanced airtightness. Please refer to Table 2.3 in Section 2.13 of this report for details. The project team will design the spaces to achieve air permeability levels of 4 m³ /h.m² at 50 Pa for flats and 3.5 m³ /h.m² at 50 Pa for houses.

- Set out a detailed strategy to reduce thermal bridging, reducing risks of condensation and heat loss, with calculations of the proposed thermal bridge heat loss factors;
- Confirm details of what materials and thicknesses of insulation will be used and where showing on detailed plans and sections; how the fenestration will be improved (preference for double or triple glazing in existing timber frames);

Response:

- 2.28 See sections 2.11 to 2.12 of the report which explains the details of thermal bridges and fabric efficiency of the materials used in the envelope.

- Provide existing measured space heating demand (kWh/m²/year) and energy use (kWh/year) and set out the modelled space heating demand for the development (kWh/m²/year).

Response

- 2.29 The existing measured space heating demand (kWh/m²/year) and energy use (kWh/year) were calculated using notional building fabrics and a gas boiler for the refurbished dwellings. The results are shown in Table 2.10 below.

Type	Area	Multiplier	Total Area	Space Heating Demand kWh/year	Energy Consumption kWh/Year	Total Space Heating Demand kWh/year	Total Energy Consumption kWh/Year
AH1-3B SEMI DETACH	129.21	6	775.26	9977.58	13988.83	59865.50	83932.95
Flat A1- 2B4P	73.81	2	147.62	5839.02	9081.74	11678.04	18163.47
Flat A2-1B2P	52.77	1	52.77	3470.11	6266.69	3470.11	6266.69
Flat A4-3B5P	99.61	1	99.61	8442.51	11958.32	8442.51	11958.32
			1075.26			87234.2	124552.5
Total Space heating demand kWh/m²/year						81.13	
Total Energy Usage kWh/year						115.83	

Table 2.10: Existing Space heating demand and Energy Consumption

- 2.30 The proposed measured space heating demand (kWh/m²/year), utilizing energy-efficient building fabrics and services, achieves a space heating demand of 8.26 kWh/m²/year for the refurbished dwellings. Detailed results are presented in Table 2.10.

Type	Area	Multiplier	Total Area	Space Heating Demand kWh/year	Total Space Heating Demand kWh/year
AH1-3B SEMI DETACH	129.21	6	775.26	1081.8098	6490.86
Flat A1- 2B4P	73.81	2	147.62	594.6787	1189.36
Flat A2-1B2P	52.77	1	52.77	301.8926	301.89
Flat A4-3B5P	99.61	1	99.61	902.6323	902.63
			1075.26		8884.74
Total Space heating demand kWh/m ² /year					8.26

Table 2.11: Proposed Space heating demand

3.0 CONCLUSION

- 3.1 The Energy Strategy Report for the Hornsey Police Station project responds and provides additional information requested by the Haringey Council in the planning conditions.
- 3.2 The Report outlines a comprehensive approach to achieving significant energy efficiency improvements and reducing carbon emissions in compliance with national and local policies, including the Greater London Authority (GLA) Energy Assessment Guidance. The project successfully integrates a combination of high-performance building fabric, energy-efficient technologies, and renewable energy sources.
- 3.3 Through the application of the Energy Hierarchy—comprising "Be Lean," "Be Clean," and "Be Green" strategies—the development has achieved an 84% reduction in carbon emissions compared to the baseline set by the 2021 Building Regulations Part L.
- 3.4 While this falls short of the 100% net-zero carbon target, the shortfall will be addressed through a carbon offset payment, ensuring compliance with planning conditions
- 3.5 Key energy efficiency measures, such as improved U-values, the use of Mechanical Ventilation with Heat Recovery (MVHR), and the installation of Air Source Heat Pumps (ASHPs), contribute to the project's overall energy performance. The inclusion of a 37.41 kW solar photovoltaic (PV) array further enhances the development's sustainability credentials.
- 3.6 The strategies implemented to meet regulatory requirements and set a precedent for sustainable development in the Proposed development.
- 3.7 The Hornsey Police Station project demonstrates a commitment to energy efficiency, sustainability, and the reduction of environmental impact, aligning with the broader goals of reducing carbon emissions and promoting renewable energy use in residential developments.

4.0 DISCLAIMER

- 4.1 Create Consulting disclaims any responsibility to the Client Archanaeum Ltd in respect of any matters outside the scope of this report.
- 4.2 The copyright of this report is vested in Create Consulting Engineers Ltd and Archanaeum Ltd. The Client, or his appointed representatives, may copy the report for purposes in connection with the development described herein. It shall not be copied by any other party or used for any other purposes without the written consent of Create Consulting Engineers Ltd or Archanaeum Ltd.
- 4.3 Create Consulting Engineers Ltd accepts no responsibility whatsoever to other parties to whom this report, or any part thereof, is made known. Any such other parties rely upon the report at their own risk.

APPENDICES

APPENDIX A



19/08/2024

Create Consulting Engineers,
09-112 Temple Chambers
3-7 Temple Avenue
London
EC4Y 0HP

Confirmation of Thermal Bridges and Building Fabric Efficiency for Hornsey Police Station: Post-Planning Application Stage

Dear Energy assessor,

I am confirming that the project has adopted the specified LABC Psi values to minimise thermal bridging. Below are the details of the linear thermal bridges and their corresponding PSI values (W/mK).

Thermal Bridging Input to SAP assessment			
SAP Ref	Junction	Calculated Psi-value (W/mK)	Source drawing
E2	Lintel	0.041	LABC-E2MCFF6
E3	Sill	0.021	LABC-E3MCFF3
E4	Jamb	0.016	LABC-E4MCFF3
E5	Ground Floor	0.164	LABC-E5MCFF15
E6	Party Floor	0.000	LABC-E6MCFF3
E11	Eaves (insulation at rafter level)	0.008	LABC-E11MCFF3
E13	Gable (insulation at rafter level)	0.090	LABC-E13MCFF3
E16	Corner (normal)	0.054	LABC-E16MCFF3
E18	Party wall between dwellings	0.060	LABC-E18MCFF6
P5	Party wall - Roof (insulation at rafter level)	0.045	LABC-P5MCFF2

Additionally, the project has incorporated the following thermal performance specifications for the building materials used in the newly constructed and refurbished areas.



Category		New Built (Block B & Block C)	Refurbish (Block A)
U value (W/m²K)	Wall	0.18	0.17
	Floor	0.07	0.07
	Roof	0.07	0.07
	Windows	1.20 (g-value: 0.25 for South-east-west facing windows) (g-value: 0.52 for North facing windows)	1.20 (g-value: 0.25 for South-east-west facing windows) (g-value: 0.52 for North facing windows)
	Door	0.98	0.98
Air permeability (m ³ /h.m ² at 50 Pa)		Flats: 4 Houses: 3.5	Flats: 4 Houses: 3.5

Please be informed that the U-value proposed in the Stage 2 design has been revised. The originally proposed U-value for the external wall was 0.14 W/m²K. However, after consultation with the vendor, it has been determined that this U-value is challenging to achieve. Therefore, the U-value for the wall has been revised to 0.18 W/m²K. To compensate for this change, additional care has been taken in the selection of materials for the roof and floor, resulting in revised U-values of 0.07 W/m²K and 0.07 W/m²K, respectively.

By adopting the LABC Psi values and the revised U-values, we aim to meet the BE LEAN requirements. Kindly confirm through an energy simulation the savings that will be achieved with these recent updates.

Kind regards

Chris Boyle
Director

Project Information

Client : Chris Boyle, Archanaeum

Date : 17 November 2023

Address : Hendon Lane, London, N3 1RY

Project : Oatlands Road, 8 Oatlands Road Oxford

Construction Type : Walls > Cavity Wall - Full Fill Insulation

	Thickness (mm)	Thermal conductivity (W/mK)	Thermal resistance (m²K/W)	Bridge details air gaps
Outside surface resistance	0.0	0.0000	0.0400	–
External Finish <i>None</i>	–	–	–	–
Outer Leaf <i>Brickwork</i>	102.5	0.7700	0.1331	–
Insulation <i>Cavity Wall Slab (CWS) 34 150mm</i>	150.0	0.0340	4.4118	–
Inner Leaf <i>Blockwork Aerated Standard (lambda = 0.15)</i>	100.0	0.1500	0.6667	0.9342
Mortar	100.0	0.8800	0.1136	0.0658
Air cavity	15.0	–	0.1713	0.8000
Plasterboard on Dabs	15.0	0.4300	0.0349	0.2000
12.5mm Gyproc Wallboard	12.5	0.1900	0.0658	–
Inside surface resistance	0.0	0.0000	0.1300	–

U-value = 0.18 W/m².K (combined method : 0.183 W/m².K, upper limit : 5.551m²K/W, lower limit : 5.382m²K/W, dUf : 0.0017)

Correction Factors

Mechanical Fasteners : (nf = fasteners per m², Af = fasteners cross-sectional area)

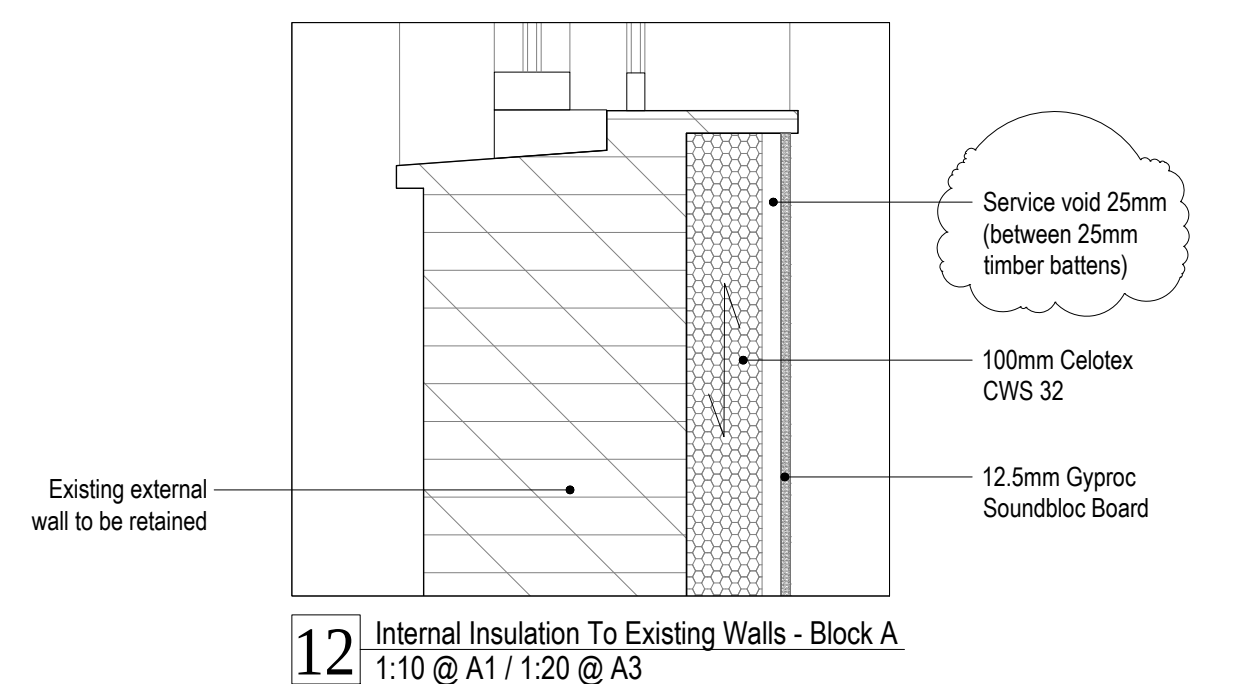
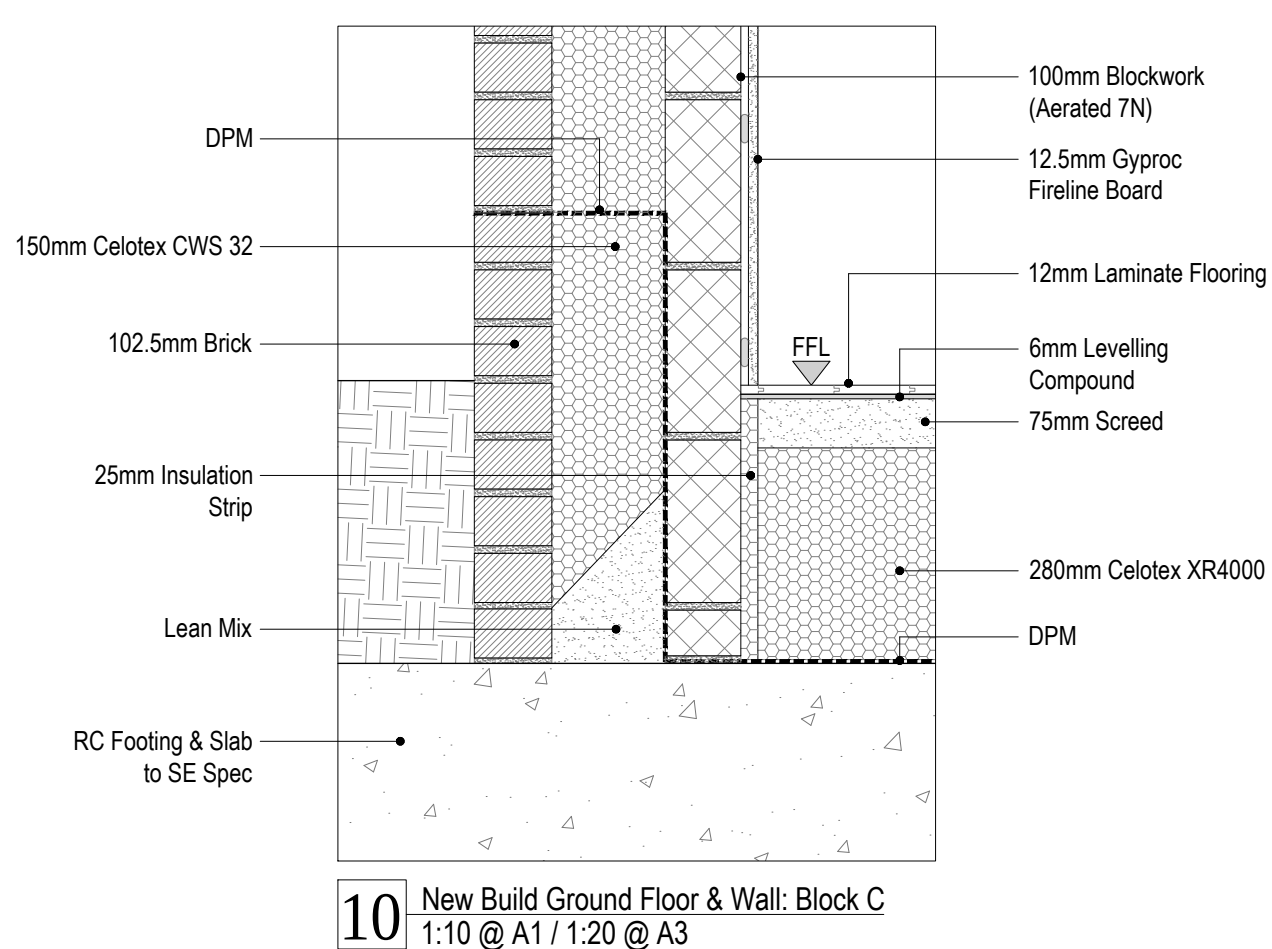
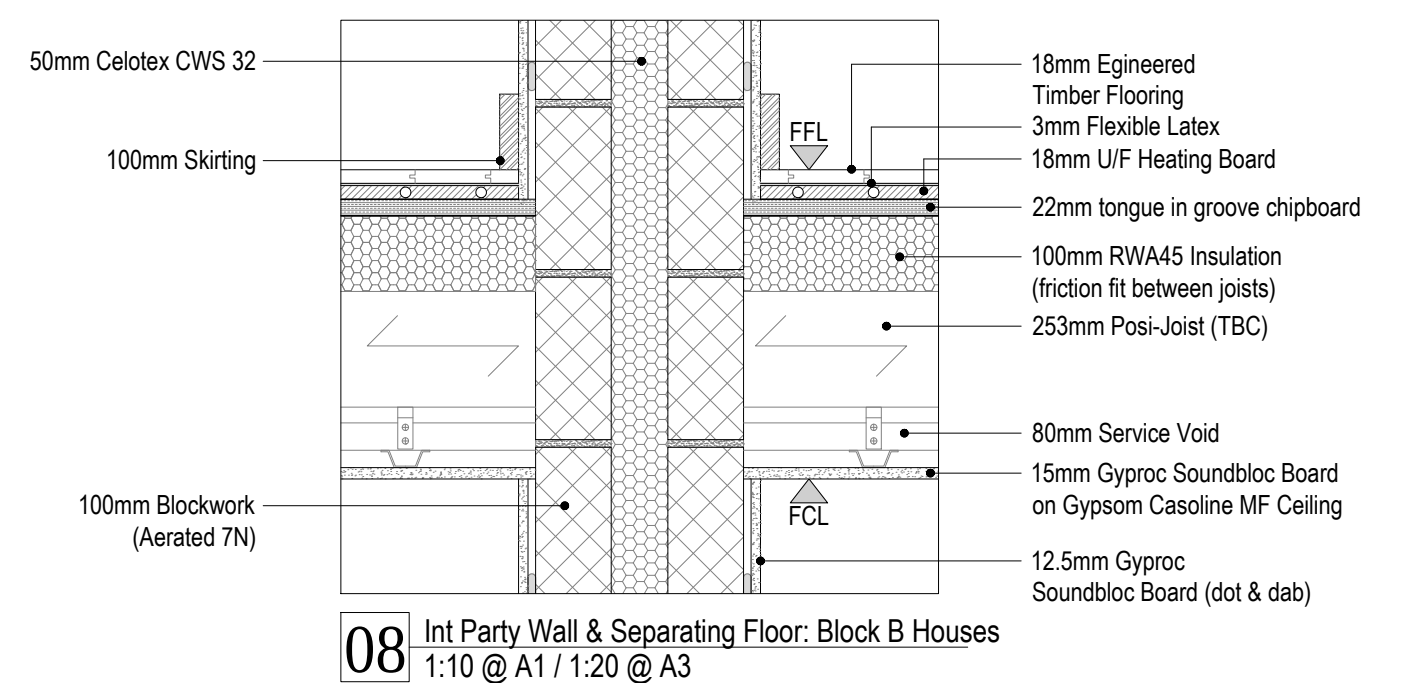
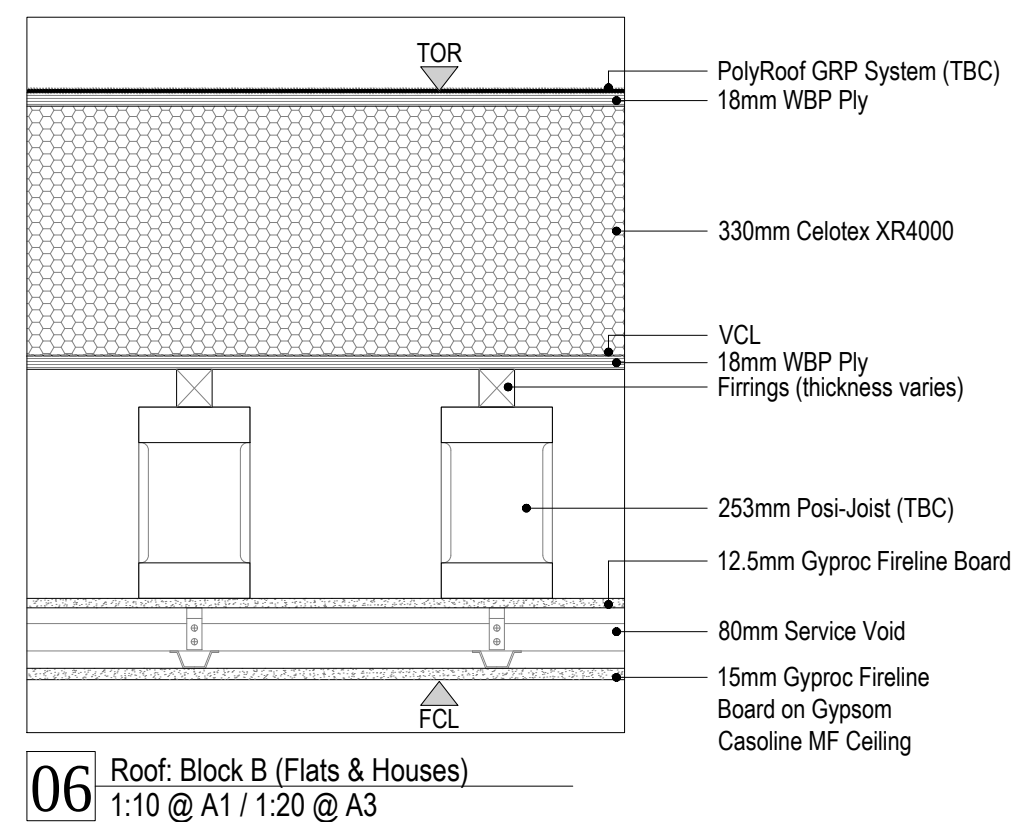
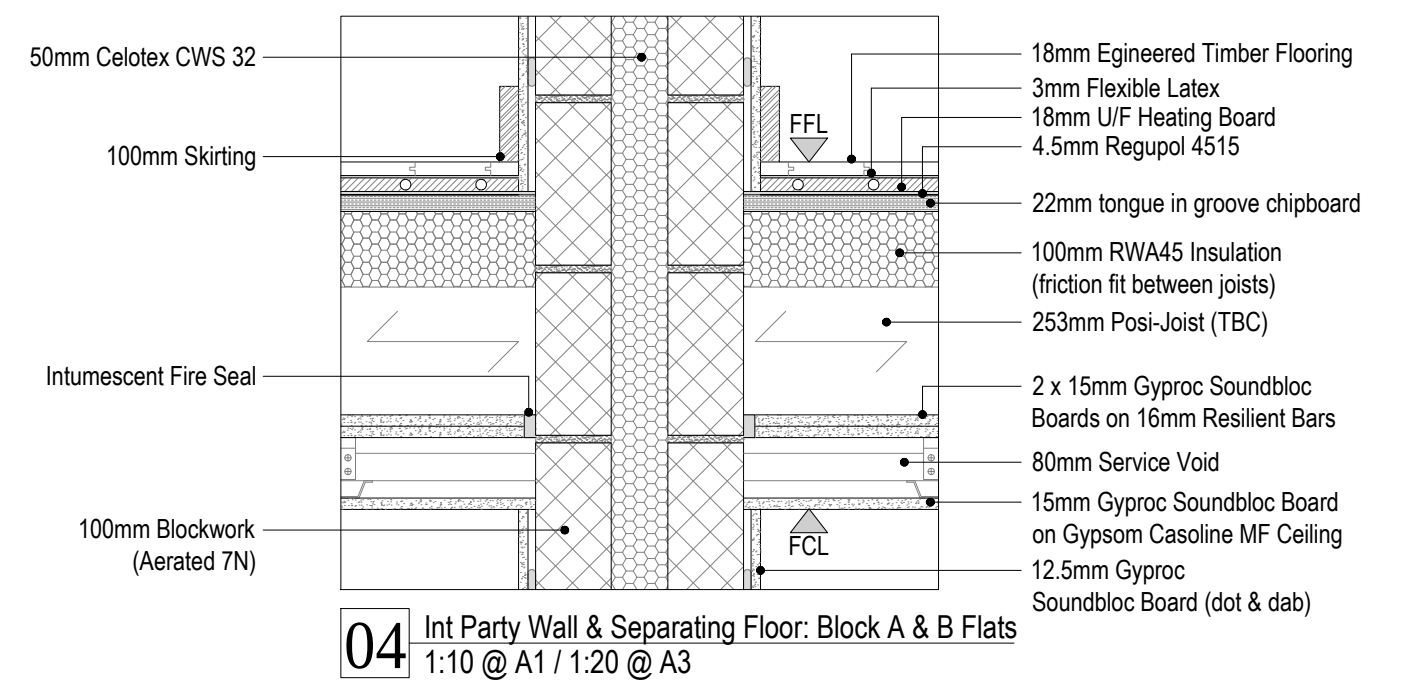
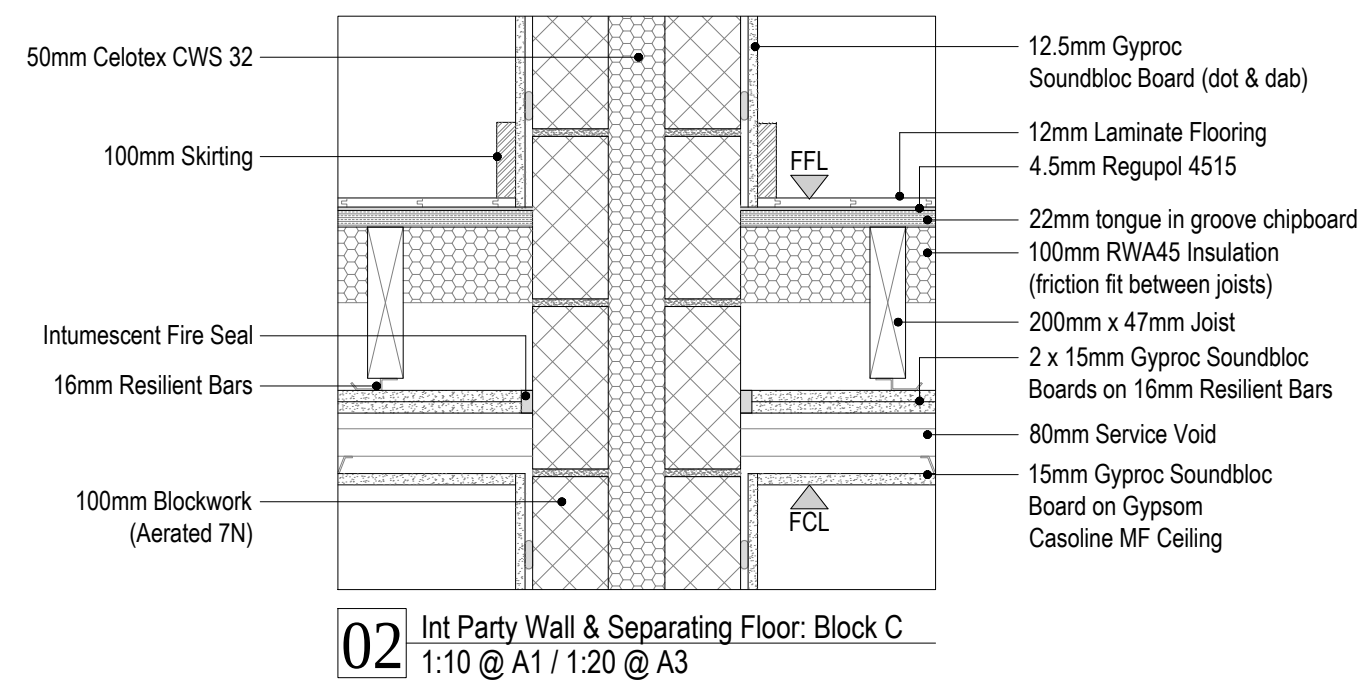
1. Delta Uf for Cavity Wall Slab (CWS) 34 150mm Insulation : 0.0017

Alpha : 0.8 per m, lambda f : 17.0000 W/mK, nf : 0.00002500 per m², Af : 8.6000mm²

Air Gap Corrections : N/A

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

Celotex products should not be used in the external walls of buildings over 11 metres in height. Recent changes to Building Regulations mean that only non-combustible insulation or insulation of limited combustibility should be used in buildings of that height.



Project Information

Client : Mark Bouchat, Rosquill Development

Date : 11 September 2024

Address : Unit 1A, Radlett, WD7 9AD

Project : Hornsey Police Station Existing Block A Walls

Construction Type : Walls > Solid Wall - Internal Insulation > Conventional Insulation Options - Mechanical Fix

	Thickness (mm)	Thermal conductivity (W/mK)	Thermal resistance (m²K/W)	Bridge details air gaps
Outside surface resistance	0.0	0.0000	0.0400	–
External Finish None	–	–	–	–
Brick/Block Brickwork	350.0	0.7700	0.4545	0.7600
Mortar	350.0	0.9400	0.3723	0.2400
Insulation Celotex GA4000 100.0mm	100.0	0.0220	4.5455	–
Joints taped to create VCL + Air Leakage Barrier	–	–	–	–
Cavity (low emissivity)	25.0	–	0.6651	0.9217
Timber counter batten 25 x 47 @ 600 ctrs	25.0	0.1300	0.1923	0.0783
12.5mm Gyproc Wallboard	12.5	0.1900	0.0658	–
Plaster skim	3.0	0.1800	0.0167	–
Inside surface resistance	0.0	0.0000	0.1300	–

U-value = 0.17 W/m².K (combined method : 0.172 W/m².K, upper limit : 5.858m²K/W, lower limit : 5.787m²K/W, dUf : 0.0013)

Correction Factors

Mechanical Fasteners : (nf = fasteners per m², Af = fasteners cross-sectional area)

1. Delta Uf for Celotex GA4000 100.0mm Insulation : 0.0013

Alpha : 0.8 per m, lambda f : 50.0000 W/mK, nf : 0.00001600 per m², Af : 4.0000mm²

Air Gap Corrections : N/A

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

Celotex products should not be used in the external walls of buildings over 11 metres in height. Recent changes to Building Regulations mean that only non-combustible insulation or insulation of limited combustibility should be used in buildings of that height.

Project Information

Reference T1229541-SW
Date 5 Aug 2024
Client Mark Bouchat
Project Hornsey Police station
Rosguill Development
Unit 1A Chestnut House Farm Close, Shenley
Radlett
WD7 9AD
Email: mark.bouchat@rosguilldev.com

Construction Type

Element : Flat roof - 001 Warm Flat Roof
Balcony Detail
Internal surface emissivity : High External surface emissivity : High
Building use : BS5250 dry/moist occupancy

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m ² K/W)	Pitch (°)	Bridge details Air gaps (Level, Delta U")
Outside surface resistance	-	-	0.040		
Single Ply Membrane	-	-	-		
Plywood	18.0	0.170	0.106		
Celotex XR4000 (2 x 165mm)	330.0	0.022	15.000		
VCL as BS6229:2018	-	-	-		
Plywood	18.0	0.170	0.106		
Cavity between joists	200.0	-	0.160		11.750% Timber (200.0mm)
Gyproc Wallboard	12.5	0.189	0.066		
Inside surface resistance	-	-	0.100		

U-value = 0.07W/m²K

U-value, Combined Method : 0.072W/m²K (upper/lower limit 15.728 / 15.597m²K/W, dUf 0.0082, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

Correction factors

Mechanical fasteners :-

Alpha : 0.80 per m lambda f : 50.0000W/mK nf : 5.550 per m² Af : 13.200mm² Recess : 0.0mm

Warm Flat Roof - Suretwist Bigtwist

Delta Uf for Celotex XR4000 (2 x 165mm) : 0.0082

nf = fasteners per m² Af = fasteners cross-sectional area

Air gaps, Delta Ug = 0.000W/m²K

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

Project Information

ReferenceT1229541-SW

Date5 Aug 2024

ClientMark Bouchat

ProjectHornsey Police station

Rosguill Development

Unit 1A Chestnut House Farm Close, Shenley

Radlett

WD7 9AD

Email:mark.bouchat@rosguilldev.com

Construction Type

Element: Pitched roof, ceiling at rafter line - 002 Pitched Roof

Cold pitched roof.

Internal surface emissivity: High

External surface emissivity: High

Building use: BS5250 dry/moist occupancy

	Thickness	Thermal Conductivity	Thermal Resistance	Pitch	Bridge details
	(mm)	(W/mK)	(m²K/W)	(°)	Air gaps (Level, Delta U")
Outside surface resistance	-	-	0.100		
Slates on battens on counter battens including battens	-	-	0.000		
Breather membrane	-	-	-		
Cavity (low emissivity) between rafters @ 400 ctrs	10.0	-	0.454		12.800% Timber (10.0mm)
Celotex XR4000 between rafters @ 400 ctrs	165.0	0.022	7.500		12.800% Timber (165.0mm)
Celotex XR4000 under rafters. Joints taped	165.0	0.022	7.500		
Joints taped to create VCL + Air Leakage Barrier	-	-	-		
Batten airspace - low emissivity	25.0	-	0.454		12.800% Timber (25.0mm)
Gyproc Wallboard	12.5	0.189	0.066		
Inside surface resistance	-	-	0.100		

U-value = 0.07W/m²K

U-value, Combined Method : 0.072W/m²K (upper/lower limit 14.825 / 13.037m²K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

Correction factors

Air gaps, Delta Ug = 0.000W/m²K

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

Project Information

Reference

T1229541-SW

Date

5 Aug 2024

Client

Mark Bouchat

Rosguill Development

Unit 1A Chestnut House Farm Close, Shenley

Radlett

WD7 9AD

Project

Hornsey Police station

Email:

mark.bouchat@rosguilldev.com

Construction Type

Element	: Solid ground floor - 003 Ground Floor - Block C				
Solid ground floor					
Internal surface emissivity	: High	External surface emissivity	: High		
		Thickness	Thermal Conductivity	Thermal Resistance	Pitch Bridge details
		(mm)	(W/mK)	(m²K/W)	(°) Air gaps
					(Level, Delta U")
Inside surface		-	-	0.170	
Screed		75.0	1.401	0.054	
Polythene, 500 gauge separating layer		-	-	-	
Celotex XR4000 (2 x 140mm)		280.0	0.022	12.727	
DPM - Polythene ,1200 gauge		-	-	-	
Concrete oversite		-	-	0.000	
Sand Blinded Hardcore		-	-	0.000	
Ground		-	-	0.040	

Ground Floor Details

Floor type

: Solid floor

Calculation method

: EN ISO 13370:2007

P/A

: 0.520

Characteristic dimension, B'

: 3.846

Thermal conductivity of ground:

: 2.000 W/mK

Width of walls, w:

: 0.300 m

Edge insulation position

: None

U-value = 0.07W/m²K

U-value, Combined Method : 0.071W/m²K (upper/lower limit 12.991 / 12.991m²K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

Correction factors

Air gaps, Delta Ug = 0.000W/m²K

Project Information

ReferenceT1229541-SW

Date5 Aug 2024

ClientMark Bouchat

ProjectHornsey Police station

Rosguill Development

Unit 1A Chestnut House Farm Close, Shenley

Radlett

WD7 9AD

Email:mark.bouchat@rosguilldev.com

Construction Type

Element	: Basement floor - 004 Basement Floor - Block B				
Ground Bearing Slab					
Internal surface emissivity	: High	External surface emissivity	: High		
		Thickness	Thermal Conductivity	Thermal Resistance	Pitch Bridge details
		(mm)	(W/mK)	(m²K/W)	(°) Air gaps
					(Level, Delta U")
Inside surface	-	-	-	0.170	
Screed	75.0		1.401	0.054	
Polythene, 500 gauge separating layer	-	-	-	-	
Celotex XR4000 (2 x 120mm)	240.0		0.022	10.909	
Concrete including Waterproofing	-	-	-	-	
Ground	-	-	-	0.040	

Basement Details

Calculation method: BS EN ISO 13370:2007

Perimeter: 60.08m

Area: 190.05m²

P/A: 0.316

Element: Basement floor

Average basement depth: 3.5m

Earth conductivity: 2.0

U-value = 0.07W/m²K

U-value, Combined Method : 0.073W/m²K (upper/lower limit 11.173 / 11.173m²K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

Correction factors

Air gaps, Delta Ug = 0.000W/m²K

Project Information

Reference T1229541-SW
Date 5 Aug 2024
Client Mark Bouchat
Project Hornsey Police station
Rosguill Development
Unit 1A Chestnut House Farm Close, Shenley
Radlett
WD7 9AD
Email: mark.bouchat@rosguilldev.com

Construction Type

Element : Basement floor - 005 Basement Floor - Mews

Ground Bearing Slab

Internal surface emissivity	: High	External surface emissivity	: High	Thickness	Thermal Conductivity	Thermal Resistance	Pitch	Bridge details
				(mm)	(W/mK)	(m ² K/W)	(°)	Air gaps
								(Level, Delta U")
Inside surface				-	-	0.170		
Screed				75.0	1.401	0.054		
Polythene, 500 gauge separating layer				-	-	-		
Celotex XR4000 (2 x 130mm)				260.0	0.022	11.818		
Concrete including Waterproofing				-	-	-		
Ground				-	-	0.040		

Basement Details

Calculation method : BS EN ISO 13370:2007
Perimeter : 74.40m
Area : 220.19m²
P/A : 0.338
Element : Basement floor
Average basement depth : 1.4m
Earth conductivity : 2.0

$U\text{-value} = 0.07\text{W/m}^2\text{K}$

U-value, Combined Method : 0.072W/m²K (upper/lower limit 12.082 / 12.082m²K/W, dUf 0.0000, dUg 0.0000, dUp 0.0000, dUr 0.0000, dUrc1 0.0000, dUrc2 0.0000)

Correction factors

Air gaps, Delta Ug = 0.000W/m²K

APPENDIX B

Full SAP Calculation Printout



Property Reference	AH1-3B6P			Issued on Date	12/09/2024
Assessment Reference	AH1-Semi Detach House Baseline	Prop Type Ref	BLOCK A		
Property	Hornsey Police Station, 88/90 , Tottenham Ln., London , N8 7EJ				
SAP Rating	84 B	DER	21.31	TER	
Environmental	80 C	% DER < TER			N/A
CO ₂ Emissions (t/year)	2.27	DFEE	66.33	TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER	111.24	TPER	
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

SAP 10 WORKSHEET FOR Conversion (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)
Ground floor	52.6300 (1b)	x 2.9500 (2b)	= 155.2585 (1b) - (3b)
First floor	50.8000 (1c)	x 2.8600 (2c)	= 145.2880 (1c) - (3c)
Second floor	25.7800 (1d)	x 2.4500 (2d)	= 63.1610 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	129.2100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 363.7075 (5)

2. Ventilation rate

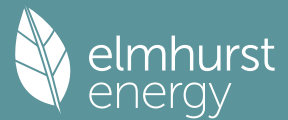
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	40.0000 / (5) = 0.1100 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	8.0000 (17)
Infiltration rate	0.5100 (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) = 0.5100 (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	0.6502	0.6375	0.6247	0.5610	0.5482	0.4845	0.4845	0.4717	0.5100	0.5482	0.5737	0.5992 (22b)
Effective ac	0.7114	0.7032	0.6951	0.6573	0.6503	0.6174	0.6174	0.6113	0.6300	0.6503	0.6646	0.6795 (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
Window North (Uw = 1.60)			19.6500	1.5038	29.5489		(27)
Window South (Uw = 1.60)			5.3000	1.5038	7.9699		(27)
Door			2.7500	1.6000	4.4000		(26)
CF			52.6300	0.1800	9.4734	110.0000	5789.3000 (28a)
External Wall 1	167.2400	27.7000	139.5400	0.2600	36.2804	190.0000	26512.6000 (29a)
Flat Roof	25.2700		25.2700	0.1600	4.0432	9.0000	227.4300 (30)
Pitched Roof	25.3200		25.3200	0.1600	4.0512	9.0000	227.8800 (30)
Total net area of external elements Aum(A, m ²)			270.4600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	95.7670		(33)
Party Wall 1			63.8700	0.0000	0.0000	180.0000	11496.6000 (32)
Internal Wall 1			156.8400			75.0000	11763.0000 (32c)
Internal Floor 1			50.0800			18.0000	901.4400 (32d)
Internal Floor 2			25.7800			18.0000	464.0400 (32d)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	57382.2900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							444.1010 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	10.6400	0.0410	0.4362
E3 Sill	4.9400	0.0210	0.1037
E4 Jamb	32.9400	0.0160	0.5270
E5 Ground floor (normal)	20.5600	0.1640	3.3718
E6 Intermediate floor within a dwelling	39.8500	0.0000	0.0000
E16 Corner (normal)	24.2700	0.0540	1.3106
E17 Corner (inverted - internal area greater than external area)	7.7600	-0.0900	-0.6984
E18 Party wall between dwellings	16.5100	0.0600	0.9906
P1 Party wall - Ground floor	9.5800	0.0800	0.7664
P2 Party wall - Intermediate floor within a dwelling	12.9500	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	9.5200	0.0450	0.4284
E21 Exposed floor (inverted)	5.5000	0.3200	1.7600
E11 Eaves (insulation at rafter level)	18.2700	0.0080	0.1462
E13 Gable (insulation at rafter level)	7.2400	0.0900	0.6516
E14 Flat roof	10.0300	0.0400	0.4012
R1 Head of roof window	7.8800	0.0410	0.3231
R2 Sill of roof window	7.8800	0.0210	0.1655
R3 Jamb of roof window	2.5800	0.0160	0.0413
R7 Flat ceiling (inverted)	23.6000	0.1200	2.8320
R9 Roof to wall (flat ceiling)	10.2500	0.3200	3.2800
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			16.8372 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	112.6042 (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	85.3841	84.3988	83.4331	78.8971	78.0484	74.0977	74.0977	73.3661	75.6195	78.0484	79.7653	81.5602 (38)
Average = Sum(39)m / 12 =	197.9883	197.0031	196.0373	191.5013	190.6527	186.7020	186.7020	185.9703	188.2237	190.6527	192.3695	194.1644 (39)
												191.4973
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.5323	1.5247	1.5172	1.4821	1.4755	1.4449	1.4449	1.4393	1.4567	1.4755	1.4888	1.5027 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

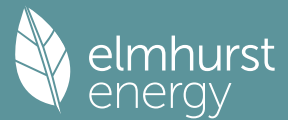
Assumed occupancy													2.8929 (42)
Hot water usage for mixer showers	72.7245	71.6316	70.0390	66.9919	64.7432	62.2355	60.8101	62.3906	64.1231	66.8157	69.9282	72.4458 (42a)	
Hot water usage for baths	33.0496	32.5588	31.8676	30.5931	29.6388	28.5807	28.0091	28.6955	29.4428	30.5751	31.8758	32.9379 (42b)	
Hot water usage for other uses	46.5856	44.8916	43.1976	41.5035	39.8095	38.1155	38.1155	39.8095	41.5035	43.1976	44.8916	46.5856 (42c)	
Average daily hot water use (litres/day)												140.0423 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	152.3597	149.0819	145.1041	139.0885	134.1915	128.9316	126.9347	130.8956	135.0695	140.5883	146.6956	151.9693 (44)	
Distribution loss (46)m = 0.15 x (45)m	36.1951	31.8436	33.4529	28.5608	27.0971	23.7805	23.0275	24.3114	24.9831	28.6166	31.3492	35.6921 (46)	
Water storage loss:													
Store volume												210.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.7000 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.9180 (55)	
Total storage loss	28.4580	25.7040	28.4580	27.5400	28.4580	27.5400	28.4580	28.4580	27.5400	28.4580	27.5400	28.4580 (56)	
If cylinder contains dedicated solar storage	28.4580	25.7040	28.4580	27.5400	28.4580	27.5400	28.4580	28.4580	27.5400	28.4580	27.5400	28.4580 (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	293.0209	259.0059	274.7400	240.4573	232.3680	208.5885	205.2369	213.7965	216.6062	242.4974	259.0467	289.6676 (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	293.0209	259.0059	274.7400	240.4573	232.3680	208.5885	205.2369	213.7965	216.6062	242.4974	259.0467	289.6676 (64)	
12Total per year (kWh/year)												2935.0319 (64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)	
Heat gains from water heating, kWh/month	121.6087	107.9588	115.5303	103.3513	101.4416	92.7550	92.4206	95.2666	95.4209	104.8097	109.5324	120.4938 (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	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	151.3494	167.5654	151.3494	156.3944	151.3494	156.3944	151.3494	151.3494	156.3944	151.3494	156.3944	151.3494 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	296.7659	299.8454	292.0851	275.5645	254.7102	235.1100	222.0159	218.9364	226.6967	243.2173	264.0716	283.6718 (68)
Pumps, fans	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646 (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)
Water heating gains (Table 5)	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165 (71)
Total internal gains	163.4526	160.6530	155.2827	143.5435	136.3463	128.8264	124.2212	128.0465	132.5290	140.8732	152.1283	161.9540 (72)
	680.9615	697.4574	668.1109	644.8961	611.7995	586.7244	563.9802	564.7260	582.0137	604.8336	641.9880	666.3688 (73)

6. Solar gains

Full SAP Calculation Printout



[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W	
North	19.6500				10.6334	0.6300	0.7000	0.7000	0.7700	63.8567 (74)	
South	5.3000				46.7521	0.6300	0.7000	0.7000	0.7700	75.7266 (78)	

Solar gains	139.5833	246.0540	365.3448	511.6326	634.7523	659.3956	623.4071	525.6946	414.3484	279.0327	168.5373	118.6688 (83)
Total gains	820.5448	943.5115	1033.4557	1156.5287	1246.5518	1246.1200	1187.3873	1090.4206	996.3621	883.8663	810.5252	785.0377 (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	80.5074	80.9100	81.3086	83.2345	83.6050	85.3742	85.3742	85.7100	84.6839	83.6050	82.8589	82.0929
alpha	6.3672	6.3940	6.4206	6.5490	6.5737	6.6916	6.6916	6.7140	6.6456	6.5737	6.5239	6.4729
util living area	0.9999	0.9997	0.9990	0.9947	0.9685	0.8510	0.6726	0.7454	0.9539	0.9973	0.9997	0.9999 (86)
MIT	19.7749	19.9008	20.1065	20.4218	20.7195	20.9331	20.9886	20.9787	20.8269	20.4539	20.0772	19.7753 (87)
Th 2	20.2339	20.2377	20.2414	20.2590	20.2622	20.2775	20.2775	20.2804	20.2716	20.2622	20.2556	20.2486 (88)
util rest of house	0.9999	0.9996	0.9987	0.9925	0.9539	0.7902	0.5719	0.6472	0.9257	0.9958	0.9996	0.9999 (89)
MIT 2	19.0834	19.2125	19.4211	19.7498	20.0424	20.2400	20.2738	20.2724	20.1527	19.7852	19.4037	19.0961 (90)
Living area fraction	FLA = Living area / (4) = 0.2310 (91)											
MIT	19.2432	19.3715	19.5794	19.9051	20.1988	20.4002	20.4389	20.4356	20.3085	19.9397	19.5593	19.2530 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.2432	19.3715	19.5794	19.9051	20.1988	20.4002	20.4389	20.4356	20.3085	19.9397	19.5593	19.2530 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9998	0.9994	0.9983	0.9910	0.9523	0.8016	0.5953	0.6698	0.9275	0.9949	0.9994	0.9999 (94)
Useful gains	820.3763	942.9748	1031.6488	1146.1643	1187.1037	998.9484	706.8384	730.3234	924.1147	879.3890	810.0705	784.9219 (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	2958.5735	2850.9327	2564.0592	2107.4867	1620.3183	1082.9001	716.7348	750.5015	1168.5842	1780.6376	2396.7808	2922.7625 (97)
Space heating kWh	1590.8187	1282.1477	1140.1134	692.1521	322.3117	0.0000	0.0000	0.0000	0.0000	670.5290	1142.4314	1590.5535 (98a)
Space heating requirement - total per year (kWh/year)	8431.0575											
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	1590.8187	1282.1477	1140.1134	692.1521	322.3117	0.0000	0.0000	0.0000	0.0000	670.5290	1142.4314	1590.5535 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	8431.0575											
Space heating per m2	(98c) / (4) = 65.2508 (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 %) 84.5000 (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	1590.8187	1282.1477	1140.1134	692.1521	322.3117	0.0000	0.0000	0.0000	0.0000	670.5290	1142.4314	1590.5535 (98)
Space heating efficiency (main heating system 1)	84.5000	84.5000	84.5000	84.5000	84.5000	0.0000	0.0000	0.0000	0.0000	84.5000	84.5000	84.5000 (210)
Space heating fuel (main heating system)	1882.6257	1517.3346	1349.2466	819.1149	381.4339	0.0000	0.0000	0.0000	0.0000	793.5254	1351.9899	1882.3118 (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	293.0209	259.0059	274.7400	240.4573	232.3680	208.5885	205.2369	213.7965	216.6062	242.4974	259.0467	289.6676 (64)
Efficiency of water heater (217)m	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000 (216)
Fuel for water heating, kWh/month	346.7703	306.5158	325.1361	284.5648	274.9917	246.8503	242.8839	253.0136	256.3387	286.9792	306.5642	342.8019 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	61.5610	49.3865	44.4671	32.5785	25.1646	20.5597	22.9560	29.8390	38.7579	50.8525	57.4378	63.2720 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-51.7632	-73.0851	-105.0517	-117.6999	-126.0997	-117.2211	-115.8802	-110.0919	-99.2023	-83.7354	-57.0011	-44.7353 (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	9977.5828 (211)											

Full SAP Calculation Printout



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	3473.4105	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
central heating pump	41.0000	(230c)
Total electricity for the above, kWh/year	41.0000	(231)
Electricity for lighting (calculated in Appendix L)	496.8325	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1101.5669	(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	12887.2589	(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	9977.5828	0.2100	2095.2924 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3473.4105	0.2100	729.4162 (264)
Space and water heating			2824.7086 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	496.8325	0.1443	71.7083 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1101.5669	0.1347	-148.3294
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-148.3294 (269)
Total CO2, kg/year			2753.7747 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			21.3100 (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	9977.5828	1.1300	11274.6685 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3473.4105	1.1300	3924.9539 (278)
Space and water heating			15199.6224 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	496.8325	1.5338	762.0583 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1101.5669	1.4977	-1649.7732
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1649.7732 (283)
Total Primary energy kWh/year			14373.9323 (286)
Dwelling Primary energy Rate (DPER)			111.2400 (287)

Full SAP Calculation Printout



Property Reference	AH1-3B6P			Issued on Date	12/09/2024
Assessment Reference	AH1-Semi Detach House Baseline	Prop Type Ref	BLOCK A		
Property	Hornsey Police Station, 88/90 , Tottenham Ln., London , N8 7EJ				
SAP Rating	84 B	DER	21.31	TER	
Environmental	80 C	% DER < TER			N/A
CO ₂ Emissions (t/year)	2.27	DFEE	66.33	TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER	111.24	TPER	
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

SAP 10 WORKSHEET FOR Conversion (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)
Ground floor	52.6300 (1b)	x 2.9500 (2b)	= 155.2585 (1b) - (3b)
First floor	50.8000 (1c)	x 2.8600 (2c)	= 145.2880 (1c) - (3c)
Second floor	25.7800 (1d)	x 2.4500 (2d)	= 63.1610 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	129.2100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 363.7075 (5)

2. Ventilation rate

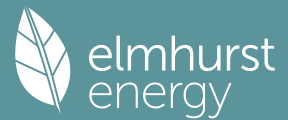
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	40.0000 / (5) = 0.1100 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	8.0000 (17)
Infiltration rate	0.5100 (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) = 0.5100 (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	0.6502	0.6375	0.6247	0.5610	0.5482	0.4845	0.4845	0.4717	0.5100	0.5482	0.5737	0.5992 (22b)
Effective ac	0.7114	0.7032	0.6951	0.6573	0.6503	0.6174	0.6174	0.6113	0.6300	0.6503	0.6646	0.6795 (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
Window North (Uw = 1.60)			19.6500	1.5038	29.5489		(27)
Window South (Uw = 1.60)			5.3000	1.5038	7.9699		(27)
Door			2.7500	1.6000	4.4000		(26)
CF			52.6300	0.1800	9.4734	110.0000	5789.3000 (28a)
External Wall 1	167.2400	27.7000	139.5400	0.2600	36.2804	190.0000	26512.6000 (29a)
Flat Roof	25.2700		25.2700	0.1600	4.0432	9.0000	227.4300 (30)
Pitched Roof	25.3200		25.3200	0.1600	4.0512	9.0000	227.8800 (30)
Total net area of external elements Aum(A, m ²)			270.4600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	95.7670		(33)
Party Wall 1			63.8700	0.0000	0.0000	180.0000	11496.6000 (32)
Internal Wall 1			156.8400			75.0000	11763.0000 (32c)
Internal Floor 1			50.0800			18.0000	901.4400 (32d)
Internal Floor 2			25.7800			18.0000	464.0400 (32d)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	57382.2900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							444.1010 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	10.6400	0.0410	0.4362
E3 Sill	4.9400	0.0210	0.1037
E4 Jamb	32.9400	0.0160	0.5270
E5 Ground floor (normal)	20.5600	0.1640	3.3718
E6 Intermediate floor within a dwelling	39.8500	0.0000	0.0000
E16 Corner (normal)	24.2700	0.0540	1.3106
E17 Corner (inverted - internal area greater than external area)	7.7600	-0.0900	-0.6984
E18 Party wall between dwellings	16.5100	0.0600	0.9906
P1 Party wall - Ground floor	9.5800	0.0800	0.7664
P2 Party wall - Intermediate floor within a dwelling	12.9500	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	9.5200	0.0450	0.4284
E21 Exposed floor (inverted)	5.5000	0.3200	1.7600
E11 Eaves (insulation at rafter level)	18.2700	0.0080	0.1462
E13 Gable (insulation at rafter level)	7.2400	0.0900	0.6516
E14 Flat roof	10.0300	0.0400	0.4012
R1 Head of roof window	7.8800	0.0410	0.3231
R2 Sill of roof window	7.8800	0.0210	0.1655
R3 Jamb of roof window	2.5800	0.0160	0.0413
R7 Flat ceiling (inverted)	23.6000	0.1200	2.8320
R9 Roof to wall (flat ceiling)	10.2500	0.3200	3.2800
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			16.8372 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	112.6042 (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	85.3841	84.3988	83.4331	78.8971	78.0484	74.0977	74.0977	73.3661	75.6195	78.0484	79.7653	81.5602 (38)
Average = Sum(39)m / 12 =	197.9883	197.0031	196.0373	191.5013	190.6527	186.7020	186.7020	185.9703	188.2237	190.6527	192.3695	194.1644 (39)
												191.4973
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.5323	1.5247	1.5172	1.4821	1.4755	1.4449	1.4449	1.4393	1.4567	1.4755	1.4888	1.5027 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

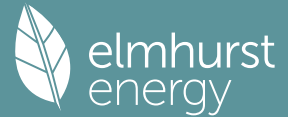
Assumed occupancy													2.8929 (42)
Hot water usage for mixer showers	72.7245	71.6316	70.0390	66.9919	64.7432	62.2355	60.8101	62.3906	64.1231	66.8157	69.9282	72.4458 (42a)	
Hot water usage for baths	33.0496	32.5588	31.8676	30.5931	29.6388	28.5807	28.0091	28.6955	29.4428	30.5751	31.8758	32.9379 (42b)	
Hot water usage for other uses	46.5856	44.8916	43.1976	41.5035	39.8095	38.1155	38.1155	39.8095	41.5035	43.1976	44.8916	46.5856 (42c)	
Average daily hot water use (litres/day)												140.0423 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	152.3597	149.0819	145.1041	139.0885	134.1915	128.9316	126.9347	130.8956	135.0695	140.5883	146.6956	151.9693 (44)	
Distribution loss (46)m = 0.15 x (45)m	36.1951	31.8436	33.4529	28.5608	27.0971	23.7805	23.0275	24.3114	24.9831	28.6166	31.3492	35.6921 (46)	
Water storage loss:													
Store volume												210.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.7000 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.9180 (55)	
Total storage loss	28.4580	25.7040	28.4580	27.5400	28.4580	27.5400	28.4580	28.4580	27.5400	28.4580	27.5400	28.4580 (56)	
If cylinder contains dedicated solar storage	28.4580	25.7040	28.4580	27.5400	28.4580	27.5400	28.4580	28.4580	27.5400	28.4580	27.5400	28.4580 (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	293.0209	259.0059	274.7400	240.4573	232.3680	208.5885	205.2369	213.7965	216.6062	242.4974	259.0467	289.6676 (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	293.0209	259.0059	274.7400	240.4573	232.3680	208.5885	205.2369	213.7965	216.6062	242.4974	259.0467	289.6676 (64)	
12Total per year (kWh/year)												2935.0319 (64)	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)	
Heat gains from water heating, kWh/month	121.6087	107.9588	115.5303	103.3513	101.4416	92.7550	92.4206	95.2666	95.4209	104.8097	109.5324	120.4938 (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	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456	144.6456 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	151.3494	167.5654	151.3494	156.3944	151.3494	156.3944	151.3494	151.3494	156.3944	151.3494	156.3944	151.3494 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	296.7659	299.8454	292.0851	275.5645	254.7102	235.1100	222.0159	218.9364	226.6967	243.2173	264.0716	283.6718 (68)
Pumps, fans	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646 (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)
Water heating gains (Table 5)	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165 (71)
Total internal gains	163.4526	160.6530	155.2827	143.5435	136.3463	128.8264	124.2212	128.0465	132.5290	140.8732	152.1283	161.9540 (72)
	680.9615	697.4574	668.1109	644.8961	611.7995	586.7244	563.9802	564.7260	582.0137	604.8336	641.9880	666.3688 (73)

6. Solar gains

Full SAP Calculation Printout



[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
North	19.6500	10.6334	0.6300	0.7000	0.7700	63.8567 (74)
South	5.3000	46.7521	0.6300	0.7000	0.7700	75.7266 (78)

Solar gains	139.5833	246.0540	365.3448	511.6326	634.7523	659.3956	623.4071	525.6946	414.3484	279.0327	168.5373	118.6688 (83)
Total gains	820.5448	943.5115	1033.4557	1156.5287	1246.5518	1246.1200	1187.3873	1090.4206	996.3621	883.8663	810.5252	785.0377 (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	80.5074	80.9100	81.3086	83.2345	83.6050	85.3742	85.3742	85.7100	84.6839	83.6050	82.8589	82.0929
alpha	6.3672	6.3940	6.4206	6.5490	6.5737	6.6916	6.6916	6.7140	6.6456	6.5737	6.5239	6.4729
util living area	0.9999	0.9997	0.9990	0.9947	0.9685	0.8510	0.6726	0.7454	0.9539	0.9973	0.9997	0.9999 (86)
MIT	19.7749	19.9008	20.1065	20.4218	20.7195	20.9331	20.9886	20.9787	20.8269	20.4539	20.0772	19.7753 (87)
Th 2	20.2339	20.2377	20.2414	20.2590	20.2622	20.2775	20.2775	20.2804	20.2716	20.2622	20.2556	20.2486 (88)
util rest of house	0.9999	0.9996	0.9987	0.9925	0.9539	0.7902	0.5719	0.6472	0.9257	0.9958	0.9996	0.9999 (89)
MIT 2	19.0834	19.2125	19.4211	19.7498	20.0424	20.2400	20.2738	20.2724	20.1527	19.7852	19.4037	19.0961 (90)
Living area fraction	FLA = Living area / (4) = 0.2310 (91)											
MIT	19.2432	19.3715	19.5794	19.9051	20.1988	20.4002	20.4389	20.4356	20.3085	19.9397	19.5593	19.2530 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.2432	19.3715	19.5794	19.9051	20.1988	20.4002	20.4389	20.4356	20.3085	19.9397	19.5593	19.2530 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9998	0.9994	0.9983	0.9910	0.9523	0.8016	0.5953	0.6698	0.9275	0.9949	0.9994	0.9999 (94)
Useful gains	820.3763	942.9748	1031.6488	1146.1643	1187.1037	998.9484	706.8384	730.3234	924.1147	879.3890	810.0705	784.9219 (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	2958.5735	2850.9327	2564.0592	2107.4867	1620.3183	1082.9001	716.7348	750.5015	1168.5842	1780.6376	2396.7808	2922.7625 (97)
Space heating kWh	1590.8187	1282.1477	1140.1134	692.1521	322.3117	0.0000	0.0000	0.0000	0.0000	670.5290	1142.4314	1590.5535 (98a)
Space heating requirement - total per year (kWh/year)	8431.0575											
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	1590.8187	1282.1477	1140.1134	692.1521	322.3117	0.0000	0.0000	0.0000	0.0000	670.5290	1142.4314	1590.5535 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	8431.0575											
Space heating per m2	(98c) / (4) = 65.2508 (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 %)	84.5000 (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	1590.8187	1282.1477	1140.1134	692.1521	322.3117	0.0000	0.0000	0.0000	0.0000	670.5290	1142.4314	1590.5535 (98)
Space heating efficiency (main heating system 1)	84.5000	84.5000	84.5000	84.5000	84.5000	0.0000	0.0000	0.0000	0.0000	84.5000	84.5000	84.5000 (210)
Space heating fuel (main heating system)	1882.6257	1517.3346	1349.2466	819.1149	381.4339	0.0000	0.0000	0.0000	0.0000	793.5254	1351.9899	1882.3118 (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	293.0209	259.0059	274.7400	240.4573	232.3680	208.5885	205.2369	213.7965	216.6062	242.4974	259.0467	289.6676 (64)
Efficiency of water heater (217)m	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000	84.5000 (216)
Fuel for water heating, kWh/month	346.7703	306.5158	325.1361	284.5648	274.9917	246.8503	242.8839	253.0136	256.3387	286.9792	306.5642	342.8019 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	61.5610	49.3865	44.4671	32.5785	25.1646	20.5597	22.9560	29.8390	38.7579	50.8525	57.4378	63.2720 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-51.7632	-73.0851	-105.0517	-117.6999	-126.0997	-117.2211	-115.8802	-110.0919	-99.2023	-83.7354	-57.0011	-44.7353 (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	9977.5828 (211)											

Full SAP Calculation Printout



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	3473.4105	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
central heating pump	41.0000	(230c)
Total electricity for the above, kWh/year	41.0000	(231)
Electricity for lighting (calculated in Appendix L)	496.8325	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1101.5669	(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	12887.2589	(238)

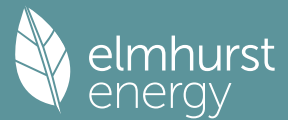
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	9977.5828	0.2100	2095.2924 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3473.4105	0.2100	729.4162 (264)
Space and water heating			2824.7086 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	496.8325	0.1443	71.7083 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1101.5669	0.1347	-148.3294
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-148.3294 (269)
Total CO2, kg/year			2753.7747 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			21.3100 (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	9977.5828	1.1300	11274.6685 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3473.4105	1.1300	3924.9539 (278)
Space and water heating			15199.6224 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	496.8325	1.5338	762.0583 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1101.5669	1.4977	-1649.7732
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1649.7732 (283)
Total Primary energy kWh/year			14373.9323 (286)
Dwelling Primary energy Rate (DPER)			111.2400 (287)

Full SAP Calculation Printout



Property Reference	AH1-3B6P			Issued on Date	12/09/2024
Assessment Reference	AH1-Semi Detach House	Prop Type Ref	BLOCK A		
Property	Hornsey Police Station, 88/90 , Tottenham Ln,, London , N8 7EJ				
SAP Rating	82 B	DER	3.71	TER	
Environmental	96 A	% DER < TER			N/A
CO ₂ Emissions (t/year)	0.43	DFEE	47.88	TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER	39.12	TPER	
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

SAP 10 WORKSHEET FOR Conversion (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)
Ground floor	52.6300 (1b)	x 2.9500 (2b)	= 155.2585 (1b) - (3b)
First floor	50.8000 (1c)	x 2.8600 (2c)	= 145.2880 (1c) - (3c)
Second floor	25.7800 (1d)	x 2.4500 (2d)	= 63.1610 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	129.2100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 363.7075 (5)

2. Ventilation rate

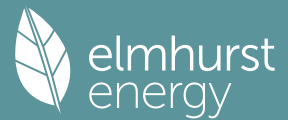
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1750 (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	0.2231	0.2188	0.2144	0.1925	0.1881	0.1662	0.1662	0.1619	0.1750	0.1881	0.1969	0.2056 (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) =												73.6000 (23c)
Effective ac	0.3551	0.3507	0.3464	0.3245	0.3201	0.2982	0.2982	0.2939	0.3070	0.3201	0.3289	0.3376 (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
Window North (Uw = 1.20)			19.6500	1.1450	22.5000		(27)
Window South (Uw = 1.20)			5.3000	1.1450	6.0687		(27)
Door			2.7500	0.9800	2.6950		(26)
GF			52.6300	0.0700	3.6841	110.0000	5789.3000 (28a)
External Wall 1	167.2400	27.7000	139.5400	0.1700	23.7218	190.0000	26512.6000 (29a)
Flat Roof	25.2700		25.2700	0.0700	1.7689	9.0000	227.4300 (30)
Pitched Roof	25.3200		25.3200	0.0700	1.7724	9.0000	227.8800 (30)
Total net area of external elements Aum(A, m ²)			270.4600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	62.2109		(33)
Party Wall 1			63.8700	0.0000	0.0000	180.0000	11496.6000 (32)
Internal Wall 1			156.8400			75.0000	11763.0000 (32c)
Internal Floor 1			50.0800			18.0000	901.4400 (32d)
Internal Floor 2			25.7800			18.0000	464.0400 (32d)

Full SAP Calculation Printout



Heat capacity $C_m = \text{Sum}(A \times k)$ (28)...(30) + (32) + (32a)...(32e) = 57382.2900 (34)
Thermal mass parameter (TMP = C_m / TFA) in $\text{kJ/m}^2\text{K}$ 444.1010 (35)

List of Thermal Bridges			
K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.6400	0.0410	0.4362
E3 Sill	4.9400	0.0210	0.1037
E4 Jamb	32.9400	0.0160	0.5270
E5 Ground floor (normal)	20.5600	0.1640	3.3718
E6 Intermediate floor within a dwelling	39.8500	0.0000	0.0000
E16 Corner (normal)	24.2700	0.0540	1.3106
E17 Corner (inverted - internal area greater than external area)	7.7600	-0.0900	-0.6984
E18 Party wall between dwellings	16.5100	0.0600	0.9906
P1 Party wall - Ground floor	9.5800	0.0800	0.7664
P2 Party wall - Intermediate floor within a dwelling	12.9500	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	9.5200	0.0450	0.4284
E21 Exposed floor (inverted)	5.5000	0.3200	1.7600
E11 Eaves (insulation at rafter level)	18.2700	0.0080	0.1462
E13 Gable (insulation at rafter level)	7.2400	0.0900	0.6516
E14 Flat roof	10.0300	0.0400	0.4012
R1 Head of roof window	7.8800	0.0410	0.3231
R2 Sill of roof window	7.8800	0.0210	0.1655
R3 Jamb of roof window	2.5800	0.0160	0.0413
R7 Flat ceiling (inverted)	23.6000	0.1200	2.8320
R9 Roof to wall (flat ceiling)	10.2500	0.3200	3.2800

Thermal bridges ($\text{Sum}(L \times \text{Psi})$) calculated using Appendix K) 16.8372 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 79.0481 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	42.6233	42.0982	41.5731	38.9476	38.4225	35.7970	35.7970	35.2719	36.8472	38.4225	39.4727	40.5229 (38)
Average = $\text{Sum}(39)\text{m} / 12 =$	121.6715	121.1464	120.6213	117.9958	117.4707	114.8451	114.8451	114.3200	115.8953	117.4707	118.5209	119.5711 (39)
HLP	0.9417	0.9376	0.9335	0.9132	0.9091	0.8888	0.8888	0.8848	0.8970	0.9091	0.9173	0.9254 (40)
HLP (average)												0.9122
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

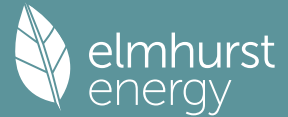
4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.8929 (42)											
Hot water usage for mixer showers	63.6339	62.6776	61.2841	58.6179	56.6503	54.4560	53.2088	54.5918	56.1077	58.4637	61.1872	63.3901 (42a)
Hot water usage for baths	33.0496	32.5588	31.8676	30.5931	29.6388	28.5807	28.0091	28.6955	29.4428	30.5751	31.8758	32.9379 (42b)
Hot water usage for other uses	46.5856	44.8916	43.1976	41.5035	39.8095	38.1155	38.1155	39.8095	41.5035	43.1976	44.8916	46.5856 (42c)
Average daily hot water use (litres/day)												131.6611 (43)
Daily hot water use	143.2691	140.1280	136.3492	130.7146	126.0986	121.1522	119.3334	123.0968	127.0541	132.2363	137.9546	142.9136 (44)
Energy content (annual)	226.9033	199.5404	209.5637	178.9417	169.7530	148.9708	144.3234	152.4195	156.6704	179.4435	196.5415	223.7681 (45)
Distribution loss (46)m = $0.15 \times (45)\text{m}$	34.0355	29.9311	31.4346	26.8413	25.4630	22.3456	21.6485	22.8629	23.5006	26.9165	29.4812	33.5652 (46)
Water storage loss:												210.0000 (47)
Store volume												1.5300 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8262 (55)
Enter (49) or (54) in (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	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	275.7779	243.6852	258.4383	226.2397	218.6276	196.2688	193.1980	201.2941	203.9684	228.3181	243.8395	272.6427 (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	275.7779	243.6852	258.4383	226.2397	218.6276	196.2688	193.1980	201.2941	203.9684	228.3181	243.8395	272.6427 (64)
12Total per year (kWh/year)												2762.2983 (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) = $\text{Sum}(64a)\text{m} =$												0.0000 (64a)
Heat gains from water heating, kWh/month	114.5450	101.6630	108.7796	97.3365	95.5426	87.3712	87.0872	89.7792	89.9313	98.7646	103.1885	113.5026 (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	151.3494	167.5654	151.3494	156.3944	151.3494	156.3944	151.3494	151.3494	156.3944	151.3494	156.3944	151.3494 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	296.7659	299.8454	292.0851	275.5645	254.7102	235.1100	222.0159	218.9364	226.6967	243.2173	264.0716	283.6718 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646	37.4646 (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)	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165	-115.7165 (71)
Water heating gains (Table 5)	153.9584	151.2842	146.2092	135.1896	128.4174	121.3489	117.0527	120.6709	124.9046	132.7482	143.3173	152.5572 (72)
Total internal gains	668.4673	685.0887	656.0374	633.5421	600.8706	579.2469	556.8117	557.3504	574.3893	593.7085	630.1770	653.9721 (73)

Full SAP Calculation Printout



6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
North				19.6500	10.6334	0.5200	0.7000	0.7700		52.7071 (74)
South				5.3000	46.7521	0.2500	0.7000	0.7700		30.0502 (78)
Solar gains	82.7573	149.9405	233.8486	345.7776	444.1815	467.5232	439.5788	361.0912	172.9836	69.9054 (83)
Total gains	751.2246	835.0292	889.8859	979.3198	1045.0522	1046.7701	996.3905	845.6644	766.6921	723.8775 (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	131.0046	131.5724	132.1452	135.0856	135.6894	138.7915	138.7915	139.4290	137.5338	135.6894	134.4871	133.3059
alpha	9.7336	9.7715	9.8097	10.0057	10.0460	10.2528	10.2528	10.2953	10.1689	10.0460	9.9658	9.8871
util living area	1.0000	0.9999	0.9994	0.9927	0.9283	0.6965	0.5069	0.5718	0.8829	0.9965	0.9998	1.0000 (86)
Living	20.4623	20.5274	20.6284	20.7883	20.9205	20.9672	20.9695	20.9694	20.9483	20.7876	20.6057	20.4601
Non living	19.6362	19.7044	19.8084	19.9819	20.1014	20.1459	20.1466	20.1501	20.1311	19.9854	19.7983	19.6465
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	20.7249	20.5274	20.6284	20.7883	20.9205	20.9672	20.9695	20.9694	20.9483	20.7876	20.6057	20.5357 (87)
Th 2	20.1322	20.1357	20.1391	20.1563	20.1597	20.1770	20.1770	20.1805	20.1701	20.1597	20.1528	20.1460 (88)
util rest of house	0.9999	0.9998	0.9989	0.9871	0.8849	0.6103	0.4123	0.4705	0.8072	0.9930	0.9997	1.0000 (89)
MIT 2	19.8785	19.7044	19.8084	19.9819	20.1014	20.1459	20.1466	20.1501	20.1311	19.9854	19.7983	19.7164 (90)
Living area fraction									fLA = Living area / (4) =			0.2310 (91)
MIT	20.0740	19.8945	19.9979	20.1682	20.2906	20.3357	20.3367	20.3394	20.3199	20.1707	19.9848	19.9056 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0740	19.8945	19.9979	20.1682	20.2906	20.3357	20.3367	20.3394	20.3199	20.1707	19.9848	19.9056 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9999	0.9997	0.9988	0.9872	0.8927	0.6273	0.4307	0.4902	0.8226	0.9931	0.9997	1.0000 (94)
Useful gains	751.1751	834.8021	888.8073	966.7836	932.9691	656.5879	429.0971	450.2040	695.6478	761.4035	730.5715	723.8416 (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	1919.2487	1816.5336	1628.1287	1329.6009	1009.1410	658.7147	429.1405	450.3535	720.8596	1124.2749	1527.1180	1877.9400 (97)
Space heating kWh	869.0467	659.7235	550.0551	261.2285	56.6719	0.0000	0.0000	0.0000	0.0000	269.9763	573.5135	858.6492 (98a)
Space heating requirement - total per year (kWh/year)												4098.8648
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	869.0467	659.7235	550.0551	261.2285	56.6719	0.0000	0.0000	0.0000	0.0000	269.9763	573.5135	858.6492 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4098.8648
Space heating per m2										(98c) / (4) =		31.7225 (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 %)												378.8896 (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	869.0467	659.7235	550.0551	261.2285	56.6719	0.0000	0.0000	0.0000	0.0000	269.9763	573.5135	858.6492 (98)
Space heating efficiency (main heating system 1)	378.8896	378.8896	378.8896	378.8896	378.8896	0.0000	0.0000	0.0000	0.0000	378.8896	378.8896	378.8896 (210)
Space heating fuel (main heating system)	229.3667	174.1203	145.1756	68.9458	14.9574	0.0000	0.0000	0.0000	0.0000	71.2546	151.3669	226.6225 (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	275.7779	243.6852	258.4383	226.2397	218.6276	196.2688	193.1980	201.2941	203.9684	228.3181	243.8395	272.6427 (64)
Efficiency of water heater	177.2382	177.2382	177.2382	177.2382	177.2382	177.2382	177.2382	177.2382	177.2382	177.2382	177.2382	177.2382 (216)
Fuel for water heating, kWh/month	155.5973	137.4902	145.8141	127.6472	123.3524	110.7373	109.0047	113.5726	115.0815	128.8199	137.5773	153.8284 (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	29.0183	26.2101	29.0183	28.0822	29.0183	28.0822	29.0183	29.0183	28.0822	29.0183	28.0822	29.0183 (231)
Lighting	37.1672	29.8169	26.8468	19.6691	15.1930	12.4128	13.8596	18.0152	23.3999	30.7020	34.6778	38.2002 (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)

Full SAP Calculation Printout



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												1081.8098	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												177.2382	
Water heating fuel used												1558.5230	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.7700)													
mechanical ventilation fans (SFP = 0.7700)												341.6668	(230a)
Total electricity for the above, kWh/year												341.6668	(231)
Electricity for lighting (calculated in Appendix L)												299.9604	(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												3281.9600	(238)

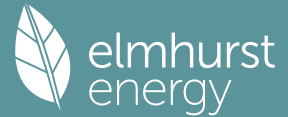
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1081.8098	0.1560	168.7780 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1558.5230	0.1410	219.7222 (264)
Space and water heating			388.5002 (265)
Pumps, fans and electric keep-hot	341.6668	0.1387	47.3934 (267)
Energy for lighting	299.9604	0.1443	43.2935 (268)
Total CO2, kg/year			479.1872 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.7100 (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	1081.8098	1.5776	1706.6822 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1558.5230	1.5213	2370.9822 (278)
Space and water heating			4077.6644 (279)
Pumps, fans and electric keep-hot	341.6668	1.5128	516.8736 (281)
Energy for lighting	299.9604	1.5338	460.0892 (282)
Total Primary energy kWh/year			5054.6272 (286)
Dwelling Primary energy Rate (DPER)			39.1200 (287)

Full SAP Calculation Printout



Property Reference	FLAT A1-2B4P			Issued on Date	12/09/2024
Assessment Reference	FLAT A1-2B4P Baseline	Prop Type Ref	BLOCK A		
Property	Hornsey Police Station, 88/90 , Tottenham Ln,, London , N8 7EJ				
SAP Rating	82 B	DER	24.34	TER	
Environmental	81 B	% DER < TER			N/A
CO ₂ Emissions (t/year)	1.5	DFEE	78.02	TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER	128.94	TPER	
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

SAP 10 WORKSHEET FOR Conversion (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)
Ground floor	73.8100 (1b)	3.3000 (2b)	243.5730 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.8100		243.5730 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	243.5730 (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) = 0.0821 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	8.0000 (17)
Infiltration rate	0.4821 (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) = 0.4821 (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	0.6147	0.6026	0.5906	0.5303	0.5183	0.4580	0.4580	0.4460	0.4821	0.5183	0.5424	0.5665 (22b)
Effective ac	0.6889	0.6816	0.6744	0.6406	0.6343	0.6049	0.6049	0.5994	0.6162	0.6343	0.6471	0.6604 (25)

3. Heat losses and heat loss parameter

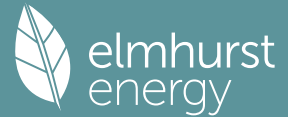
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Window North (Uw = 1.60)			1.0600	1.5038	1.5940		(27)
Door			3.4100	1.6000	5.4560		(26)
Window S (Uw = 1.60)			7.0300	1.5038	10.5714		(27)
GF			73.8100	0.1800	13.2858	110.0000	8119.1000 (28a)
External Wall	88.5700	11.5000	77.0700	0.2600	20.0382	190.0000	14643.3000 (29a)
Total net area of external elements Aum(A, m ²)			162.3800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	50.9454		(33)
Party Wall 1			25.8000	0.0000	0.0000	180.0000	4644.0000 (32)
Party Ceiling 1			73.8100			30.0000	2214.3000 (32b)
Internal Wall 1			145.7000			75.0000	10927.5000 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
(28)...(30) + (32) + (32a)...(32e) = 40548.2000 (34)
549.3592 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.2400	0.5000	3.1200
E3 Sill	5.0300	0.0400	0.2012
E4 Jamb	22.8500	0.0500	1.1425
E5 Ground floor (normal)	26.8400	0.1600	4.2944
E7 Party floor between dwellings (in blocks of flats)	26.8400	0.0700	1.8788

Full SAP Calculation Printout



E16 Corner (normal)	6.6000	0.0900	0.5940
E25 Staggered party wall between dwellings	3.3000	0.2400	0.7920
E18 Party wall between dwellings	6.6000	0.0600	0.3960
P1 Party wall - Ground floor	7.8200	0.0800	0.6256
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.8200	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			13.0445 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	63.9899 (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	55.3750	54.7853	54.2073	51.4925	50.9846	48.6201	48.6201	48.1822	49.5308	50.9846	52.0121	53.0864
	119.3649	118.7752	118.1972	115.4824	114.9745	112.6100	112.6100	112.1721	113.5208	114.9745	116.0020	117.0763
Average = Sum(39)m / 12 =												115.4800
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.6172	1.6092	1.6014	1.5646	1.5577	1.5257	1.5257	1.5197	1.5380	1.5577	1.5716	1.5862
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.5646

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3350 (42)
Hot water usage for mixer showers												
	63.3693	62.4170	61.0293	58.3741	56.4147	54.2296	52.9875	54.3647	55.8744	58.2206	60.9328	63.1265 (42a)
Hot water usage for baths												
	27.3741	26.9675	26.3950	25.3395	24.5491	23.6726	23.1992	23.7677	24.3867	25.3245	26.4018	27.2815 (42b)
Hot water usage for other uses												
	38.5423	37.1408	35.7393	34.3377	32.9362	31.5346	31.5346	32.9362	34.3377	35.7393	37.1408	38.5423 (42c)
Average daily hot water use (litres/day)												118.8429 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	129.2857	126.5253	123.1636	118.0513	113.8999	109.4368	107.7214	111.0686	114.5988	119.2844	124.4754	128.9504 (44)
Energy conte	204.7570	180.1704	189.2978	161.6063	153.3312	134.5653	130.2797	137.5262	141.3118	161.8677	177.3380	201.9051 (45)
Energy content (annual)										Total = Sum(45)m =		1973.9565
Distribution loss (46)m = 0.15 x (45)m												
	30.7135	27.0256	28.3947	24.2409	22.9997	20.1848	19.5420	20.6289	21.1968	24.2802	26.6007	30.2858 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3800 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7452 (55)
Total storage loss												
	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (56)
If cylinder contains dedicated solar storage												
	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (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												
	251.1206	222.0472	235.6614	206.4743	199.6948	179.4333	176.6433	183.8898	186.1798	208.2313	222.2060	248.2687 (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												
	251.1206	222.0472	235.6614	206.4743	199.6948	179.4333	176.6433	183.8898	186.1798	208.2313	222.2060	248.2687 (64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				2519.8505 (64)
Electric shower(s)												2520 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month												
	105.1726	93.4081	100.0324	89.6285	88.0735	80.6374	80.4089	82.8183	82.8806	90.9119	94.8593	104.2243 (65)

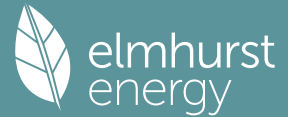
5. Internal gains (see Table 5 and 5a)

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	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	117.6595	130.2658	117.6595	121.5814	117.6595	121.5814	117.6595	117.6595	121.5814	117.6595	121.5814	117.6595 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	206.0212	208.1591	202.7718	191.3028	176.8252	163.2184	154.1282	151.9904	157.3777	168.8467	183.3242	196.9310 (68)
Pumps, fans	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748 (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)
	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984 (71)
Water heating gains (Table 5)												
	141.3610	139.0001	134.4522	124.4840	118.3784	111.9964	108.0764	111.3150	115.1119	122.1934	131.7490	140.0865 (72)
Total internal gains												
	526.0661	538.4495	515.9078	498.3927	473.8875	454.8206	437.8885	438.9892	452.0954	469.7239	497.6791	515.7014 (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			
North				1.0600	10.6334	0.5200	0.7000	0.7700	2.8432 (74)			
East				5.9700	19.6403	0.2500	0.7000	0.7700	14.2198 (76)			
West				1.0600	19.6403	0.2500	0.7000	0.7700	2.5248 (80)			
Solar gains	19.5878	38.1895	63.1773	93.5051	116.3967	120.0887	113.9356	96.5589	73.8405	45.3356	24.3860	16.1402 (83)
Total gains	545.6539	576.6389	579.0851	591.8978	590.2842	574.9094	551.8241	535.5480	525.9359	515.0596	522.0651	531.8415 (84)

Full SAP Calculation Printout



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	94.3610	94.8294	95.2932	97.5334	97.9642	100.0212	100.0212	100.4117	99.2188	97.9642	97.0965	96.2056	21.0000 (85)
alpha	7.2907	7.3220	7.3529	7.5022	7.5309	7.6681	7.6681	7.6941	7.6146	7.5309	7.4731	7.4137	
util living area	0.9999	0.9999	0.9998	0.9991	0.9949	0.9584	0.8318	0.8679	0.9836	0.9990	0.9999	1.0000	(86)
MIT	19.9651	20.0445	20.1876	20.4211	20.6536	20.8777	20.9737	20.9631	20.8085	20.5105	20.2173	19.9713	(87)
Th 2	20.1914	20.1954	20.1993	20.2177	20.2211	20.2372	20.2372	20.2401	20.2310	20.2211	20.2142	20.2069	(88)
util rest of house	0.9999	0.9998	0.9997	0.9986	0.9911	0.9234	0.7212	0.7696	0.9682	0.9983	0.9998	0.9999	(89)
MIT 2	19.2255	19.3083	19.4546	19.7035	19.9375	20.1623	20.2288	20.2267	20.0965	19.7957	19.4969	19.2448	(90)
Living area fraction													
MIT	19.5488	19.6301	19.7751	20.0172	20.2506	20.4750	20.5545	20.5487	20.4078	20.1082	19.8119	19.5624	(91)
Temperature adjustment													
adjusted MIT	19.3988	19.4801	19.6251	19.8672	20.1006	20.3250	20.4045	20.3987	20.2578	19.9582	19.6619	19.4124	(92)

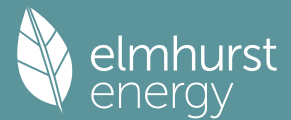
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9999	0.9998	0.9996	0.9982	0.9903	0.9286	0.7483	0.7933	0.9690	0.9980	0.9997	0.9999	(94)
Ext temp.	545.5912	576.5164	578.8262	590.8485	584.5707	533.8472	412.9409	424.8381	509.6069	514.0116	521.9089	531.7936	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Space heating kWh	1802.2708	1731.7603	1551.3456	1266.5242	965.8531	644.6977	428.4207	448.5381	699.0397	1075.9531	1457.2028	1781.0129	(97)
Space heating requirement - total per year (kWh/year)	934.9696	776.3239	723.5545	486.4865	283.6741	0.0000	0.0000	0.0000	0.0000	418.0845	673.4117	929.4191	(98a)
Solar heating kWh													
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Space heating kWh	934.9696	776.3239	723.5545	486.4865	283.6741	0.0000	0.0000	0.0000	0.0000	418.0845	673.4117	929.4191	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													
Space heating per m2										(98c) / (4) =		70.8024	(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)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating efficiency (main heating system 1)	934.9696	776.3239	723.5545	486.4865	283.6741	0.0000	0.0000	0.0000	0.0000	418.0845	673.4117	929.4191	(98)
Space heating fuel (main heating system)	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 efficiency (main heating system 2)	1044.6588	867.4010	808.4407	543.5604	316.9543	0.0000	0.0000	0.0000	0.0000	467.1335	752.4153	1038.4571	(211)
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	(212)
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	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	251.1206	222.0472	235.6614	206.4743	199.6948	179.4333	176.6433	183.8898	186.1798	208.2313	222.2060	248.2687	(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	280.5816	248.0974	263.3088	230.6976	223.1227	200.4842	197.3668	205.4634	208.0221	232.6607	248.2749	277.3952	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822	(231)
Lighting	47.8577	38.3932	34.5688	25.3266	19.5630	15.9831	17.8460	23.1969	30.1305	39.5329	44.6523	49.1878	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-26.2907	-38.3698	-57.0294	-66.1968	-72.9626	-68.6246	-67.8836	-63.4827	-55.6435	-45.0047	-29.4043	-22.5810	(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													5839.0210 (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													2815.4754 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
central heating pump													41.0000 (230c)
Total electricity for the above, kWh/year													41.0000 (231)
Electricity for lighting (calculated in Appendix L)													386.2391 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-613.4736 (233)
Wind generation													0.0000 (234)

Full SAP Calculation Printout



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	8468.2619 (238)

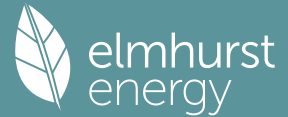
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	5839.0210	0.2100	1226.1944 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2815.4754	0.2100	591.2498 (264)
Space and water heating			1817.4443 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	386.2391	0.1443	55.7462 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-613.4736	0.1339	-82.1572
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-82.1572 (269)
Total CO2, kg/year			1796.7205 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			24.3400 (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	5839.0210	1.1300	6598.0938 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2815.4754	1.1300	3181.4872 (278)
Space and water heating			9779.5810 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	386.2391	1.5338	592.4264 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-613.4736	1.4949	-917.0906
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-917.0906 (283)
Total Primary energy kWh/year			9516.9416 (286)
Dwelling Primary energy Rate (DPER)			128.9400 (287)

Full SAP Calculation Printout



Property Reference	FLAT A1-2B4P			Issued on Date	12/09/2024
Assessment Reference	FLAT A1-2B4P BeLean	Prop Type Ref	BLOCK A		
Property	Hornsey Police Station, 88/90 , Tottenham Ln,, London , N8 7EJ				
SAP Rating	77 C	DER	18.43	TER	
Environmental	85 B	% DER < TER			N/A
CO ₂ Emissions (t/year)	1.16	DFEE	46.86	TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER	109.98	TPER	
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

SAP 10 WORKSHEET FOR Conversion (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)
Ground floor	73.8100 (1b)	3.3000 (2b)	243.5730 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.8100		243.5730 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	243.5730 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.2000	(18)
Number of sides sheltered	0	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2000 (21)

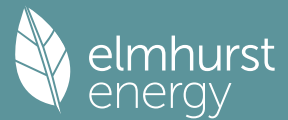
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												46.2000 (23c)
Effective ac	0.5240	0.5190	0.5140	0.4890	0.4840	0.4590	0.4590	0.4540	0.4690	0.4840	0.4940	0.5040 (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
Window North (Uw = 1.20)			1.0600	1.1450	1.2137		(27)
Door			3.4100	0.9800	3.3418		(26)
Window S (Uw = 1.20)			7.0300	1.1450	8.0496		(27)
GF			73.8100	0.0600	4.4286	110.0000	(28a)
External Wall	88.5700	11.5000	77.0700	0.1700	13.1019	190.0000	14643.3000 (29a)
Total net area of external elements Aum(A, m ²)			162.3800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.1357		(33)
Party Wall 1			25.8000	0.0000	0.0000	180.0000	4644.0000 (32)
Party Ceiling 1			73.8100			30.0000	2214.3000 (32b)
Internal Wall 1			145.7000			75.0000	10927.5000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	40548.2000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		549.3592	(35)
List of Thermal Bridges			
K1 Element	Length	Psi-value	Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	6.2400	0.0410	0.2558
E3 Sill	5.0300	0.0210	0.1056
E4 Jamb	22.8500	0.0160	0.3656
E5 Ground floor (normal)	26.8400	0.1640	4.4018
E7 Party floor between dwellings (in blocks of flats)	26.8400	0.0000	0.0000
E16 Corner (normal)	6.6000	0.0540	0.3564
E25 Staggered party wall between dwellings	3.3000	0.2400	0.7920
E18 Party wall between dwellings	6.6000	0.0600	0.3960
P1 Party wall - Ground floor	7.8200	0.0800	0.6256
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.8200	0.0000	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.2988 (36)

Point Thermal bridges 0.0000

Total fabric heat loss (33) + (36) + (36a) = 37.4345 (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	42.1186	41.7167	41.3149	39.3054	38.9035	36.8940	36.8940	36.4921	37.6978	38.9035	39.7073	40.5111 (38)
Average = Sum(39)m / 12 =	79.5531	79.1512	78.7493	76.7399	76.3380	74.3285	74.3285	73.9266	75.1323	76.3380	77.1418	77.9456 (39)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0778	1.0724	1.0669	1.0397	1.0342	1.0070	1.0070	1.0016	1.0179	1.0342	1.0451	1.0560 (40)
HLP (average)												1.0383
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3350 (42)
Hot water usage for mixer showers	63.3693	62.4170	61.0293	58.3741	56.4147	54.2296	52.9875	54.3647	55.8744	58.2206	60.9328	63.1265 (42a)	
Hot water usage for baths	27.3741	26.9675	26.3950	25.3395	24.5491	23.6726	23.1992	23.7677	24.3867	25.3245	26.4018	27.2815 (42b)	
Hot water usage for other uses	38.5423	37.1408	35.7393	34.3377	32.9362	31.5346	31.5346	32.9362	34.3377	35.7393	37.1408	38.5423 (42c)	
Average daily hot water use (litres/day)												118.8429 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	129.2857	126.5253	123.1636	118.0513	113.8999	109.4368	107.7214	111.0686	114.5988	119.2844	124.4754	128.9504 (44)	
Energy content (annual)	204.7570	180.1704	189.2978	161.6063	153.3312	134.5653	130.2797	137.5262	141.3118	161.8677	177.3380	201.9051 (45)	
Distribution loss (46)m = 0.15 x (45)m	30.7135	27.0256	28.3947	24.2409	22.9997	20.1848	19.5420	20.6289	21.1968	24.2802	26.6007	30.2858 (46)	
Water storage loss:													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3800 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7452 (55)	
Total storage loss	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (56)	
If cylinder contains dedicated solar storage	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (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	251.1206	222.0472	235.6614	206.4743	199.6948	179.4333	176.6433	183.8898	186.1798	208.2313	222.2060	248.2687 (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	251.1206	222.0472	235.6614	206.4743	199.6948	179.4333	176.6433	183.8898	186.1798	208.2313	222.2060	248.2687 (64)	
12Total per year (kWh/year)												2519.8505 (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	105.1726	93.4081	100.0324	89.6285	88.0735	80.6374	80.4089	82.8183	82.8806	90.9119	94.8593	104.2243 (65)	

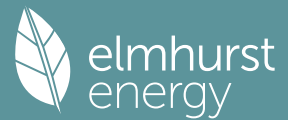
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	117.6595	130.2658	117.6595	121.5814	117.6595	121.5814	117.6595	117.6595	121.5814	117.6595	121.5814	117.6595 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.0212	208.1591	202.7718	191.3028	176.8252	163.2184	154.1282	151.9904	157.3777	168.8467	183.3242	196.9310 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748 (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)	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984 (71)
Water heating gains (Table 5)	141.3610	139.0001	134.4522	124.4840	118.3784	111.9964	108.0764	111.3150	115.1119	122.1934	131.7490	140.0865 (72)
Total internal gains	526.0661	538.4495	515.9078	498.3927	473.8875	454.8206	437.8885	438.9892	452.0954	469.7239	497.6791	515.7014 (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
North	1.0600	10.6334	0.5200	0.7000	0.7700	2.8432 (74)
East	5.9700	19.6403	0.2500	0.7000	0.7700	14.2198 (76)
West	1.0600	19.6403	0.2500	0.7000	0.7700	2.5248 (80)

Full SAP Calculation Printout



Solar gains	19.5878	38.1895	63.1773	93.5051	116.3967	120.0887	113.9356	96.5589	73.8405	45.3356	24.3860	16.1402 (83)
Total gains	545.6539	576.6389	579.0851	591.8978	590.2842	574.9094	551.8241	535.5480	525.9359	515.0596	522.0651	531.8415 (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	141.5832	142.3021	143.0284	146.7736	147.5464	151.5353	151.5353	152.3591	149.9141	147.5464	146.0090	144.5033
alpha	10.4389	10.4868	10.5352	10.7849	10.8364	11.1024	11.1024	11.1573	10.9943	10.8364	10.7339	10.6336
util living area	0.9999	0.9999	0.9996	0.9972	0.9743	0.8080	0.5919	0.6335	0.9099	0.9968	0.9998	1.0000 (86)
MIT	20.4119	20.4756	20.5767	20.7449	20.8983	20.9916	20.9997	20.9994	20.9699	20.7884	20.5853	20.4147 (87)
Th 2	20.4611	20.4638	20.4665	20.4802	20.4829	20.4965	20.4965	20.4992	20.4910	20.4829	20.4774	20.4720 (88)
util rest of house	0.9999	0.9998	0.9994	0.9958	0.9614	0.7531	0.5246	0.5654	0.8690	0.9949	0.9997	0.9999 (89)
MIT 2	19.9052	19.9713	20.0747	20.2546	20.4052	20.4925	20.4964	20.4990	20.4736	20.3003	20.0931	19.9176 (90)
Living area fraction										FLA = Living area / (4) =		0.4372 (91)
MIT	20.1267	20.1918	20.2942	20.4690	20.6208	20.7107	20.7164	20.7178	20.6906	20.5137	20.3083	20.1349 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.9767	20.0418	20.1442	20.3190	20.4708	20.5607	20.5664	20.5678	20.5406	20.3637	20.1583	19.9849 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9999	0.9998	0.9993	0.9952	0.9610	0.7604	0.5340	0.5748	0.8735	0.9943	0.9996	0.9999 (94)
Useful gains	545.5990	576.4996	578.6882	589.0791	567.2628	437.1634	294.6896	307.8368	459.3990	512.1216	521.8479	531.8011 (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	1247.1334	1198.4899	1074.4694	876.2892	669.5440	443.0480	294.8200	308.1113	483.8941	745.3427	1007.3415	1230.3641 (97)
Space heating kWh	521.9416	417.9775	368.8612	206.7913	76.0972	0.0000	0.0000	0.0000	0.0000	173.5164	349.5554	519.7308 (98a)
Space heating requirement - total per year (kWh/year)												2634.4714
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	521.9416	417.9775	368.8612	206.7913	76.0972	0.0000	0.0000	0.0000	0.0000	173.5164	349.5554	519.7308 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2634.4714
Space heating per m2										(98c) / (4) =		35.6926 (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	521.9416	417.9775	368.8612	206.7913	76.0972	0.0000	0.0000	0.0000	0.0000	173.5164	349.5554	519.7308 (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)	583.1750	467.0139	412.1354	231.0517	85.0247	0.0000	0.0000	0.0000	0.0000	193.8731	390.5647	580.7048 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	251.1206	222.0472	235.6614	206.4743	199.6948	179.4333	176.6433	183.8898	186.1798	208.2313	222.2060	248.2687 (64)
Efficiency of water heater	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	280.5816	248.0974	263.3088	230.6976	223.1227	200.4842	197.3668	205.4634	208.0221	232.6607	248.2749	277.3952 (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	129.6730	117.1240	129.6730	125.4900	129.6730	125.4900	129.6730	129.6730	125.4900	129.6730	125.4900	129.6730 (231)
Lighting	28.1439	22.5781	20.3291	14.8939	11.5045	9.3993	10.4948	13.6415	17.7190	23.2483	26.2589	28.9261 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-27.6846	-41.2675	-62.9566	-75.5499	-86.0841	-82.6147	-82.0845	-75.3903	-63.9844	-49.6725	-31.3848	-23.7113 (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												2943.5435 (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												2815.4754 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Table 4g: in-use factor = 2.5000, SFP = 5.0000)												
mechanical ventilation fans (SFP = 5.0000)												1485.7953 (230a)

Full SAP Calculation Printout

central heating pump	41.0000 (230c)
Total electricity for the above, kWh/year	1526.7953 (231)
Electricity for lighting (calculated in Appendix L)	227.1373 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-702.3852 (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	6810.5662 (238)

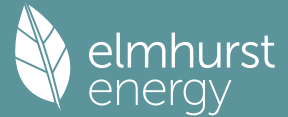
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2943.5435	0.2100	618.1441 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2815.4754	0.2100	591.2498 (264)
Space and water heating			1209.3940 (265)
Pumps, fans and electric keep-hot	1526.7953	0.1387	211.7853 (267)
Energy for lighting	227.1373	0.1443	32.7829 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-702.3852	0.1332	-93.5490
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-93.5490 (269)
Total CO2, kg/year			1360.4133 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			18.4300 (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	2943.5435	1.1300	3326.2041 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2815.4754	1.1300	3181.4872 (278)
Space and water heating			6507.6913 (279)
Pumps, fans and electric keep-hot	1526.7953	1.5128	2309.7359 (281)
Energy for lighting	227.1373	1.5338	348.3908 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-702.3852	1.4922	-1048.0690
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1048.0690 (283)
Total Primary energy kWh/year			8117.7491 (286)
Dwelling Primary energy Rate (DPER)			109.9800 (287)

Full SAP Calculation Printout



Property Reference	FLAT A1-2B4P			Issued on Date	12/09/2024
Assessment Reference	FLAT A1-2B4P	Prop Type Ref	BLOCK A		
Property	Hornsey Police Station, 88/90 , Tottenham Ln,, London , N8 7EJ				
SAP Rating	82 B	DER	4.40	TER	
Environmental	96 A	% DER < TER			N/A
CO ₂ Emissions (t/year)	0.29	DFEE	47.52	TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER	46.65	TPER	
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

SAP 10 WORKSHEET FOR Conversion (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)
Ground floor	73.8100 (1b)	3.3000 (2b)	243.5730 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.8100		243.5730 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	243.5730 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.2000	(18)
Number of sides sheltered	0	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2000 (21)

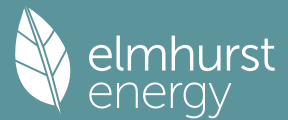
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												73.6000 (23c)
Effective ac	0.3870	0.3820	0.3770	0.3520	0.3470	0.3220	0.3220	0.3170	0.3320	0.3470	0.3570	0.3670 (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
Window North (Uw = 1.20)			1.0600	1.1450	1.2137		(27)
Door			3.4100	0.9800	3.3418		(26)
Window S (Uw = 1.20)			7.0300	1.1450	8.0496		(27)
GF			73.8100	0.0700	5.1667	110.0000	8119.1000 (28a)
External Wall	88.5700	11.5000	77.0700	0.1700	13.1019	190.0000	14643.3000 (29a)
Total net area of external elements Aum(A, m ²)			162.3800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.8738		(33)
Party Wall 1			25.8000	0.0000	0.0000	180.0000	4644.0000 (32)
Party Ceiling 1			73.8100			30.0000	2214.3000 (32b)
Internal Wall 1			145.7000			75.0000	10927.5000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	40548.2000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		549.3592	(35)
List of Thermal Bridges			
K1 Element	Length	Psi-value	Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	6.2400	0.0410	0.2558
E3 Sill	5.0300	0.0210	0.1056
E4 Jamb	22.8500	0.0160	0.3656
E5 Ground floor (normal)	26.8400	0.1640	4.4018
E7 Party floor between dwellings (in blocks of flats)	26.8400	0.0000	0.0000
E16 Corner (normal)	6.6000	0.0540	0.3564
E25 Staggered party wall between dwellings	3.3000	0.2400	0.7920
E18 Party wall between dwellings	6.6000	0.0600	0.3960
P1 Party wall - Ground floor	7.8200	0.0800	0.6256
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.8200	0.0000	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.2988 (36)

Point Thermal bridges 0.0000

Total fabric heat loss (33) + (36) + (36a) = 38.1726 (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	31.1067	30.7048	30.3029	28.2934	27.8915	25.8821	25.8821	25.4802	26.6859	27.8915	28.6953	29.4991
Average = Sum(39)m / 12 =	69.2793	68.8774	68.4755	66.4660	66.0641	64.0547	64.0547	63.6528	64.8584	66.0641	66.8679	67.6717

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9386	0.9332	0.9277	0.9005	0.8951	0.8678	0.8678	0.8624	0.8787	0.8951	0.9059	0.9168
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.3350 (42)											
Hot water usage for mixer showers	55.4481 54.6148 53.4006 51.0774 49.3629 47.4509 46.3641 47.5691 48.8901 50.9430 53.3162 55.2357											
Hot water usage for baths	27.3741 26.9675 26.3950 25.3395 24.5491 23.6726 23.1992 23.7677 24.3867 25.3245 26.4018 27.2815											
Hot water usage for other uses	38.5423 37.1408 35.7393 34.3377 32.9362 31.5346 31.5346 32.9362 34.3377 35.7393 37.1408 38.5423											
Average daily hot water use (litres/day)	111.5399 (43)											
Daily hot water use	121.3646	118.7232	115.5349	110.7545	106.8481	102.6581	101.0979	104.2730	107.6145	112.0068	116.8588	121.0596
Energy content (annual)	192.2118	169.0602	177.5728	151.6174	143.8381	126.2301	122.2692	129.1118	132.6995	151.9921	166.4868	189.5500
Distribution loss (46)m = 0.15 x (45)m	28.8318	25.3590	26.6359	22.7426	21.5757	18.9345	18.3404	19.3668	19.9049	22.7988	24.9730	28.4325
Water storage loss:												
Store volume	150.0000 (47)											
a) If manufacturer declared loss factor is known (kWh/day):	1.1500 (48)											
Temperature factor from Table 2b	0.5400 (49)											
Enter (49) or (54) in (55)	0.6210 (55)											
Total storage loss	19.2510	17.3880	19.2510	18.6300	19.2510	18.6300	19.2510	19.2510	18.6300	19.2510	18.6300	19.2510
If cylinder contains dedicated solar storage	19.2510	17.3880	19.2510	18.6300	19.2510	18.6300	19.2510	19.2510	18.6300	19.2510	18.6300	19.2510
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
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
Total heat required for water heating calculated for each month	234.7252	207.4594	220.0862	192.7594	186.3515	167.3721	164.7826	171.6252	173.8415	194.5055	207.6288	232.0634
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	234.7252	207.4594	220.0862	192.7594	186.3515	167.3721	164.7826	171.6252	173.8415	194.5055	207.6288	232.0634
12Total per year (kWh/year)	2353.2009 (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
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000 (64a)											
Heat gains from water heating, kWh/month	97.9211	86.9319	93.0537	83.3264	81.8369	74.8851	74.6652	76.9404	77.0362	84.5481	88.2705	97.0361

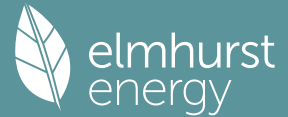
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480	116.7480
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	117.6595	130.2658	117.6595	121.5814	117.6595	121.5814	117.6595	117.6595	121.5814	117.6595	121.5814	117.6595
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.0212	208.1591	202.7718	191.3028	176.8252	163.2184	154.1282	151.9904	157.3777	168.8467	183.3242	196.9310
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748	34.6748
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
Losses e.g. evaporation (negative values) (Table 5)	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984	-93.3984
Water heating gains (Table 5)	131.6144	129.3629	125.0722	115.7311	109.9958	104.0071	100.3565	103.4145	106.9947	113.6399	122.5978	130.4249
Total internal gains	513.3195	525.8123	503.5278	486.6397	462.5049	446.8314	430.1686	431.0887	443.9782	458.1705	485.5279	503.0398

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
North	1.0600	10.6334	0.5200	0.7000	0.7700	2.8432 (74)
East	5.9700	19.6403	0.2500	0.7000	0.7700	14.2198 (76)
West	1.0600	19.6403	0.2500	0.7000	0.7700	2.5248 (80)

Full SAP Calculation Printout



Solar gains	19.5878	38.1895	63.1773	93.5051	116.3967	120.0887	113.9356	96.5589	73.8405	45.3356	24.3860	16.1402 (83)
Total gains	532.9073	564.0017	566.7051	580.1448	578.9016	566.9201	544.1041	527.6476	517.8187	503.5061	509.9139	519.1799 (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	162.5794	163.5281	164.4879	169.4608	170.4917	175.8403	175.8403	176.9505	173.6611	170.4917	168.4423	166.4416
alpha	11.8386	11.9019	11.9659	12.2974	12.3661	12.7227	12.7227	12.7967	12.5774	12.3661	12.2295	12.0961
util living area	0.9999	0.9998	0.9995	0.9949	0.9495	0.7198	0.5179	0.5548	0.8425	0.9942	0.9997	1.0000 (86)
Living	20.6174	20.6625	20.7302	20.8445	20.9377	20.9744	20.9754	20.9756	20.9687	20.8679	20.7341	20.6208
Non living	19.7864	19.8357	19.9075	20.0417	20.1271	20.1702	20.1704	20.1752	20.1590	20.0689	19.9286	19.8068
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	20.8043	20.6625	20.7302	20.8445	20.9377	20.9744	20.9754	20.9756	20.9687	20.8679	20.7341	20.6739 (87)
Th 2	20.1348	20.1394	20.1440	20.1671	20.1717	20.1949	20.1949	20.1996	20.1856	20.1717	20.1624	20.1532 (88)
util rest of house	0.9999	0.9997	0.9990	0.9899	0.9086	0.6315	0.4232	0.4584	0.7561	0.9872	0.9994	0.9999 (89)
MIT 2	19.9566	19.8357	19.9075	20.0417	20.1271	20.1702	20.1704	20.1752	20.1590	20.0689	19.9286	19.8553 (90)
Living area fraction	20.3272	20.1972	20.2672	20.3927	20.4815	20.5218	20.5224	20.5251	20.5130	20.4182	20.2808	0.4372 (91)
MIT	20.3272	20.1972	20.2672	20.3927	20.4815	20.5218	20.5224	20.5251	20.5130	20.4182	20.2808	20.2132 (92)
Temperature adjustment												0.0000
adjusted MIT	20.3272	20.1972	20.2672	20.3927	20.4815	20.5218	20.5224	20.5251	20.5130	20.4182	20.2808	20.2132 (93)

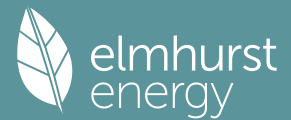
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9999	0.9997	0.9991	0.9916	0.9262	0.6677	0.4617	0.4976	0.7927	0.9899	0.9995	0.9999 (94)
Useful gains	532.8607	563.8475	566.1922	575.2843	536.1616	378.5584	251.2380	262.5572	410.4549	498.4183	509.6472	519.1431 (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	1110.3517	1053.6297	942.7166	763.8726	580.1425	379.3172	251.2453	262.5747	415.9373	648.6316	881.3706	1083.6380 (97)
Space heating kWh	429.6533	329.1337	280.1342	135.7835	32.7218	0.0000	0.0000	0.0000	0.0000	111.7587	267.6409	419.9842 (98a)
Space heating requirement - total per year (kWh/year)												2006.8103
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	429.6533	329.1337	280.1342	135.7835	32.7218	0.0000	0.0000	0.0000	0.0000	111.7587	267.6409	419.9842 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2006.8103
Space heating per m2										(98c) / (4) =		27.1889 (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 %)												337.4613 (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	429.6533	329.1337	280.1342	135.7835	32.7218	0.0000	0.0000	0.0000	0.0000	111.7587	267.6409	419.9842 (98)
Space heating efficiency (main heating system 1)	337.4613	337.4613	337.4613	337.4613	337.4613	0.0000	0.0000	0.0000	0.0000	337.4613	337.4613	337.4613 (210)
Space heating fuel (main heating system)	127.3193	97.5323	83.0122	40.2368	9.6965	0.0000	0.0000	0.0000	0.0000	33.1175	79.3101	124.4541 (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	234.7252	207.4594	220.0862	192.7594	186.3515	167.3721	164.7826	171.6252	173.8415	194.5055	207.6288	232.0634 (64)
Efficiency of water heater (217)m	190.8945	190.8945	190.8945	190.8945	190.8945	190.8945	190.8945	190.8945	190.8945	190.8945	190.8945	190.8945 (216)
Fuel for water heating, kWh/month	122.9607	108.6776	115.2921	100.9770	97.6201	87.6778	86.3213	89.9058	91.0668	101.8917	108.7663	121.5663 (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	18.3734	16.5953	18.3734	17.7807	18.3734	17.7807	18.3734	18.3734	17.7807	18.3734	17.7807	18.3734 (231)
Lighting	24.3915	19.5678	17.6186	12.9081	9.9706	8.1461	9.0955	11.8227	15.3565	20.1486	22.7578	25.0694 (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												594.6787 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												190.8945
Water heating fuel used												1232.7234 (219)

Full SAP Calculation Printout



Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.7280)	
mechanical ventilation fans (SFP = 0.7280)	216.3318 (230a)
Total electricity for the above, kWh/year	216.3318 (231)
Electricity for lighting (calculated in Appendix L)	196.8533 (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	2240.5872 (238)

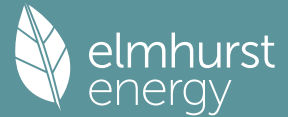
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	594.6787	0.1561	92.8587 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1232.7234	0.1410	173.7751 (264)
Space and water heating			266.6338 (265)
Pumps, fans and electric keep-hot	216.3318	0.1387	30.0079 (267)
Energy for lighting	196.8533	0.1443	28.4120 (268)
Total CO2, kg/year			325.0537 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.4000 (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	594.6787	1.5781	938.4767 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1232.7234	1.5213	1875.2850 (278)
Space and water heating			2813.7617 (279)
Pumps, fans and electric keep-hot	216.3318	1.5128	327.2667 (281)
Energy for lighting	196.8533	1.5338	301.9402 (282)
Total Primary energy kWh/year			3442.9687 (286)
Dwelling Primary energy Rate (DPER)			46.6500 (287)

Full SAP Calculation Printout



Property Reference	FLAT A2- 1B2P			Issued on Date	12/09/2024
Assessment Reference	FLAT A2-1B2P Baseline	Prop Type Ref	BLOCK A		
Property	Hornsey Police Station, 88/90 , Tottenham Ln,, London , N8 7EJ				
SAP Rating	82 B	DER	23.85	TER	
Environmental	84 B	% DER < TER			N/A
CO ₂ Emissions (t/year)	1.04	DFEE	65.33	TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER	128.66	TPER	
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

SAP 10 WORKSHEET FOR Conversion (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)
Ground floor	26.3600 (1b)	x 3.1500 (2b)	= 83.0340 (1b) - (3b)
First floor	26.4100 (1c)	x 2.7700 (2c)	= 73.1557 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.7700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 156.1897 (5)

2. Ventilation rate

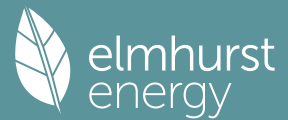
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1280 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	8.0000 (17)
Infiltration rate	0.5280 (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) = 0.5280 (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	0.6733	0.6601	0.6469	0.5809	0.5677	0.5016	0.5016	0.4884	0.5280	0.5677	0.5941	0.6205 (22b)
Effective ac	0.7266	0.7178	0.7092	0.6687	0.6611	0.6258	0.6258	0.6193	0.6394	0.6611	0.6765	0.6925 (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
Window North (Uw = 1.60)			8.1200	1.5038	12.2105		(27)
GF			26.3600	0.1800	4.7448	110.0000	2899.6000 (28a)
External Wall	98.5600	8.1200	90.4400	0.2600	23.5144	190.0000	17183.6000 (29a)
Total net area of external elements Aum(A, m ²)			124.9200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	40.4697			(33)
Party Wall 1			40.9900	0.0000	0.0000	180.0000	7378.2000 (32)
Party Ceiling 1			26.4100			30.0000	792.3000 (32b)
Internal Wall 1			64.7100			75.0000	4853.2500 (32c)
Internal Floor 1			26.4100			18.0000	475.3800 (32d)
Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =				33582.3300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							636.3906 (35)
List of Thermal Bridges							
K1 Element			Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)			3.8400	0.5000	1.9200		
E3 Sill			3.8400	0.0400	0.1536		
E4 Jamb			16.8800	0.0500	0.8440		
E5 Ground floor (normal)			16.7500	0.1600	2.6800		
E7 Party floor between dwellings (in blocks of flats)			33.5000	0.0700	2.3450		

Full SAP Calculation Printout



E16 Corner (normal)	2.7700	0.0900	0.2493
E25 Staggered party wall between dwellings	2.7700	0.1200	0.3324
E18 Party wall between dwellings	29.9700	0.0600	1.7982
P1 Party wall - Ground floor	6.8400	0.0800	0.5472
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.8200	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.8697 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	51.3394 (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	37.4530	36.9994	36.5547	34.4663	34.0756	32.2566	32.2566	31.9198	32.9573	34.0756	34.8660	35.6924 (38)
Average = Sum(39)m / 12 =	88.7924	88.3388	87.8942	85.8058	85.4150	83.5961	83.5961	83.2592	84.2967	85.4150	86.2055	87.0319 (39)
												85.8039
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.6826	1.6740	1.6656	1.6260	1.6186	1.5842	1.5842	1.5778	1.5974	1.6186	1.6336	1.6493 (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												1.7718 (42)
Hot water usage for mixer showers												
	53.9265	53.1160	51.9351	49.6756	48.0082	46.1487	45.0917	46.2637	47.5484	49.5450	51.8530	53.7198 (42a)
Hot water usage for baths												
	23.3134	22.9671	22.4796	21.5806	20.9074	20.1610	19.7578	20.2420	20.7691	21.5678	22.4853	23.2346 (42b)
Hot water usage for other uses												
	32.7748	31.5830	30.3912	29.1994	28.0076	26.8158	26.8158	28.0076	29.1994	30.3912	31.5830	32.7748 (42c)
Average daily hot water use (litres/day)												101.1288 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	110.0146	107.6662	104.8059	100.4556	96.9232	93.1254	91.6653	94.5132	97.5169	101.5040	105.9213	109.7292 (44)
Energy conte	174.2363	153.3152	161.0827	137.5187	130.4772	114.5085	110.8612	117.0271	120.2481	137.7400	150.9044	171.8094 (45)
Energy content (annual)										Total = Sum(45)m =		1679.7288
Distribution loss (46)m = 0.15 x (45)m												
	26.1354	22.9973	24.1624	20.6278	19.5716	17.1763	16.6292	17.5541	18.0372	20.6610	22.6357	25.7714 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3800 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7452 (55)
Total storage loss												
	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (56)
If cylinder contains dedicated solar storage												
	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (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												
	220.5999	195.1920	207.4463	182.3867	176.8408	159.3765	157.2248	163.3907	165.1161	184.1036	195.7724	218.1730 (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	220.5999	195.1920	207.4463	182.3867	176.8408	159.3765	157.2248	163.3907	165.1161	184.1036	195.7724	218.1730 (64)
								Total per year (kWh/year) = Sum(64)m =				2225.6228 (64)
												2226 (64)
12Total per year (kWh/year)												
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month												
	95.0244	84.4787	90.6509	81.6194	80.4745	73.9685	73.9522	76.0024	75.8769	82.8894	86.0701	94.2175 (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	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	81.9007	90.6758	81.9007	84.6307	81.9007	84.6307	81.9007	81.9007	84.6307	81.9007	84.6307	81.9007 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	154.4220	156.0245	151.9864	143.3899	132.5384	122.3394	115.5259	113.9235	117.9615	126.5581	137.4096	147.6085 (68)
Pumps, fans	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589 (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)
	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713 (71)
Water heating gains (Table 5)												
	127.7210	125.7124	121.8426	113.3602	108.1647	102.7340	99.3982	102.1538	105.3846	111.4105	119.5418	126.6364 (72)
Total internal gains	416.6205	424.9894	408.3064	393.9576	375.1805	359.2809	346.4015	347.5547	357.5536	372.4460	394.1588	408.7224 (73)

6. Solar gains

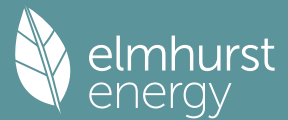
[Jan]												
				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W	

South				8.1200	46.7521	0.5200		0.7000		0.7700	95.7616 (78)	

Solar gains	95.7616	156.8328	199.7772	225.7916	235.2888	226.4335	221.2393	214.8540	208.6909	169.1589	113.5102	82.7468 (83)
Total gains	512.3821	581.8222	608.0836	619.7492	610.4693	585.7144	567.6408	562.4087	566.2444	541.6049	507.6690	491.4692 (84)

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



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	105.0588	105.5983	106.1325	108.7156	109.2129	111.5893	111.5893	112.0407	110.6618	109.2129	108.2115	107.1840
alpha	8.0039	8.0399	8.0755	8.2477	8.2809	8.4393	8.4393	8.4694	8.3775	8.2809	8.2141	8.1456
util living area	0.9999	0.9996	0.9987	0.9942	0.9714	0.8493	0.6420	0.6724	0.9049	0.9934	0.9995	0.9999 (86)
MIT	20.1498	20.2630	20.4147	20.6286	20.8227	20.9669	20.9970	20.9957	20.9389	20.6916	20.3925	20.1474 (87)
Th 2	20.1587	20.1630	20.1672	20.1870	20.1907	20.2079	20.2079	20.2111	20.2013	20.1907	20.1832	20.1754 (88)
util rest of house	0.9998	0.9993	0.9980	0.9908	0.9524	0.7726	0.5301	0.5623	0.8457	0.9887	0.9992	0.9999 (89)
MIT 2	19.3739	19.4907	19.6458	19.8751	20.0640	20.1935	20.2073	20.2101	20.1700	19.9409	19.6374	19.3858 (90)
Living area fraction									fLA = Living area /	(4) =		0.3125 (91)
MIT	19.6163	19.7320	19.8861	20.1105	20.3011	20.4352	20.4541	20.4556	20.4103	20.1755	19.8734	19.6238 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.4663	19.5820	19.7361	19.9605	20.1511	20.2852	20.3041	20.3056	20.2603	20.0255	19.7234	19.4738 (93)

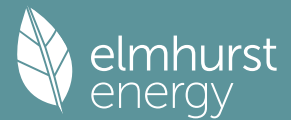
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9997	0.9991	0.9975	0.9895	0.9512	0.7809	0.5440	0.5758	0.8508	0.9874	0.9990	0.9998 (94)
Useful gains	512.2432	581.3123	606.5396	613.2241	580.6637	457.4126	308.7990	323.8476	481.7828	534.7801	507.1524	491.3757 (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	1346.6563	1296.9948	1163.3724	949.0586	721.8517	475.2599	309.6473	325.1798	519.2924	805.0790	1088.2044	1329.3040 (97)
Space heating kWh	620.8034	480.9386	414.2836	241.8009	105.0439	0.0000	0.0000	0.0000	0.0000	201.1024	418.3574	623.4187 (98a)
Space heating requirement - total per year (kWh/year)												3105.7488
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	620.8034	480.9386	414.2836	241.8009	105.0439	0.0000	0.0000	0.0000	0.0000	201.1024	418.3574	623.4187 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3105.7488
Space heating per m2										(98c) / (4) =		58.8544 (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	620.8034	480.9386	414.2836	241.8009	105.0439	0.0000	0.0000	0.0000	0.0000	201.1024	418.3574	623.4187 (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)	693.6351	537.3616	462.8867	270.1686	117.3674	0.0000	0.0000	0.0000	0.0000	224.6954	467.4384	696.5572 (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	220.5999	195.1920	207.4463	182.3867	176.8408	159.3765	157.2248	163.3907	165.1161	184.1036	195.7724	218.1730 (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	246.4803	218.0916	231.7836	203.7840	197.5875	178.0744	175.6702	182.5595	184.4873	205.7023	218.7401	243.7687 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	33.3129	26.7249	24.0628	17.6294	13.6175	11.1256	12.4223	16.1470	20.9733	27.5182	31.0817	34.2388 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-10.5891	-16.1232	-25.0274	-30.4251	-34.8035	-33.2233	-32.8421	-30.0360	-25.3778	-19.4398	-12.0660	-9.0206 (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												3470.1104 (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												2486.7294 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												41.0000 (230c)
Total electricity for the above, kWh/year												41.0000 (231)
Electricity for lighting (calculated in Appendix L)												268.8543 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-278.9738 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)

Full SAP Calculation Printout



Appendix Q - special features

Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	5987.7202 (238)

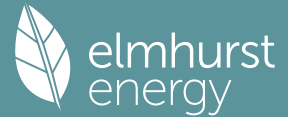
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3470.1104	0.2100	728.7232 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2486.7294	0.2100	522.2132 (264)
Space and water heating			1250.9364 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	268.8543	0.1443	38.8040 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-278.9738	0.1330	-37.1083
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-37.1083 (269)
Total CO2, kg/year			1258.3192 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			23.8500 (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	3470.1104	1.1300	3921.2247 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2486.7294	1.1300	2810.0042 (278)
Space and water heating			6731.2289 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	268.8543	1.5338	412.3777 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-278.9738	1.4915	-416.0948
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-416.0948 (283)
Total Primary energy kWh/year			6789.5366 (286)
Dwelling Primary energy Rate (DPER)			128.6600 (287)

Full SAP Calculation Printout



Property Reference	FLAT A2- 1B2P			Issued on Date	12/09/2024
Assessment Reference	FLAT A2-1B2P Belean	Prop Type Ref	BLOCK A		
Property	Hornsey Police Station, 88/90 , Tottenham Ln,, London , N8 7EJ				
SAP Rating	78 C	DER	17.87	TER	
Environmental	88 B	% DER < TER			N/A
CO ₂ Emissions (t/year)	0.82	DFEE	36.20	TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER	108.25	TPER	
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

SAP 10 WORKSHEET FOR Conversion (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)
Ground floor	26.3600 (1b)	x 3.1500 (2b)	= 83.0340 (1b) - (3b)
First floor	26.4100 (1c)	x 2.7700 (2c)	= 73.1557 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.7700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 156.1897 (5)

2. Ventilation rate

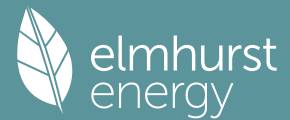
											m3 per hour		
Number of open chimneys											0 * 80 =	0.0000 (6a)	
Number of open flues											0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire											0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler											0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater											0 * 35 =	0.0000 (6e)	
Number of blocked chimneys											0 * 20 =	0.0000 (6f)	
Number of intermittent extract fans											0 * 10 =	0.0000 (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) =											0.0000 / (5) =	0.0000 (8)	
Pressure test											Yes		
Pressure Test Method											Blower Door		
Measured/design AP50											4.0000 (17)		
Infiltration rate											0.2000 (18)		
Number of sides sheltered											0 (19)		
Shelter factor											(20) = 1 - [0.075 x (19)] =	1.0000 (20)	
Infiltration rate adjusted to include shelter factor											(21) = (18) x (20) =	0.2000 (21)	
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	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													
	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =													46.2000 (23c)
Effective ac	0.5240	0.5190	0.5140	0.4890	0.4840	0.4590	0.4590	0.4540	0.4690	0.4840	0.4940	0.5040 (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
Window North (Uw = 1.20)			8.1200	1.1450	9.2977		(27)
GF			26.3600	0.0600	1.5816	110.0000	2899.6000 (28a)
External Wall	98.5600	8.1200	90.4400	0.1700	15.3748	190.0000	17183.6000 (29a)
Total net area of external elements Aum(A, m ²)			124.9200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	26.2541	(33)
Party Wall 1			40.9900	0.0000	0.0000	180.0000	7378.2000 (32)
Party Ceiling 1			26.4100			30.0000	792.3000 (32b)
Internal Wall 1			64.7100			75.0000	4853.2500 (32c)
Internal Floor 1			26.4100			18.0000	475.3800 (32d)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	33582.3300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							636.3906 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

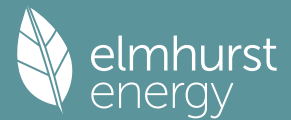
Page 2 of 4

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	157.1898	157.8754	158.5670	162.1179	162.8473	166.5948	166.5948	167.3651	165.0753	162.8473	161.3951	159.9685
alpha	11.4793	11.5250	11.5711	11.8079	11.8565	12.1063	12.1063	12.1577	12.0050	11.8565	11.7597	11.6646
util living area	0.9998	0.9987	0.9942	0.9641	0.8459	0.6112	0.4340	0.4559	0.6862	0.9584	0.9983	0.9998 (86)
MIT	20.5613	20.6606	20.7722	20.9093	20.9850	20.9997	21.0000	21.0000	20.9987	20.9295	20.7276	20.5519 (87)
Th 2	20.4377	20.4401	20.4426	20.4548	20.4572	20.4694	20.4694	20.4719	20.4646	20.4572	20.4524	20.4475 (88)
util rest of house	0.9996	0.9981	0.9917	0.9501	0.8062	0.5609	0.3817	0.4035	0.6342	0.9400	0.9975	0.9998 (89)
MIT 2	20.0295	20.1308	20.2434	20.3849	20.4485	20.4693	20.4694	20.4719	20.4640	20.4062	20.2087	20.0289 (90)
Living area fraction									fLA = Living area /	(4) =		0.3125 (91)
MIT	20.1957	20.2964	20.4087	20.5488	20.6162	20.6350	20.6352	20.6369	20.6311	20.5697	20.3708	20.1923 (92)
Temperature adjustment												-0.1500
adjusted MIT	20.0457	20.1464	20.2587	20.3988	20.4662	20.4850	20.4852	20.4869	20.4811	20.4197	20.2208	20.0423 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9995	0.9977	0.9907	0.9485	0.8069	0.5624	0.3833	0.4050	0.6358	0.9385	0.9970	0.9997 (94)
Useful gains	512.1482	580.4808	602.4008	587.8019	492.5851	329.3951	217.5514	227.7899	360.0151	508.2758	506.1632	491.3231 (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	934.4291	900.8654	809.4153	661.6517	502.1545	329.5316	217.5526	227.7922	360.5981	562.5051	758.3665	923.8326 (97)
Space heating kWh	314.1770	215.2984	154.0188	53.1718	7.1196	0.0000	0.0000	0.0000	0.0000	40.3466	181.5864	321.7870 (98a)
Space heating requirement - total per year (kWh/year)												1287.5057
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	314.1770	215.2984	154.0188	53.1718	7.1196	0.0000	0.0000	0.0000	0.0000	40.3466	181.5864	321.7870 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1287.5057
Space heating per m2										(98c) / (4) =		24.3984 (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	314.1770	215.2984	154.0188	53.1718	7.1196	0.0000	0.0000	0.0000	0.0000	40.3466	181.5864	321.7870 (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)	351.0357	240.5569	172.0880	59.4098	7.9549	0.0000	0.0000	0.0000	0.0000	45.0800	202.8898	359.5386 (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	220.5999	195.1920	207.4463	182.3867	176.8408	159.3765	157.2248	163.3907	165.1161	184.1036	195.7724	218.1730 (64)
Efficiency of water heater	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	246.4803	218.0916	231.7836	203.7840	197.5875	178.0744	175.6702	182.5595	184.4873	205.7023	218.7401	243.7687 (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	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	84.4013	76.2334	84.4013	81.6787	84.4013	81.6787	84.4013	84.4013	81.6787	84.4013	81.6787	84.4013 (231)
Lighting	18.1363	14.5496	13.1003	9.5979	7.4137	6.0570	6.7630	8.7908	11.4184	14.9815	16.9216	18.6404 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-10.9128	-16.8246	-26.5249	-32.8948	-38.3873	-37.0922	-36.7633	-33.2584	-27.5604	-20.6006	-12.5347	-9.2811 (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												1438.5538 (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												2486.7294 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Table 4g: in-use factor = 2.5000, SFP = 5.0000)												
mechanical ventilation fans (SFP = 5.0000)												952.7572 (230a)
central heating pump												41.0000 (230c)
Total electricity for the above, kWh/year												993.7572 (231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	146.3704 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-302.6351 (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	4762.7757 (238)

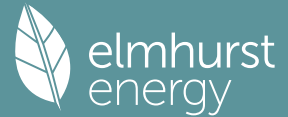
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1438.5538	0.2100	302.0963 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2486.7294	0.2100	522.2132 (264)
Space and water heating			824.3095 (265)
Pumps, fans and electric keep-hot	993.7572	0.1387	137.8464 (267)
Energy for lighting	146.3704	0.1443	21.1258 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-302.6351	0.1326	-40.1265
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-40.1265 (269)
Total CO2, kg/year			943.1552 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			17.8700 (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	1438.5538	1.1300	1625.5658 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2486.7294	1.1300	2810.0042 (278)
Space and water heating			4435.5700 (279)
Pumps, fans and electric keep-hot	993.7572	1.5128	1503.3558 (281)
Energy for lighting	146.3704	1.5338	224.5079 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-302.6351	1.4899	-450.9004
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-450.9004 (283)
Total Primary energy kWh/year			5712.5334 (286)
Dwelling Primary energy Rate (DPER)			108.2500 (287)

Full SAP Calculation Printout



Property Reference	FLAT A2- 1B2P			Issued on Date	12/09/2024
Assessment Reference	FLAT A2-1B2P	Prop Type Ref	BLOCK A		
Property	Hornsey Police Station, 88/90 , Tottenham Ln,, London , N8 7EJ				
SAP Rating	83 B	DER	4.76	TER	
Environmental	97 A	% DER < TER			N/A
CO ₂ Emissions (t/year)	0.23	DFEE	36.51	TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER	50.59	TPER	
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

SAP 10 WORKSHEET FOR Conversion (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)
Ground floor	26.3600 (1b)	x 3.1500 (2b)	= 83.0340 (1b) - (3b)
First floor	26.4100 (1c)	x 2.7700 (2c)	= 73.1557 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.7700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 156.1897 (5)

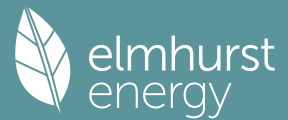
2. Ventilation rate

	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	0 * 10 = 0.0000 (7a)											
Number of passive vents	0 * 10 = 0.0000 (7b)											
Number of flueless gas fires	0 * 40 = 0.0000 (7c)											
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)											
Pressure test	Yes											
Pressure Test Method	Blower Door											
Measured/design AP50	4.0000 (17)											
Infiltration rate	0.2000 (18)											
Number of sides sheltered	0 (19)											
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)											
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2000 (21)											
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												73.6000 (23c)
Effective ac	0.3870	0.3820	0.3770	0.3520	0.3470	0.3220	0.3220	0.3170	0.3320	0.3470	0.3570	0.3670 (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
Window North (Uw = 1.20)			8.1200	1.1450	9.2977		(27)
GF			26.3600	0.0700	1.8452	110.0000	2899.6000 (28a)
External Wall	98.5600	8.1200	90.4400	0.1700	15.3748	190.0000	17183.6000 (29a)
Total net area of external elements Aum(A, m ²)			124.9200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.5177		(33)
Party Wall 1			40.9900	0.0000	0.0000	180.0000	7378.2000 (32)
Party Ceiling 1			26.4100			30.0000	792.3000 (32b)
Internal Wall 1			64.7100			75.0000	4853.2500 (32c)
Internal Floor 1			26.4100			18.0000	475.3800 (32d)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	33582.3300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							636.3906 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)						3.8400		0.0410		0.1574		
E3 Sill						3.8400		0.0210		0.0806		
E4 Jamb						16.8800		0.0160		0.2701		
E5 Ground floor (normal)						16.7500		0.1640		2.7470		
E7 Party floor between dwellings (in blocks of flats)						33.5000		0.0000		0.0000		
E16 Corner (normal)						2.7700		0.0540		0.1496		
E25 Staggered party wall between dwellings						2.7700		0.1200		0.3324		
E18 Party wall between dwellings						29.9700		0.0600		1.7982		
P1 Party wall - Ground floor						6.8400		0.0800		0.5472		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						7.8200		0.0000		0.0000		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											6.0825	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss									(33) + (36) + (36a) =		32.6002	(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	19.9470	19.6893	19.4316	18.1430	17.8853	16.5967	16.5967	16.3390	17.1121	17.8853	18.4007	18.9161
Average = Sum(39)m / 12 =												50.6788
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9958	0.9909	0.9860	0.9616	0.9567	0.9323	0.9323	0.9274	0.9421	0.9567	0.9665	0.9762
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												1.7718
Hot water usage for mixer showers												47.0049
Hot water usage for baths												22.4853
Hot water usage for other uses												31.5830
Average daily hot water use (litres/day)												94.9140
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	103.2738	101.0267	98.3140	94.2461	90.9221	87.3568	86.0288	88.7303	91.5734	95.3109	99.4397	103.0142
Energy conte	163.5605	143.8606	151.1049	129.0182	122.3987	107.4154	104.0444	109.8666	112.9191	129.3360	141.6701	161.2954
Energy content (annual)										Total = Sum(45)m =		1576.4899
Distribution loss (46)m = 0.15 x (45)m												24.1943
Water storage loss:												150.0000
Store volume												1.1500
a) If manufacturer declared loss factor is known (kWh/day):												0.5400
Temperature factor from Table 2b												0.6210
Enter (49) or (54) in (55)												19.2510
Total storage loss												18.6300
If cylinder contains dedicated solar storage												19.2510
Primary loss												23.2624
Combi loss												0.0000
Total heat required for water heating calculated for each month												148.5574
WWHRS												0.0000
PV diverter												0.0000
Solar input												0.0000
FGHRS												0.0000
Output from w/h												152.3800
12Total per year (kWh/year)												2077.0509
Electric shower(s)												0.0000
Heat gains from water heating, kWh/month												87.6414

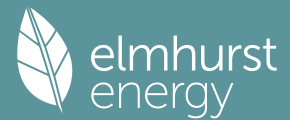
5. Internal gains (see Table 5 and 5a)												

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	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891	88.5891
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	81.9007	90.6758	81.9007	84.6307	81.9007	84.6307	81.9007	81.9007	84.6307	81.9007	84.6307	81.9007
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	154.4220	156.0245	151.9864	143.3899	132.5384	122.3394	115.5259	113.9235	117.9615	126.5581	137.4096	147.6085
Pumps, fans	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589	31.8589
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
Water heating gains (Table 5)	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713	-70.8713
Total internal gains	118.8099	116.8944	113.2434	105.2947	100.4144	95.3184	92.2117	94.8137	97.8600	103.5147	111.1374	117.7976
	404.7094	413.1713	396.7072	382.8920	364.4301	351.8652	339.2150	340.2146	350.0290	361.5501	382.7544	396.8836

6. Solar gains												

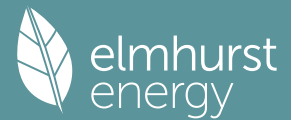
[Jan]												
Area												
Solar flux												
Specific data												
Specific data												
Access factor												
Gains W												
South	8.1200						0.5200		0.7000			95.7616
Solar gains	95.7616	156.8328	199.7772	225.7916	235.2888	226.4335	221.2393	214.8540	208.6909	169.1589	113.5102	82.7468
Total gains	500.4710	570.0042	596.4845	608.6836	599.7190	578.2987	560.4543	555.0686	558.7199	530.7091	496.2646	479.6304

Full SAP Calculation Printout



7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	177.5246	178.3995	179.2831	183.8358	184.7742	189.6138	189.6138	190.6123	187.6479	184.7742	182.9069	181.0769
alpha	12.8350	12.8933	12.9522	13.2557	13.3183	13.6409	13.6409	13.7075	13.5099	13.3183	13.1938	13.0718
util living area	0.9997	0.9979	0.9896	0.9338	0.7762	0.5444	0.3862	0.4056	0.6136	0.9251	0.9973	0.9998 (86)
Living	20.6507	20.7470	20.8479	20.9577	20.9963	21.0000	21.0000	21.0000	20.9998	20.9683	20.8013	20.6420
Non living	19.7818	19.8810	19.9817	20.0926	20.1184	20.1401	20.1401	20.1443	20.1319	20.1047	19.9535	19.7880
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	20.8213	20.7470	20.8479	20.9577	20.9963	21.0000	21.0000	21.0000	20.9998	20.9683	20.8013	20.6921 (87)
Th 2	20.0869	20.0909	20.0950	20.1155	20.1196	20.1401	20.1401	20.1443	20.1319	20.1196	20.1114	20.1032 (88)
util rest of house	0.9994	0.9960	0.9810	0.8945	0.7067	0.4713	0.3108	0.3301	0.5366	0.8755	0.9945	0.9996 (89)
MIT 2	19.9308	19.8810	19.9817	20.0926	20.1184	20.1401	20.1401	20.1443	20.1319	20.1047	19.9535	19.8321 (90)
Living area fraction												0.3125 (91)
MIT	20.2091	20.1516	20.2524	20.3629	20.3927	20.4088	20.4088	20.4117	20.4031	20.3746	20.2184	20.1008 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2091	20.1516	20.2524	20.3629	20.3927	20.4088	20.4088	20.4117	20.4031	20.3746	20.2184	20.1008 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9994	0.9962	0.9829	0.9069	0.7287	0.4942	0.3343	0.3537	0.5607	0.8916	0.9949	0.9996 (94)
Useful gains	500.1934	567.8430	586.2838	551.9848	436.9959	285.7668	187.3831	196.3282	313.2864	473.1683	493.7399	479.4484 (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	835.9785	797.5015	715.5621	581.6658	438.8559	285.7764	187.3832	196.3283	313.3420	493.4752	669.0527	819.1531 (97)
Space heating kWh	249.8241	154.3305	96.1831	21.3703	1.3839	0.0000	0.0000	0.0000	0.0000	15.1084	126.2252	252.7403 (98a)
Space heating requirement - total per year (kWh/year)												917.1657
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	249.8241	154.3305	96.1831	21.3703	1.3839	0.0000	0.0000	0.0000	0.0000	15.1084	126.2252	252.7403 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												917.1657
Space heating per m2										(98c) / (4) =		17.3804 (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 %)												303.8053 (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	249.8241	154.3305	96.1831	21.3703	1.3839	0.0000	0.0000	0.0000	0.0000	15.1084	126.2252	252.7403 (98)
Space heating efficiency (main heating system 1)	303.8053	303.8053	303.8053	303.8053	303.8053	0.0000	0.0000	0.0000	0.0000	303.8053	303.8053	303.8053 (210)
Space heating fuel (main heating system)	82.2317	50.7992	31.6594	7.0342	0.4555	0.0000	0.0000	0.0000	0.0000	4.9730	41.5481	83.1915 (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	206.0739	182.2598	193.6183	170.1602	164.9121	148.5574	146.5578	152.3800	154.0611	171.8494	182.8121	203.8088 (64)
Efficiency of water heater (217)m	177.6642	177.6642	177.6642	177.6642	177.6642	177.6642	177.6642	177.6642	177.6642	177.6642	177.6642	177.6642 (216)
Fuel for water heating, kWh/month	115.9907	102.5867	108.9799	95.7763	92.8223	83.6170	82.4915	85.7686	86.7148	96.7271	102.8976	114.7157 (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	11.7818	10.6416	11.7818	11.4018	11.7818	11.4018	11.7818	11.7818	11.4018	11.7818	11.4018	11.7818 (231)
Lighting	16.3276	13.0986	11.7939	8.6407	6.6743	5.4530	6.0885	7.9141	10.2797	13.4875	15.2341	16.7814 (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												301.8926 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												177.6642
Water heating fuel used												1169.0881 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.7280)	
mechanical ventilation fans (SFP = 0.7280)	138.7214 (230a)
Total electricity for the above, kWh/year	138.7214 (231)
Electricity for lighting (calculated in Appendix L)	131.7735 (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	1741.4756 (238)

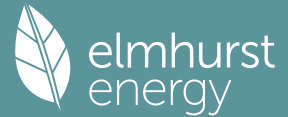
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	301.8926	0.1588	47.9519 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1169.0881	0.1409	164.7098 (264)
Space and water heating			212.6616 (265)
Pumps, fans and electric keep-hot	138.7214	0.1387	19.2424 (267)
Energy for lighting	131.7735	0.1443	19.0190 (268)
Total CO2, kg/year			250.9230 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.7600 (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	301.8926	1.5880	479.3904 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1169.0881	1.5209	1778.1245 (278)
Space and water heating			2257.5149 (279)
Pumps, fans and electric keep-hot	138.7214	1.5128	209.8578 (281)
Energy for lighting	131.7735	1.5338	202.1186 (282)
Total Primary energy kWh/year			2669.4912 (286)
Dwelling Primary energy Rate (DPER)			50.5900 (287)

Full SAP Calculation Printout



Property Reference	FLAT A4-3B5P				Issued on Date	12/09/2024
Assessment Reference	FLAT A4-3B5P		Prop Type Ref			
Property						
SAP Rating	82 B	DER	4.08	TER		
Environmental	96 A	% DER < TER				N/A
CO ₂ Emissions (t/year)	0.36	DFEE	49.21	TFEE		
Compliance Check	See BREL	% DFEE < TFEE				
% DPER < TPER		DPER	43.11	TPER		
Assessor Details	Mr. Mirza Baig				Assessor ID	CK52-0001
Client	Archanaeum Ltd, ARCHANAUM					

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)
Ground floor	99.6100	3.1900	317.7559
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	99.6100		
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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.2000	(18)
Number of sides sheltered	0	(19)

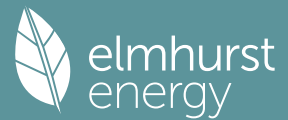
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2000 (21)

	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	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												73.6000 (23c)
Effective ac	0.3870	0.3820	0.3770	0.3520	0.3470	0.3220	0.3220	0.3170	0.3320	0.3470	0.3570	0.3670 (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
Window North (Uw = 1.20)			2.0800	1.1450	2.3817		(27)
Window S (Uw = 1.20)			18.3600	1.1450	21.0229		(27)
External Wall	146.2600	20.4400	125.8200	0.1700	21.3894	190.0000	23905.8000 (29a)
External Roof 1	99.6100		99.6100	0.0700	6.9727	9.0000	896.4900 (30)
Total net area of external elements Aum(A, m ²)			245.8700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.7667		(33)
Party Wall 1			14.4800	0.0000	0.0000	180.0000	2606.4000 (32)
Party Floor 1			99.6100			40.0000	3984.4000 (32d)
Internal Wall 1			167.7300			75.0000	12579.7500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	43972.8400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							441.4501 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				9.6800	0.0410	0.3969	

Full SAP Calculation Printout



E3 Sill	9.6800	0.0210	0.2033
E4 Jamb	38.2600	0.0160	0.6122
E7 Party floor between dwellings (in blocks of flats)	45.8500	0.0000	0.0000
E16 Corner (normal)	23.1000	0.0540	1.2474
E25 Staggered party wall between dwellings	6.6000	0.1200	0.7920
E17 Corner (inverted - internal area greater than external area)	9.9000	-0.0900	-0.8910
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	4.5400	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	4.5400	0.1200	0.5448
E10 Eaves (insulation at ceiling level)	45.8500	0.0600	2.7510

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

Point Thermal Bridges (36a) = 5.6565 (36)

Total fabric heat loss (33) + (36) + (36a) = 57.4232 (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	40.5806	40.0563	39.5320	36.9105	36.3862	33.7647	33.7647	33.2404	34.8133	36.3862	37.4348	38.4834 (38)
Average = Sum(39)m / 12 =	98.0038	97.4795	96.9552	94.3337	93.8094	91.1879	91.1879	90.6636	92.2365	93.8094	94.8580	95.9066 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9839	0.9786	0.9733	0.9470	0.9418	0.9154	0.9154	0.9102	0.9260	0.9418	0.9523	0.9628 (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												2.7359 (42)
Hot water usage for mixer showers	61.3302	60.4085	59.0654	56.4957	54.5993	52.4845	51.2825	52.6154	54.0765	56.3471	58.9720	61.0952 (42a)
Hot water usage for baths	30.2649	29.8154	29.1825	28.0154	27.1415	26.1725	25.6491	26.2777	26.9620	27.9989	29.1900	30.1626 (42b)
Hot water usage for other uses	42.6482	41.0974	39.5465	37.9957	36.4448	34.8940	34.8940	36.4448	37.9957	39.5465	41.0974	42.6482 (42c)
Average daily hot water use (litres/day)												123.3758 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	134.2433	131.3213	127.7944	122.5068	118.1857	113.5511	111.8256	115.3379	119.0342	123.8925	129.2594	133.9060 (44)
Distribution loss (46)m = 0.15 x (45)m	212.6085	186.9997	196.4153	167.7057	159.1007	139.6243	135.2434	142.8124	146.7810	168.1210	184.1537	209.6644 (45)
Store volume	31.8913	28.0500	29.4623	25.1559	23.8651	20.9436	20.2865	21.4219	22.0172	Total = Sum(45)m =		2049.2300
a) If manufacturer declared loss factor is known (kWh/day):												1.2500 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6750 (55)
Total storage loss	20.9250	18.9000	20.9250	20.2500	20.9250	20.2500	20.9250	20.9250	20.2500	20.9250	20.2500	20.9250 (56)
If cylinder contains dedicated solar storage	20.9250	18.9000	20.9250	20.2500	20.9250	20.2500	20.9250	20.9250	20.2500	20.9250	20.2500	20.9250 (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	256.7959	226.9109	240.6027	210.4677	203.2881	182.3863	179.4308	186.9998	189.5430	212.3084	226.9157	253.8518 (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	256.7959	226.9109	240.6027	210.4677	203.2881	182.3863	179.4308	186.9998	189.5430	212.3084	226.9157	253.8518 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											2569.5010 (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	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
	106.0423	94.1064	100.6580	89.9717	88.2509	80.6347	80.3183	82.8350	83.0143	91.2502	95.4407	105.0633 (65)

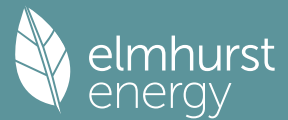
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	129.5585	143.4398	129.5585	133.8771	129.5585	133.8771	129.5585	129.5585	133.8771	129.5585	133.8771	129.5585 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	255.6957	258.3491	251.6628	237.4285	219.4602	202.5726	191.2906	188.6373	195.3236	209.5579	227.5261	244.4138 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794 (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)	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354 (71)
Water heating gains (Table 5)	142.5299	140.0392	135.2930	124.9608	118.6168	111.9926	107.9548	111.3374	115.2976	122.6481	132.5565	141.2142 (72)
Total internal gains	591.8224	605.8664	580.5526	560.3046	531.6738	512.4806	492.8421	493.5715	508.5366	525.8027	557.9980	579.2247 (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
North	2.0800	10.6334	0.5200	0.7000	0.7700	5.5792 (74)
North	4.0600	10.6334	0.2500	0.7000	0.7700	5.2356 (74)
East	10.1500	19.6403	0.2500	0.7000	0.7700	24.1760 (76)
West	4.1500	19.6403	0.2500	0.7000	0.7700	9.8848 (80)

Full SAP Calculation Printout



Solar gains	44.8756	87.2978	144.8497	216.4459	272.1195	282.1230	267.0947	224.4471	169.8458	103.6644	55.8112	37.0257 (83)
Total gains	636.6980	693.1641	725.4023	776.7505	803.7933	794.6036	759.9368	718.0185	678.3824	629.4671	613.8093	616.2504 (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	124.6347	125.3051	125.9827	129.4837	130.2074	133.9506	133.9506	134.7252	132.4278	130.2074	128.7680	127.3601	
alpha	9.3090	9.3537	9.3988	9.6322	9.6805	9.9300	9.9300	9.9817	9.8285	9.6805	9.5845	9.4907	
util living area	0.9999	0.9997	0.9990	0.9920	0.9390	0.7250	0.5275	0.5798	0.8761	0.9949	0.9996	0.9999 (86)	
Living	20.3168	20.4008	20.5341	20.7455	20.9192	20.9948	20.9998	20.9995	20.9710	20.7601	20.5166	20.3185	
Non living	19.4740	19.5618	19.6986	19.9265	20.0851	20.1529	20.1544	20.1588	20.1342	19.9460	19.6968	19.4911	
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	20.6505	20.4008	20.5341	20.7455	20.9192	20.9948	20.9998	20.9995	20.9710	20.7601	20.5166	20.4138 (87)	
Th 2	20.0968	20.1012	20.1056	20.1277	20.1321	20.1544	20.1544	20.1589	20.1455	20.1321	20.1233	20.1144 (88)	
util rest of house	0.9998	0.9996	0.9984	0.9860	0.8989	0.6348	0.4265	0.4745	0.7978	0.9899	0.9994	0.9999 (89)	
MIT 2	19.7782	19.5618	19.6986	19.9265	20.0851	20.1529	20.1544	20.1588	20.1342	19.9460	19.6968	19.5783 (90)	
Living area fraction									FLA = Living area / (4) =				0.3098 (91)
MIT	20.0484	19.8218	19.9575	20.1802	20.3435	20.4138	20.4163	20.4192	20.3934	20.1982	19.9508	19.8372 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.0484	19.8218	19.9575	20.1802	20.3435	20.4138	20.4163	20.4192	20.3934	20.1982	19.9508	19.8372 (93)	

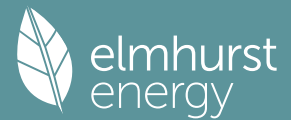
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9998	0.9995	0.9982	0.9865	0.9103	0.6631	0.4578	0.5072	0.8229	0.9904	0.9993	0.9999 (94)
Useful gains	636.5996	692.8101	724.1060	766.2668	731.6770	526.9345	347.9175	364.1920	558.2686	623.4133	613.3844	616.1720 (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	1543.4070	1454.5667	1304.7713	1064.1069	810.8459	530.1451	347.9983	364.3981	580.4856	900.4039	1219.0001	1499.7066 (97)
Space heating kWh	674.6647	511.9004	432.0149	214.4449	58.9017	0.0000	0.0000	0.0000	0.0000	206.0810	436.0433	657.3497 (98a)
Space heating requirement - total per year (kWh/year)												3191.4007
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	674.6647	511.9004	432.0149	214.4449	58.9017	0.0000	0.0000	0.0000	0.0000	206.0810	436.0433	657.3497 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3191.4007
Space heating per m2										(98c) / (4) =		32.0390 (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 %)												353.5660 (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	674.6647	511.9004	432.0149	214.4449	58.9017	0.0000	0.0000	0.0000	0.0000	206.0810	436.0433	657.3497 (98)
Space heating efficiency (main heating system 1)	353.5660	353.5660	353.5660	353.5660	353.5660	0.0000	0.0000	0.0000	0.0000	353.5660	353.5660	353.5660 (210)
Space heating fuel (main heating system)	190.8172	144.7822	122.1879	60.6520	16.6593	0.0000	0.0000	0.0000	0.0000	58.2864	123.3273	185.9200 (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	256.7959	226.9109	240.6027	210.4677	203.2881	182.3863	179.4308	186.9998	189.5430	212.3084	226.9157	253.8518 (64)
Efficiency of water heater (217)m	189.8822	189.8822	189.8822	189.8822	189.8822	189.8822	189.8822	189.8822	189.8822	189.8822	189.8822	189.8822 (216)
Fuel for water heating, kWh/month	135.2396	119.5009	126.7116	110.8412	107.0601	96.0523	94.4959	98.4820	99.8214	111.8106	119.5034	133.6891 (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	25.3520	22.8986	25.3520	24.5342	25.3520	24.5342	25.3520	25.3520	24.5342	25.3520	24.5342	25.3520 (231)
Lighting	29.0997	23.3449	21.0195	15.3998	11.8952	9.7185	10.8512	14.1048	18.3208	24.0379	27.1507	29.9085 (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												902.6323 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												189.8822
Water heating fuel used												1353.2082 (219)

Full SAP Calculation Printout



Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.7700)	
mechanical ventilation fans (SFP = 0.7700)	298.4999 (230a)
Total electricity for the above, kWh/year	298.4999 (231)
Electricity for lighting (calculated in Appendix L)	234.8515 (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	2789.1920 (238)

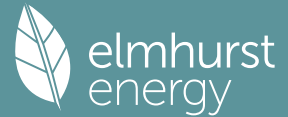
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	902.6323	0.1559	140.6897 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1353.2082	0.1410	190.7994 (264)
Space and water heating			331.4891 (265)
Pumps, fans and electric keep-hot	298.4999	0.1387	41.4056 (267)
Energy for lighting	234.8515	0.1443	33.8963 (268)
Total CO2, kg/year			406.7911 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0800 (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	902.6323	1.5771	1423.5102 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1353.2082	1.5214	2058.7217 (278)
Space and water heating			3482.2319 (279)
Pumps, fans and electric keep-hot	298.4999	1.5128	451.5706 (281)
Energy for lighting	234.8515	1.5338	360.2231 (282)
Total Primary energy kWh/year			4294.0257 (286)
Dwelling Primary energy Rate (DPER)			43.1100 (287)

Full SAP Calculation Printout



Property Reference	FLAT A4-3B5P			Issued on Date	12/09/2024
Assessment Reference	FLAT A4-3B5P_Baseline	Prop Type Ref			
Property	Hornsey Police Station, 88/90 , Tottenham Ln,, London , N8 7EJ				
SAP Rating	82 B	DER	23.83	TER	14.45
Environmental	79 C	% DER < TER			-64.91
CO ₂ Emissions (t/year)	1.98	DFEE	78.72	TFEE	50.53
Compliance Check	See BREL	% DFEE < TFEE			-55.78
% DPER < TPER	-65.02	DPER	125.57	TPER	76.09
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

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)
Ground floor	99.6100 (1b)	3.1900 (2b)	317.7559 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	99.6100		317.7559 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	317.7559 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.0944 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	8.0000 (17)
Infiltration rate	0.4944 (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) = 0.4944 (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	0.6304	0.6180	0.6057	0.5439	0.5315	0.4697	0.4697	0.4573	0.4944	0.5315	0.5562	0.5809 (22b)
Effective ac	0.6987	0.6910	0.6834	0.6479	0.6412	0.6103	0.6103	0.6046	0.6222	0.6412	0.6547	0.6687 (25)

3. Heat losses and heat loss parameter

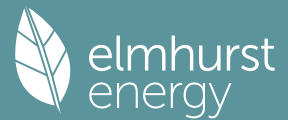
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Window North (Uw = 1.60)			2.0800	1.5038	3.1278		(27)
Window S (Uw = 1.60)			18.3600	1.5038	27.6090		(27)
External Wall	146.2600	20.4400	125.8200	0.2600	32.7132	190.0000	23905.8000 (29a)
External Roof 1	99.6100		99.6100	0.1600	15.9376	9.0000	896.4900 (30)
Total net area of external elements Aum(A, m ²)			245.8700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	79.3876			(33)
Party Wall 1			14.4800	0.0000	0.0000	180.0000	2606.4000 (32)
Party Floor 1			99.6100			40.0000	3984.4000 (32d)
Internal Wall 1			167.7300			75.0000	12579.7500 (32c)

Heat capacity Cm = Sum (A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
(28)...(30) + (32) + (32a)...(32e) = 43972.8400 (34)
441.4501 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	9.6800	0.5000	4.8400
E3 Sill	9.6800	0.0400	0.3872
E4 Jamb	38.2600	0.0500	1.9130
E7 Party floor between dwellings (in blocks of flats)	45.8500	0.0700	3.2095
E16 Corner (normal)	23.1000	0.0900	2.0790
E25 Staggered party wall between dwellings	6.6000	0.1200	0.7920

Full SAP Calculation Printout



E17 Corner (inverted - internal area greater than external area)	9.9000	-0.0900	-0.8910										
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	4.5400	0.0000	0.0000										
P4 Party wall - Roof (insulation at ceiling level)	4.5400	0.1200	0.5448										
E10 Eaves (insulation at ceiling level)	45.8500	0.0600	2.7510										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				15.6255 (36)									
Point Thermal bridges			(36a) =	0.0000									
Total fabric heat loss		(33) + (36) + (36a) =		95.0131 (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	73.2639	72.4549	71.6619	67.9372	67.2403	63.9962	63.9962	63.3955	65.2458	67.2403	68.6501	70.1239	(38)
Average = Sum(39)m / 12 =	168.2770	167.4680	166.6750	162.9503	162.2535	159.0094	159.0094	158.4086	160.2590	162.2535	163.6632	165.1371	(39)
												162.9470	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.6894	1.6812	1.6733	1.6359	1.6289	1.5963	1.5963	1.5903	1.6089	1.6289	1.6430	1.6578	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												1.6358	
												31	

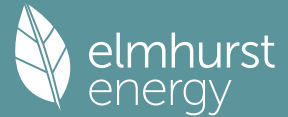
4. Water heating energy requirements (kWh/year)													
Assumed occupancy													
Hot water usage for mixer showers												2.7359 (42)	
70.0916	69.0383	67.5033	64.5665	62.3993	59.9823	58.6085	60.1318	61.8017	64.3967	67.3966	69.8231	(42a)	
Hot water usage for baths													
30.2649	29.8154	29.1825	28.0154	27.1415	26.1725	25.6491	26.2777	26.9620	27.9989	29.1900	30.1626	(42b)	
Hot water usage for other uses													
42.6482	41.0974	39.5465	37.9957	36.4448	34.8940	34.8940	36.4448	37.9957	39.5465	41.0974	42.6482	(42c)	
Average daily hot water use (litres/day)												131.4535 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	143.0047	139.9511	136.2323	130.5776	125.9856	121.0488	119.1517	122.8543	126.7594	131.9421	137.6839	142.6339	(44)
Energy content (annual)	226.4845	199.2884	209.3840	178.7542	169.6009	148.8437	144.1036	152.1193	156.3070	179.0442	196.1560	223.3301	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2183.4160	
33.9727	29.8933	31.4076	26.8131	25.4401	22.3266	21.6155	22.8179	23.4460	26.8566	29.4234	33.4995	(46)	
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													
Temperature factor from Table 2b												1.3800	(48)
Enter (49) or (54) in (55)												0.5400	(49)
Total storage loss												0.7452	(55)
23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012	(56)	
If cylinder contains dedicated solar storage													
23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012	(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													
272.8481	241.1652	255.7476	223.6222	215.9645	193.7117	190.4672	198.4829	201.1750	225.4078	241.0240	269.6937	(62)	
WWHS	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)
FGHS	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													
272.8481	241.1652	255.7476	223.6222	215.9645	193.7117	190.4672	198.4829	201.1750	225.4078	241.0240	269.6937	(64)	
Total per year (kWh/year) = Sum(64)m =												2729.3100 (64)	
12Total per year (kWh/year)													
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)	
Heat gains from water heating, kWh/month													
112.3970	99.7648	106.7111	95.3302	93.4832	85.3849	85.0053	87.6706	87.8665	96.6231	101.1163	111.3482	(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	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	129.5585	143.4398	129.5585	133.8771	129.5585	133.8771	129.5585	129.5585	133.8771	129.5585	133.8771	129.5585 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	255.6957	258.3491	251.6628	237.4285	219.4602	202.5726	191.2906	188.6373	195.3236	209.5579	227.5261	244.4138 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794 (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)	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354 (71)
Water heating gains (Table 5)	151.0712	148.4596	143.4289	132.4030	125.6494	118.5902	114.2545	117.8368	122.0368	129.8697	140.4393	149.6615 (72)
Total internal gains	603.3637	617.2867	591.6884	570.7469	541.7064	519.0781	499.1419	500.0708	515.2757	536.0244	568.8808	590.6720 (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			
North					2.0800	10.6334	0.5200	0.7000	0.7700			5.5792 (74)
North					4.0600	10.6334	0.2500	0.7000	0.7700			5.2356 (74)
East					10.1500	19.6403	0.2500	0.7000	0.7700			24.1760 (76)
West					4.1500	19.6403	0.2500	0.7000	0.7700			9.8848 (80)
Solar gains	44.8756	87.2978	144.8497	216.4459	272.1195	282.1230	267.0947	224.4471	169.8458	103.6644	55.8112	37.0257 (83)
Total gains	648.2393	704.5845	736.5381	787.1928	813.8259	801.2011	766.2365	724.5179	685.1215	639.6888	624.6920	627.6977 (84)

Full SAP Calculation Printout



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	72.5867	72.9374	73.2844	74.9595	75.2815	76.8173	76.8173	77.1087	76.2184	75.2815	74.6330	73.9669	21.0000 (85)
alpha	5.8391	5.8625	5.8856	5.9973	6.0188	6.1212	6.1212	6.1406	6.0812	6.0188	5.9755	5.9311	
util living area	0.9999	0.9997	0.9994	0.9976	0.9886	0.9398	0.8177	0.8624	0.9786	0.9982	0.9997	0.9999	(86)
MIT	19.6342	19.7407	19.9365	20.2462	20.5522	20.8311	20.9533	20.9337	20.7226	20.3331	19.9523	19.6394	(87)
Th 2	20.1553	20.1594	20.1634	20.1821	20.1856	20.2018	20.2018	20.2049	20.1956	20.1856	20.1785	20.1711	(88)
util rest of house	0.9998	0.9996	0.9991	0.9965	0.9823	0.9008	0.7111	0.7701	0.9624	0.9972	0.9995	0.9998	(89)
MIT 2	18.8793	18.9890	19.1880	19.5124	19.8184	20.0940	20.1841	20.1763	19.9933	19.6023	19.2160	18.8972	(90)
Living area fraction									fLA = Living area /	(4) =		0.3098	(91)
MIT	19.1132	19.2219	19.4199	19.7398	20.0458	20.3224	20.4224	20.4109	20.2192	19.8287	19.4441	19.1271	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.9632	19.0719	19.2699	19.5898	19.8958	20.1724	20.2724	20.2609	20.0692	19.6787	19.2941	18.9771	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9997	0.9994	0.9987	0.9953	0.9791	0.8989	0.7219	0.7779	0.9589	0.9963	0.9993	0.9998	(94)
Useful gains	648.0445	704.1836	735.6036	783.4955	796.8466	720.2350	553.1633	563.6120	656.9320	637.2925	624.2766	627.5494	(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	2467.4801	2373.3379	2128.4168	1741.9006	1329.7899	886.0581	583.9455	611.6060	956.6218	1473.0493	1995.7296	2440.2538	(97)
Space heating kWh	1353.6601	1121.6717	1036.2530	690.0517	396.5098	0.0000	0.0000	0.0000	0.0000	621.8031	987.4462	1348.6521	(98a)
Space heating requirement - total per year (kWh/year)												7556.0476	
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	1353.6601	1121.6717	1036.2530	690.0517	396.5098	0.0000	0.0000	0.0000	0.0000	621.8031	987.4462	1348.6521	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7556.0476	
Space heating per m2										(98c) / (4) =		75.8563	(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)
Space heating requirement	1353.6601	1121.6717	1036.2530	690.0517	396.5098	0.0000	0.0000	0.0000	0.0000	621.8031	987.4462	1348.6521	(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)	1512.4694	1253.2645	1157.8246	771.0075	443.0277	0.0000	0.0000	0.0000	0.0000	694.7520	1103.2918	1506.8738	(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	272.8481	241.1652	255.7476	223.6222	215.9645	193.7117	190.4672	198.4829	201.1750	225.4078	241.0240	269.6937	(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	304.8582	269.4584	285.7515	249.8573	241.3011	216.4376	212.8125	221.7686	224.7765	251.8523	269.3006	301.3338	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822	(231)
Lighting	52.6976	42.2760	38.0648	27.8879	21.5414	17.5995	19.6508	25.5429	33.1777	43.5309	49.1681	54.1622	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-34.9504	-50.5984	-74.6121	-85.8979	-94.0608	-88.2159	-87.2001	-81.7918	-72.1338	-58.9555	-38.9236	-30.0609	(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												8442.5113	(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												3049.5084	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans: central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												425.2999	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-797.4011	(233)
Wind generation												0.0000	(234)

Full SAP Calculation Printout



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	11160.9186 (238)

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

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	8442.5113	0.2100	1772.9274 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	3049.5084	0.2100	640.3968 (264)
Space and water heating			2413.3241 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	425.2999	0.1443	61.3839 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-797.4011	0.1341	-106.9292
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-106.9292 (269)
Total CO ₂ , kg/year			2373.4661 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			23.8300 (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	8442.5113	1.1300	9540.0378 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	3049.5084	1.1300	3445.9445 (278)
Space and water heating			12985.9823 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	425.2999	1.5338	652.3392 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-797.4011	1.4956	-1192.5723
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1192.5723 (283)
Total Primary energy kWh/year			12507.7740 (286)
Dwelling Primary energy Rate (DPER)			125.5700 (287)

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

1. Overall dwelling characteristics

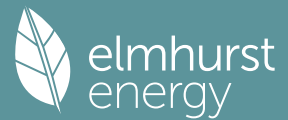
	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	99.6100 (1b)	x 3.1900 (2b)	= 317.7559 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	99.6100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 317.7559 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.0944 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3444 (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) = 0.3444 (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	0.4391	0.4305	0.4219	0.3789	0.3702	0.3272	0.3272	0.3186	0.3444	0.3702	0.3875	0.4047 (22b)
Effective ac	0.5964	0.5927	0.5890	0.5718	0.5685	0.5535	0.5535	0.5507	0.5593	0.5685	0.5751	0.5819 (25)

Full SAP Calculation Printout



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	
TER Opening Type (Uw = 1.20)			20.4400	1.1450	23.4046			(27)
External Wall	146.2600	20.4400	125.8200	0.1800	22.6476			(29a)
External Roof 1	99.6100		99.6100	0.1100	10.9571			(30)
Total net area of external elements Aum(A, m2)			245.8700					(31)
Fabric heat loss, W/K = Sum (A x U)					57.0093			(33)
Party Wall 1			14.4800	0.0000	0.0000			(32)

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

441.4501 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	9.6800	0.0500	0.4840	
E3 Sill	9.6800	0.0500	0.4840	
E4 Jamb	38.2600	0.0500	1.9130	
E7 Party floor between dwellings (in blocks of flats)	45.8500	0.0700	3.2095	
E16 Corner (normal)	23.1000	0.0900	2.0790	
E25 Staggered party wall between dwellings	6.6000	0.0600	0.3960	
E17 Corner (inverted - internal area greater than external area)	9.9000	-0.0900	-0.8910	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	4.5400	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	4.5400	0.1200	0.5448	
E10 Eaves (insulation at ceiling level)	45.8500	0.0600	2.7510	

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

10.9703 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 67.9796 (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	62.5398	62.1472	61.7624	59.9550	59.6168	58.0425	58.0425	57.7510	58.6489	59.6168	60.3009	61.0161	(38)
Average = Sum(39)m / 12 =	130.5194	130.1268	129.7420	127.9345	127.5964	126.0221	126.0221	125.7306	126.6285	127.5964	128.2805	128.9957	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3103	1.3064	1.3025	1.2844	1.2810	1.2652	1.2652	1.2622	1.2712	1.2810	1.2878	1.2950	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

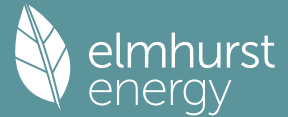
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7359 (42)
Hot water usage for mixer showers													
70.0916	69.0383	67.5033	64.5665	62.3993	59.9823	58.6085	60.1318	61.8017	64.3967	67.3966	69.8231	69.8231	(42a)
Hot water usage for baths													
30.2649	29.8154	29.1825	28.0154	27.1415	26.1725	25.6491	26.2777	26.9620	27.9989	29.1900	30.1626	30.1626	(42b)
Hot water usage for other uses													
42.6482	41.0974	39.5465	37.9957	36.4448	34.8940	34.8940	36.4448	37.9957	39.5465	41.0974	42.6482	42.6482	(42c)
Average daily hot water use (litres/day)													131.4535 (43)
Daily hot water use													
143.0047	139.9511	136.2323	130.5776	125.9856	121.0488	119.1517	122.8543	126.7594	131.9421	137.6839	142.6339	142.6339	(44)
Energy content (annual)	226.4845	199.2884	209.3840	178.7542	169.6009	148.8437	144.1036	152.1193	156.3070	179.0442	196.1560	223.3301	(45)
Distribution loss (46)m = 0.15 x (45)m													2183.4160
33.9727	29.8933	31.4076	26.8131	25.4401	22.3266	21.6155	22.8179	23.4460	26.8566	29.4234	33.4995	33.4995	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(56)
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	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													
273.0794	241.3742	255.9789	223.8461	216.1958	193.9355	190.6985	198.7142	201.3988	225.6391	241.2479	269.9250	269.9250	(62)
WWHRS	-32.0430	-28.3391	-29.6750	-24.5721	-22.9003	-19.5960	-18.3681	-19.5326	-20.2747	-23.9017	-27.0777	-31.4496	(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	241.0365	213.0351	226.3039	199.2740	193.2955	174.3396	172.3304	179.1816	181.1241	201.7374	214.1702	238.4755	(64)
12Total per year (kWh/year)													2434.3037 (64)
Electric shower(s)													2434 (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)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
112.5820	99.9320	106.8961	95.5093	93.6682	85.5640	85.1904	87.8556	88.0455	96.8081	101.2953	111.5332	111.5332	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
129.5585	143.4398	129.5585	133.8771	129.5585	133.8771	129.5585	129.5585	133.8771	129.5585	133.8771	129.5585	129.5585	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
255.6957	258.3491	251.6628	237.4285	219.4602	202.5726	191.2906	188.6373	195.3236	209.5579	227.5261	244.4138	244.4138	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	(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)													
-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	(71)
Water heating gains (Table 5)													
151.3199	148.7083	143.6776	132.6518	125.8981	118.8389	114.5032	118.0855	122.2855	130.1184	140.6880	149.9102	149.9102	(72)
Total internal gains													

Full SAP Calculation Printout



603.6124 617.5354 591.9371 570.9956 541.9551 519.3269 499.3906 500.3196 515.5244 536.2731 569.1295 590.9208 (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	
North	6.1400		10.6334		0.6300		0.7000		0.7700		19.9532 (74)	
East	10.1500		19.6403		0.6300		0.7000		0.7700		60.9235 (76)	
West	4.1500		19.6403		0.6300		0.7000		0.7700		24.9096 (80)	
Solar gains	105.7863	206.0394	341.3152	507.3656	634.4465	656.0376	621.8110	524.9322	399.5090	244.6275	131.6387	87.2190 (83)
Total gains	709.3988	823.5749	933.2523	1078.3612	1176.4017	1175.3645	1121.2015	1025.2518	915.0335	780.9006	700.7682	678.1397 (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	93.5852	93.8675	94.1459	95.4760	95.7290	96.9249	96.9249	97.1496	96.4607	95.7290	95.2185	94.6906
alpha	7.2390	7.2578	7.2764	7.3651	7.3819	7.4617	7.4617	7.4766	7.4307	7.3819	7.3479	7.3127
util living area	0.9998	0.9993	0.9969	0.9778	0.8845	0.6727	0.4932	0.5607	0.8601	0.9917	0.9994	0.9999 (86)
MIT	20.0319	20.1622	20.3734	20.6741	20.9035	20.9895	20.9990	20.9977	20.9426	20.6350	20.2853	20.0180 (87)
Th 2	19.8328	19.8359	19.8389	19.8531	19.8558	19.8682	19.8682	19.8705	19.8634	19.8558	19.8504	19.8447 (88)
util rest of house	0.9997	0.9989	0.9948	0.9623	0.8203	0.5614	0.3672	0.4252	0.7623	0.9835	0.9989	0.9998 (89)
MIT 2	18.7192	18.8885	19.1606	19.5451	19.7917	19.8647	19.8681	19.8702	19.8360	19.5057	19.0580	18.7107 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.1259	19.2831	19.5363	19.8948	20.1361	20.2132	20.2185	20.2195	20.1788	19.8556	19.4382	19.1157 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.1259	19.2831	19.5363	19.8948	20.1361	20.2132	20.2185	20.2195	20.1788	19.8556	19.4382	19.1157 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9996	0.9986	0.9940	0.9630	0.8381	0.5963	0.4064	0.4675	0.7931	0.9835	0.9986	0.9997 (94)
Useful gains	709.0841	822.3813	927.6851	1038.4995	985.9659	700.9268	455.6788	479.3453	725.6718	768.0143	699.7861	677.9256 (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	1935.0640	1871.6233	1691.3593	1406.6206	1076.4175	707.3871	456.0077	480.2264	769.7556	1180.9797	1582.7510	1924.0576 (97)
Space heating kWh	912.1290	705.0906	568.1736	265.0472	67.2960	0.0000	0.0000	0.0000	0.0000	307.2463	635.7347	927.1222 (98a)
Space heating requirement - total per year (kWh/year)	4387.8397											
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	912.1290	705.0906	568.1736	265.0472	67.2960	0.0000	0.0000	0.0000	0.0000	307.2463	635.7347	927.1222 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	4387.8397											
Space heating per m2	(98c) / (4) = 44.0502 (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	912.1290	705.0906	568.1736	265.0472	67.2960	0.0000	0.0000	0.0000	0.0000	307.2463	635.7347	927.1222 (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)	988.2221	763.9118	615.5727	287.1584	72.9101	0.0000	0.0000	0.0000	0.0000	332.8779	688.7700	1004.4661 (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	241.0365	213.0351	226.3039	199.2740	193.2955	174.3396	172.3304	179.1816	181.1241	201.7374	214.1702	238.4755 (64)
Water heating requirement	86.7549	86.5354	86.0360	84.7003	81.9448	79.8000	79.8000	79.8000	79.8000	85.0004	86.3460	79.8000 (216)
Efficiency of water heater	277.8363	246.1825	263.0338	235.2696	235.8851	218.4706	215.9529	224.5384	226.9725	237.3372	248.0371	274.7502 (219)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement	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)
(221)m	26.9197	21.5960	19.4448	14.2461	11.0041	8.9904	10.0383	13.0482	16.9483	22.2370	25.1167	27.6679 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-33.1711	-47.9013	-70.5004	-81.2108	-89.2132	-83.8311	-82.7643	-77.3054	-67.9760	-55.6075	-36.8559	-28.5443 (233a)
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	-15.4451	-32.8175	-65.8454	-99.8148	-132.8953	-133.8942	-132.3564	-111.6807	-81.3256	-47.2789	-20.7305	-12.1923 (233b)
(235c)m												

Full SAP Calculation Printout



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													4753.8891	(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													2904.2662	(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)													217.2574	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-1641.1579	(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													6320.2548	(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	4753.8891	0.2100	998.3167 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2904.2662	0.2100	609.8959 (264)
Space and water heating			1608.2126 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	217.2574	0.1443	31.3570 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-754.8813	0.1341	-101.2254
PV Unit electricity exported	-886.2767	0.1256	-111.3322
Total			-212.5575 (269)
Total CO2, kg/year			1438.9413 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.4500 (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	4753.8891	1.1300	5371.8947 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2904.2662	1.1300	3281.8209 (278)
Space and water heating			8653.7156 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	217.2574	1.5338	333.2366 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-754.8813	1.4956	-1128.9723
PV Unit electricity exported	-886.2767	0.4611	-408.6535
Total			-1537.6258 (283)
Total Primary energy kWh/year			7579.4272 (286)
Target Primary Energy Rate (TPER)			76.0900 (287)

Full SAP Calculation Printout



Property Reference	FLAT A4-3B5P			Issued on Date	12/09/2024	
Assessment Reference	FLAT A4-3B5P_Belean		Prop Type Ref			
Property						
SAP Rating	77 C		DER	17.82	TER	
Environmental	84 B		% DER < TER			N/A
CO ₂ Emissions (t/year)	1.51		DFEE	48.59	TFEE	
Compliance Check	See BREL		% DFEE < TFEE			
% DPER < TPER			DPER	105.73	TPER	
Assessor Details	Mr. Mirza Baig				Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M					

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)
Ground floor	99.6100	3.1900	317.7559
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	99.6100		
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	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.0000	(17)
Infiltration rate		0.2000	(18)
Number of sides sheltered		0	(19)

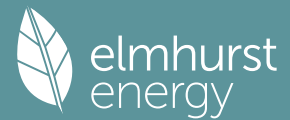
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2000	(21)

	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	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												46.2000 (23c)
Effective ac	0.5240	0.5190	0.5140	0.4890	0.4840	0.4590	0.4590	0.4540	0.4690	0.4840	0.4940	0.5040 (25)

3. Heat losses and heat loss parameter

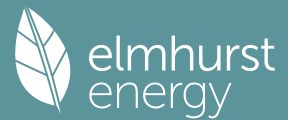
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Window North (Uw = 1.20)			2.0800	1.1450	2.3817		(27)
Window S (Uw = 1.20)			18.3600	1.1450	21.0229		(27)
External Wall	146.2600	20.4400	125.8200	0.1700	21.3894	190.0000	23905.8000 (29a)
External Roof 1	99.6100		99.6100	0.0600	5.9766	9.0000	896.4900 (30)
Total net area of external elements Aum(A, m ²)			245.8700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	50.7706	(33)
Party Wall 1			14.4800	0.0000	0.0000	180.0000	2606.4000 (32)
Party Floor 1			99.6100			40.0000	3984.4000 (32d)
Internal Wall 1			167.7300			75.0000	12579.7500 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		43972.8400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							441.4501 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				9.6800	0.0410	0.3969	

Full SAP Calculation Printout



E3 Sill								9.6800	0.0210	0.2033		
E4 Jamb								38.2600	0.0160	0.6122		
E7 Party floor between dwellings (in blocks of flats)								45.8500	0.0000	0.0000		
E16 Corner (normal)								23.1000	0.0540	1.2474		
E25 Staggered party wall between dwellings								6.6000	0.1200	0.7920		
E17 Corner (inverted - internal area greater than external area)								9.9000	-0.0900	-0.8910		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)								4.5400	0.0000	0.0000		
P4 Party wall - Roof (insulation at ceiling level)								4.5400	0.1200	0.5448		
E10 Eaves (insulation at ceiling level)								45.8500	0.0600	2.7510		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											5.6565	(36)
Point Thermal Bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	56.4271 (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	54.9464	54.4221	53.8978	51.2763	50.7520	48.1305	48.1305	47.6062	49.1791	50.7520	51.8006	52.8492 (38)
Average = Sum(39)m / 12 =	111.3735	110.8492	110.3249	107.7034	107.1791	104.5576	104.5576	104.0333	105.6062	107.1791	108.2277	109.2763 (39)
												107.5723
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1181	1.1128	1.1076	1.0813	1.0760	1.0497	1.0497	1.0444	1.0602	1.0760	1.0865	1.0970 (40)
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												2.7359 (42)
Hot water usage for mixer showers												
	70.0916	69.0383	67.5033	64.5665	62.3993	59.9823	58.6085	60.1318	61.8017	64.3967	67.3966	69.8231 (42a)
Hot water usage for baths												
	30.2649	29.8154	29.1825	28.0154	27.1415	26.1725	25.6491	26.2777	26.9620	27.9989	29.1900	30.1626 (42b)
Hot water usage for other uses												
	42.6482	41.0974	39.5465	37.9957	36.4448	34.8940	34.8940	36.4448	37.9957	39.5465	41.0974	42.6482 (42c)
Average daily hot water use (litres/day)												131.4535 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	143.0047	139.9511	136.2323	130.5776	125.9856	121.0488	119.1517	122.8543	126.7594	131.9421	137.6839	142.6339 (44)
Energy conte	226.4845	199.2884	209.3840	178.7542	169.6009	148.8437	144.1036	152.1193	156.3070	179.0442	196.1560	223.3301 (45)
Energy content (annual)										Total = Sum(45)m =		2183.4160
Distribution loss (46)m = 0.15 x (45)m												
	33.9727	29.8933	31.4076	26.8131	25.4401	22.3266	21.6155	22.8179	23.4460	26.8566	29.4234	33.4995 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3800 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7452 (55)
Total storage loss												
	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (56)
If cylinder contains dedicated solar storage												
	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (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												
	272.8481	241.1652	255.7476	223.6222	215.9645	193.7117	190.4672	198.4829	201.1750	225.4078	241.0240	269.6937 (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												
	272.8481	241.1652	255.7476	223.6222	215.9645	193.7117	190.4672	198.4829	201.1750	225.4078	241.0240	269.6937 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2729.3100 (64)
Electric shower(s)												2729 (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												
	112.3970	99.7648	106.7111	95.3302	93.4832	85.3849	85.0053	87.6706	87.8665	96.6231	101.1163	111.3482 (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	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943	136.7943 (66)
(calculated in Appendix L, equation L9 or L9a), also see Table 5												
	129.5585	143.4398	129.5585	133.8771	129.5585	133.8771	129.5585	129.5585	133.8771	129.5585	133.8771	129.5585 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	255.6957	258.3491	251.6628	237.4285	219.4602	202.5726	191.2906	188.6373	195.3236	209.5579	227.5261	244.4138 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794	36.6794 (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)												
	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354	-109.4354 (71)
Water heating gains (Table 5)												
	151.0712	148.4596	143.4289	132.4030	125.6494	118.5902	114.2545	117.8368	122.0368	129.8697	140.4393	149.6615 (72)
Total internal gains												
	603.3637	617.2867	591.6884	570.7469	541.7064	519.0781	499.1419	500.0708	515.2757	536.0244	568.8808	590.6720 (73)
6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	g											
	Specific data											
	or Table 6c											
	FF											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
North	2.0800											5.5792 (74)
North	4.0600											5.2356 (74)
East	10.1500											24.1760 (76)
West	4.1500											9.8848 (80)

Full SAP Calculation Printout



Solar gains	44.8756	87.2978	144.8497	216.4459	272.1195	282.1230	267.0947	224.4471	169.8458	103.6644	55.8112	37.0257 (83)
Total gains	648.2393	704.5845	736.5381	787.1928	813.8259	801.2011	766.2365	724.5179	685.1215	639.6888	624.6920	627.6977 (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	109.6732	110.1919	110.7156	113.4104	113.9651	116.8225	116.8225	117.4112	115.6625	113.9651	112.8610	111.7780
alpha	8.3115	8.3461	8.3810	8.5607	8.5977	8.7882	8.7882	8.8274	8.7108	8.5977	8.5241	8.4519
util living area	0.9999	0.9997	0.9992	0.9947	0.9625	0.8011	0.5977	0.6546	0.9224	0.9964	0.9997	0.9999 (86)
MIT	20.1847	20.2728	20.4182	20.6485	20.8557	20.9815	20.9986	20.9971	20.9345	20.6773	20.4059	20.1852 (87)
Th 2	20.4410	20.4436	20.4462	20.4594	20.4620	20.4752	20.4752	20.4778	20.4699	20.4620	20.4567	20.4515 (88)
util rest of house	0.9999	0.9997	0.9989	0.9926	0.9479	0.7480	0.5279	0.5834	0.8886	0.9947	0.9996	0.9999 (89)
MIT 2	19.6676	19.7578	19.9054	20.1462	20.3486	20.4650	20.4747	20.4767	20.4266	20.1776	19.9023	19.6771 (90)
Living area fraction												0.3098 (91)
MIT	19.8278	19.9174	20.0643	20.3018	20.5057	20.6250	20.6370	20.6380	20.5840	20.3324	20.0583	19.8345 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.6778	19.7674	19.9143	20.1518	20.3557	20.4750	20.4870	20.4880	20.4340	20.1824	19.9083	19.6845 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9998	0.9995	0.9985	0.9911	0.9444	0.7480	0.5295	0.5848	0.8860	0.9935	0.9994	0.9999 (94)
Useful gains	648.1139	704.2489	735.4691	780.2147	768.5443	599.2849	405.6879	423.6815	606.9863	635.5268	624.3074	627.6073 (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	1712.6789	1648.0363	1479.9272	1211.8577	927.7129	614.2759	406.4146	425.2831	668.9071	1027.0355	1386.2140	1692.0893 (97)
Space heating kWh	792.0363	634.2251	553.8768	310.7829	118.4214	0.0000	0.0000	0.0000	0.0000	291.2824	548.5727	791.9746 (98a)
Space heating requirement - total per year (kWh/year)												4041.1724
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	792.0363	634.2251	553.8768	310.7829	118.4214	0.0000	0.0000	0.0000	0.0000	291.2824	548.5727	791.9746 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4041.1724
Space heating per m2												(98c) / (4) = 40.5699 (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	792.0363	634.2251	553.8768	310.7829	118.4214	0.0000	0.0000	0.0000	0.0000	291.2824	548.5727	791.9746 (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)	884.9568	708.6314	618.8567	347.2435	132.3145	0.0000	0.0000	0.0000	0.0000	325.4552	612.9304	884.8878 (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	272.8481	241.1652	255.7476	223.6222	215.9645	193.7117	190.4672	198.4829	201.1750	225.4078	241.0240	269.6937 (64)
Efficiency of water heater	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	304.8582	269.4584	285.7515	249.8573	241.3011	216.4376	212.8125	221.7686	224.7765	251.8523	269.3006	301.3338 (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	168.1059	151.8376	168.1059	162.6831	168.1059	162.6831	168.1059	168.1059	162.6831	168.1059	162.6831	168.1059 (231)
Lighting	30.3469	24.3454	21.9204	16.0598	12.4050	10.1350	11.3163	14.7093	19.1060	25.0681	28.3144	31.1903 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-37.0976	-55.0094	-83.5154	-99.7614	-113.3176	-108.6717	-108.0010	-99.3701	-84.5928	-66.0326	-41.9657	-31.8078 (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												4515.2764 (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												3049.5084 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Table 4g: in-use factor = 2.5000, SFP = 5.0000)												
mechanical ventilation fans (SFP = 5.0000)												1938.3110 (230a)

Full SAP Calculation Printout



central heating pump	41.0000 (230c)
Total electricity for the above, kWh/year	1979.3110 (231)
Electricity for lighting (calculated in Appendix L)	244.9170 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-929.1430 (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	8859.8697 (238)

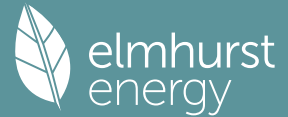
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4515.2764	0.2100	948.2080 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3049.5084	0.2100	640.3968 (264)
Space and water heating			1588.6048 (265)
Pumps, fans and electric keep-hot	1979.3110	0.1387	274.5548 (267)
Energy for lighting	244.9170	0.1443	35.3491 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-929.1430	0.1333	-123.8305
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-123.8305 (269)
Total CO2, kg/year			1774.6783 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			17.8200 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	4515.2764	1.1300	5102.2623 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3049.5084	1.1300	3445.9445 (278)
Space and water heating			8548.2068 (279)
Pumps, fans and electric keep-hot	1979.3110	1.5128	2994.3017 (281)
Energy for lighting	244.9170	1.5338	375.6618 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-929.1430	1.4925	-1386.7281
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1386.7281 (283)
Total Primary energy kWh/year			10531.4422 (286)
Dwelling Primary energy Rate (DPER)			105.7300 (287)

Full SAP Calculation Printout



Property Reference	FLAT B2- 2B4P				Issued on Date	12/09/2024	
Assessment Reference	FLAT B2-2B4P			Prop Type Ref	BLOCK B		
Property	Hornsey Police Station, 98, Tottenham Ln., London , N8 7EJ						
SAP Rating	85 B		DER	2.26		TER	11.52
Environmental	98 A		% DER < TER				80.38
CO ₂ Emissions (t/year)	0.14		DFEE	25.58		TFEE	28.31
Compliance Check	See BREL		% DFEE < TFEE				9.66
% DPER < TPER	61.80		DPER	23.29		TPER	60.96
Assessor Details	Mr. Mirza Baig					Assessor ID	CK52-0001
Client	Archanaeum Ltd, ARCHANAUM						

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)
Ground floor	73.3500 (1b)	2.5000 (2b)	183.3750 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.3500		183.3750 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	183.3750 (5)

2. Ventilation rate

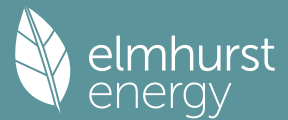
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2000 (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	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												73.6000 (23c)
Effective ac	0.3870	0.3820	0.3770	0.3520	0.3470	0.3220	0.3220	0.3170	0.3320	0.3470	0.3570	0.3670 (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
Window North (Uw = 1.20)			5.9000	1.1450	6.7557		(27)
Door			3.4100	0.9800	3.3418		(26)
Window S (Uw = 1.20)			5.6400	1.1450	6.4580		(27)
External Wall	48.5800	14.9500	33.6300	0.1800	6.0534	190.0000	6389.7000 (29a)
Total net area of external elements Aum(A, m ²)			48.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.6089		(33)
Party Wall 1			56.3700	0.0000	0.0000	180.0000	10146.6000 (32)
Party Floor 1			73.3500			40.0000	2934.0000 (32d)
Party Ceiling 1			73.3500			30.0000	2200.5000 (32b)
Internal Wall 1			73.1500			75.0000	5486.2500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	27157.0500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							370.2393 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	5.5200	0.0410	0.2263
E3 Sill	5.5200	0.0210	0.1159
E4 Jamb	25.3200	0.0160	0.4051
E7 Party floor between dwellings (in blocks of flats)	19.4300	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	19.4300	0.0000	0.0000
E16 Corner (normal)	12.5000	0.0540	0.6750
E25 Staggered party wall between dwellings	2.5000	0.1200	0.3000
E18 Party wall between dwellings	17.5000	0.0600	1.0500
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.5500	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.5500	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			1.8724 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	24.4813 (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	23.4188	23.1163	22.8137	21.3008	20.9983	19.4854	19.4854	19.1829	20.0906	20.9983	21.6034	22.2085	(38)
Heat transfer coeff	47.9001	47.5976	47.2950	45.7821	45.4796	43.9667	43.9667	43.6642	44.5719	45.4796	46.0847	46.6898	(39)
Average = Sum(39)m / 12 =												45.7065	
HLP	0.6530	0.6489	0.6448	0.6242	0.6200	0.5994	0.5994	0.5953	0.6077	0.6200	0.6283	0.6365	(40)
HLP (average)												0.6231	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3246 (42)
Hot water usage for mixer showers	63.1961	62.2464	60.8625	58.2146	56.2605	54.0814	52.8427	54.2162	55.7217	58.0615	60.7662	62.9540	(42a)
Hot water usage for baths	27.2996	26.8942	26.3232	25.2705	24.4823	23.6082	23.1361	23.7030	24.3203	25.2556	26.3300	27.2073	(42b)
Hot water usage for other uses	38.4366	37.0389	35.6412	34.2435	32.8458	31.4481	31.4481	32.8458	34.2435	35.6412	37.0389	38.4366	(42c)
Average daily hot water use (litres/day)												118.5181	(43)
Daily hot water use	128.9323	126.1795	122.8269	117.7286	113.5886	109.1377	107.4269	110.7650	114.2856	118.9583	124.1351	128.5979	(44)
Energy conte	204.1973	179.6779	188.7804	161.1646	152.9121	134.1975	129.9236	137.1502	140.9255	161.4253	176.8532	201.3532	(45)
Energy content (annual)										Total = Sum(45)m =		1968.5608	
Distribution loss (46)m = 0.15 x (45)m	30.6296	26.9517	28.3171	24.1747	22.9368	20.1296	19.4885	20.5725	21.1388	24.2138	26.5280	30.2030	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1500	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.6210	(55)
Total storage loss	19.2510	17.3880	19.2510	18.6300	19.2510	18.6300	19.2510	19.2510	18.6300	19.2510	18.6300	19.2510	(56)
If cylinder contains dedicated solar storage	19.2510	17.3880	19.2510	18.6300	19.2510	18.6300	19.2510	19.2510	18.6300	19.2510	18.6300	19.2510	(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	246.7107	218.0771	231.2938	202.3066	195.4255	175.3395	172.4370	179.6636	182.0675	203.9387	217.9952	243.8666	(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	246.7107	218.0771	231.2938	202.3066	195.4255	175.3395	172.4370	179.6636	182.0675	203.9387	217.9952	243.8666	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2469.1218	(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	101.9063	90.4623	96.7802	86.5008	84.8540	77.5343	77.2103	79.6132	79.7713	87.6846	91.7173	100.9607	(65)

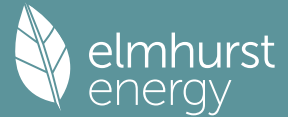
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.2292	119.8252	108.2292	111.8369	108.2292	111.8369	108.2292	108.2292	111.8369	108.2292	111.8369	108.2292	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	204.9862	207.1133	201.7530	190.3417	175.9369	162.3984	153.3539	151.2267	156.5870	167.9984	182.4032	195.9416	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	(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)	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	(71)
Water heating gains (Table 5)	136.9708	134.6164	130.0809	120.1400	114.0511	107.6865	103.7773	107.0069	110.7935	117.8557	127.3851	135.6998	(72)
Total internal gains	508.0557	519.4244	497.9326	480.1880	456.0866	439.7912	423.2299	424.3324	437.0869	451.9527	479.4947	497.7402	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	5.9000	10.6334	0.5200	0.7000	0.7700	15.8255 (74)
North	1.8800	10.6334	0.2500	0.7000	0.7700	2.4244 (74)
East	3.7600	19.6403	0.2500	0.7000	0.7700	8.9558 (76)

Full SAP Calculation Printout



Solar gains	27.2058	52.3961	88.1159	137.2719	179.8030	190.0683	178.4251	144.8552	104.8105	62.3043	33.6805	22.5789 (83)
Total gains	535.2615	571.8205	586.0485	617.4600	635.8896	629.8595	601.6549	569.1876	541.8974	514.2571	513.1752	520.3190 (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	157.4866	158.4877	159.5016	164.7722	165.8684	171.5758	171.5758	172.7647	169.2463	165.8684	163.6904	161.5689
alpha	11.4991	11.5658	11.6334	11.9848	12.0579	12.4384	12.4384	12.5176	12.2831	12.0579	11.9127	11.7713
util living area	0.9967	0.9912	0.9729	0.8639	0.6635	0.4467	0.3215	0.3529	0.5673	0.8792	0.9850	0.9973 (86)
Living	20.7464	20.8033	20.8748	20.9564	20.9732	20.9749	20.9749	20.9751	20.9745	20.9563	20.8586	20.7473
Non living	20.1534	20.2126	20.2841	20.3710	20.3857	20.4054	20.4054	20.4093	20.3977	20.3753	20.2836	20.1680
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	20.8703	20.8033	20.8748	20.9564	20.9732	20.9749	20.9749	20.9751	20.9745	20.9563	20.8586	20.7827 (87)
Th 2	20.3825	20.3862	20.3899	20.4083	20.4120	20.4305	20.4305	20.4342	20.4231	20.4120	20.4046	20.3972 (88)
util rest of house	0.9953	0.9876	0.9626	0.8319	0.6223	0.4070	0.2799	0.3095	0.5200	0.8431	0.9782	0.9961 (89)
MIT 2	20.2653	20.2126	20.2841	20.3710	20.3857	20.4054	20.4054	20.4093	20.3977	20.3753	20.2836	20.2001 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	20.5005	20.4422	20.5137	20.5985	20.6141	20.6268	20.6268	20.6292	20.6219	20.6011	20.5071	20.4265 (92)
Temperature adjustment	0.0000											
adjusted MIT	20.5005	20.4422	20.5137	20.5985	20.6141	20.6268	20.6268	20.6292	20.6219	20.6011	20.5071	20.4265 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9956	0.9880	0.9649	0.8426	0.6365	0.4207	0.2943	0.3244	0.5363	0.8554	0.9796	0.9962 (94)
Useful gains	532.9190	564.9455	565.4893	520.2565	404.7599	264.9741	177.0440	184.6645	290.6272	439.8751	502.6987	518.3471 (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	776.0040	739.7715	662.7765	535.5837	405.4073	264.9774	177.0441	184.6646	290.6913	454.8476	617.8623	757.6143 (97)
Space heating kWh	180.8552	117.4830	72.3817	11.0355	0.4817	0.0000	0.0000	0.0000	0.0000	11.1395	82.9178	178.0148 (98a)
Space heating requirement - total per year (kWh/year)	654.3092											
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	180.8552	117.4830	72.3817	11.0355	0.4817	0.0000	0.0000	0.0000	0.0000	11.1395	82.9178	178.0148 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	654.3092											
Space heating per m2	(98c) / (4) = 8.9204 (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 %)												311.3659 (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	180.8552	117.4830	72.3817	11.0355	0.4817	0.0000	0.0000	0.0000	0.0000	11.1395	82.9178	178.0148 (98)
Space heating efficiency (main heating system 1)	311.3659	311.3659	311.3659	311.3659	311.3659	0.0000	0.0000	0.0000	0.0000	311.3659	311.3659	311.3659 (210)
Space heating fuel (main heating system)	58.0845	37.7315	23.2465	3.5442	0.1547	0.0000	0.0000	0.0000	0.0000	3.5776	26.6303	57.1722 (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	246.7107	218.0771	231.2938	202.3066	195.4255	175.3395	172.4370	179.6636	182.0675	203.9387	217.9952	243.8666 (64)
Water heating requirement	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436 (216)
Efficiency of water heater (217)m	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436	191.9436 (217)
Fuel for water heating, kWh/month	128.5329	113.6152	120.5009	105.3990	101.8140	91.3495	89.8373	93.6023	94.8547	106.2493	113.5725	127.0512 (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	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	13.8325	12.4939	13.8325	13.863	13.8325	13.863	13.8325	13.8325	13.863	13.8325	13.863	13.8325 (231)
Lighting	25.8580	20.7442	18.6779	13.6842	10.5701	8.6358	9.6424	12.5335	16.2798	21.3600	24.1261	26.5766 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-24.9057	-41.1639	-69.4655	-87.4729	-101.1809	-96.8273	-95.0562	-86.2120	-70.0699	-50.2741	-28.8612	-20.6044 (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)
(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												
Space heating fuel - main system 1	210.1416 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	191.9436											

Full SAP Calculation Printout



Water heating fuel used	1286.3787 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.7280)	
mechanical ventilation fans (SFP = 0.7280)	162.8663 (230a)
Total electricity for the above, kWh/year	162.8663 (231)
Electricity for lighting (calculated in Appendix L)	208.6886 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-772.0942 (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	1095.9810 (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	210.1416	0.1590	33.4156 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1286.3787	0.1410	181.3757 (264)
Space and water heating			214.7913 (265)
Pumps, fans and electric keep-hot	162.8663	0.1387	22.5916 (267)
Energy for lighting	208.6886	0.1443	30.1202 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-772.0942	0.1322	-102.0672
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-102.0672 (269)
Total CO2, kg/year			165.4359 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.2600 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	210.1416	1.5886	333.8359 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1286.3787	1.5214	1957.0466 (278)
Space and water heating			2290.8824 (279)
Pumps, fans and electric keep-hot	162.8663	1.5128	246.3842 (281)
Energy for lighting	208.6886	1.5338	320.0936 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-772.0942	1.4884	-1149.2184
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1149.2184 (283)
Total Primary energy kWh/year			1708.1418 (286)
Dwelling Primary energy Rate (DPER)			23.2900 (287)

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

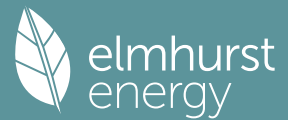
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	73.3500 (1b)	2.5000 (2b)	183.3750 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.3500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	183.3750 (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	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	30.0000 / (5) = 0.1636 (8)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Yes
Pressure test	Blower Door
Pressure Test Method	5.0000 (17)
Measured/design AP50	0.4136 (18)
Infiltration rate	0 (19)
Number of sides sheltered	
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.4136 (21)

Full SAP Calculation Printout



Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
	0.5273	0.5170	0.5067	0.4550	0.4446	0.3929	0.3929	0.3826	0.4136	0.4446	0.4653	0.4860	(22b)
Effective ac	0.6390	0.6336	0.6284	0.6035	0.5988	0.5772	0.5772	0.5732	0.5855	0.5988	0.6083	0.6181	(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
TER Opaque door			3.4100	1.0000	3.4100		(26)
TER Opening Type (Uw = 1.20)			11.5400	1.1450	13.2137		(27)
External Wall	48.5800	14.9500	33.6300	0.1800	6.0534		(29a)
Total net area of external elements Aum(A, m2)			48.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.6771		(33)
Party Wall 1			56.3700	0.0000	0.0000		(32)

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

380.2393 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.5200	0.0500	0.2760
E3 Sill	5.5200	0.0500	0.2760
E4 Jamb	25.3200	0.0500	1.2660
E7 Party floor between dwellings (in blocks of flats)	19.4300	0.0700	1.3601
E7 Party floor between dwellings (in blocks of flats)	19.4300	0.0700	1.3601
E16 Corner (normal)	12.5000	0.0900	1.1250
E25 Staggered party wall between dwellings	2.5000	0.0600	0.1500
E18 Party wall between dwellings	17.5000	0.0600	1.0500
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.5500	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.5500	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000

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

5.9632 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 28.6403 (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	
	38.6709	38.3442	38.0239	36.5197	36.2382	34.9281	34.9281	34.6855	35.4327	36.2382	36.8076	37.4028	(38)
Heat transfer coeff	67.3112	66.9845	66.6643	65.1600	64.8786	63.5684	63.5684	63.3258	64.0731	64.8786	65.4479	66.0432	(39)
Average = Sum(39)m / 12 =												65.1587	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9177	0.9132	0.9089	0.8883	0.8845	0.8666	0.8666	0.8633	0.8735	0.8845	0.8923	0.9004	(40)
HLP (average)												0.8883	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3246 (42)
Hot water usage for mixer showers													
	63.1961	62.2464	60.8625	58.2146	56.2605	54.0814	52.8427	54.2162	55.7217	58.0615	60.7662	62.9540	(42a)
Hot water usage for baths													
	27.2996	26.8942	26.3232	25.2705	24.4823	23.6082	23.1361	23.7030	24.3203	25.2556	26.3300	27.2073	(42b)
Hot water usage for other uses													
	38.4366	37.0389	35.6412	34.2435	32.8458	31.4481	31.4481	32.8458	34.2435	35.6412	37.0389	38.4366	(42c)
Average daily hot water use (litres/day)												118.5181	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	128.9323	126.1795	122.8269	117.7286	113.5886	109.1377	107.4269	110.7650	114.2856	118.9583	124.1351	128.5979	(44)
Energy conte	204.1973	179.6779	188.7804	161.1646	152.9121	134.1975	129.9236	137.1502	140.9255	161.4253	176.8532	201.3532	(45)
Energy content (annual)										Total = Sum(45)m =		1968.5608	
Distribution loss (46)m = 0.15 x (45)m													
	30.6296	26.9517	28.3171	24.1747	22.9368	20.1296	19.4885	20.5725	21.1388	24.2138	26.5280	30.2030	(46)

Water storage loss:

Store volume

150.0000 (47)

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

1.3938 (48)

Temperature factor from Table 2b

0.5400 (49)

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

0.7527 (55)

Total storage loss

23.3325 21.0745 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 (56)

If cylinder contains dedicated solar storage

23.3325 21.0745 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 22.5798 23.3325 22.5798 23.3325 23.3325 (57)

Primary loss 23.2624 21.0112 23.2624 22.5120 23.2624 22.5120 23.2624 23.2624 22.5120 23.2624 22.5120 23.2624 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 0.0000 (61)

Total heat required for water heating calculated for each month

250.7922 221.7636 235.3753 206.2564 199.5070 179.2894 176.5185 183.7451 186.0174 208.0202 221.9451 247.9481 (62)

WWHRS -28.8906 -25.5511 -26.7556 -22.1547 -20.6474 -17.6681 -16.5611 -17.6110 -18.2801 -21.5503 -24.4138 -28.3556 (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

221.9015 196.2125 208.6196 184.1017 178.8596 161.6212 159.9574 166.1341 167.7372 186.4699 197.5313 219.5925 (64)

12Total per year (kWh/year)

Total per year (kWh/year) = Sum(64)m = 2248.7385 (64)

Electric shower(s)

2249 (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

105.1715 93.4115 100.0454 89.6607 88.1192 80.6941 80.4755 82.8784 82.9312 90.9498 94.8772 104.2259 (65)

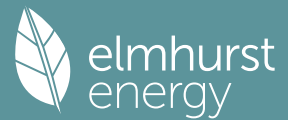
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

Full SAP Calculation Printout



108.2292	119.8252	108.2292	111.8369	108.2292	111.8369	108.2292	108.2292	111.8369	108.2292	111.8369	108.2292	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
204.9862	207.1133	201.7530	190.3417	175.9369	162.3984	153.3539	151.2267	156.5870	167.9984	182.4032	195.9416	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	(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)												
-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	(71)
Water heating gains (Table 5)												
141.3596	139.0052	134.4696	124.5288	118.4398	112.0752	108.1660	111.3957	115.1822	122.2444	131.7739	140.0885	(72)
Total internal gains	515.4444	526.8131	505.3214	487.5768	463.4753	444.1799	427.6186	428.7211	441.4756	459.3415	486.8834	(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	
North				7.7800	10.6334	0.6300	0.7000	0.7700			25.2827 (74)	
East				3.7600	19.6403	0.6300	0.7000	0.7700			22.5687 (76)	
Solar gains	47.8514	92.4657	154.8090	237.9157	307.6046	323.2113	304.2085	249.6607	183.2745	109.9013	59.3300	39.6363 (83)
Total gains	563.2958	619.2789	660.1304	725.4924	771.0800	767.3912	731.8271	678.3818	624.7501	569.2427	546.2134	544.7652 (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	115.0978	115.6592	116.2148	118.8977	119.4134	121.8746	121.8746	122.3415	120.9147	119.4134	118.3746	117.3078	
alpha	8.6732	8.7106	8.7477	8.9265	8.9609	9.1250	9.1250	9.1561	9.0610	8.9609	8.8916	8.8205	
util living area	0.9988	0.9966	0.9884	0.9324	0.7618	0.5294	0.3822	0.4293	0.6983	0.9582	0.9957	0.9990 (86)	
MIT	20.4008	20.5075	20.6644	20.8800	20.9829	20.9994	21.0000	20.9999	20.9938	20.8615	20.6083	20.3954 (87)	
Th 2	20.1525	20.1563	20.1600	20.1774	20.1807	20.1959	20.1959	20.1988	20.1901	20.1807	20.1741	20.1672 (88)	
util rest of house	0.9981	0.9949	0.9828	0.9049	0.7033	0.4633	0.3123	0.3546	0.6213	0.9344	0.9932	0.9986 (89)	
MIT 2	19.4613	19.6003	19.8010	20.0697	20.1698	20.1957	20.1959	20.1988	20.1872	20.0573	19.7438	19.4665 (90)	
Living area fraction	FLA = Living area / (4) =												0.3887 (91)
MIT	19.8265	19.9529	20.1366	20.3847	20.4858	20.5081	20.5085	20.5102	20.5007	20.3699	20.0798	19.8275 (92)	
Temperature adjustment													0.0000
adjusted MIT	19.8265	19.9529	20.1366	20.3847	20.4858	20.5081	20.5085	20.5102	20.5007	20.3699	20.0798	19.8275 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9978	0.9944	0.9826	0.9126	0.7257	0.4890	0.3395	0.3836	0.6514	0.9408	0.9929	0.9983	(94)
Useful gains	562.0727	615.8274	648.6194	662.1011	559.5817	375.2847	248.4457	260.2543	406.9585	535.5574	542.3215	543.8461	(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	1045.1049	1008.3111	909.0712	748.3431	570.0117	375.5674	248.4543	260.2792	410.1125	633.8565	849.5017	1032.0913	(97)
Space heating kWh	359.3759	263.7491	193.7761	62.0942	7.7599	0.0000	0.0000	0.0000	0.0000	73.1345	221.1697	363.2544	(98a)
Space heating requirement - total per year (kWh/year)												1544.3139	
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	359.3759	263.7491	193.7761	62.0942	7.7599	0.0000	0.0000	0.0000	0.0000	73.1345	221.1697	363.2544	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1544.3139	
Space heating per m2	(98c) / (4) =											21.0540	(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	359.3759	263.7491	193.7761	62.0942	7.7599	0.0000	0.0000	0.0000	0.0000	73.1345	221.1697	363.2544	(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)	389.3564	285.7520	209.9416	67.2743	8.4072	0.0000	0.0000	0.0000	0.0000	79.2357	239.6205	393.5584	(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	221.9015	196.2125	208.6196	184.1017	178.8596	161.6212	159.9574	166.1341	167.7372	186.4699	197.5313	219.5925	(64)
Efficiency of water heater (217)m	85.1346	84.7238	83.8946	81.8934	80.1377	79.8000	79.8000	79.8000	79.8000	82.1454	84.3139	79.8000	(216)
Fuel for water heating, kWh/month	260.6479	231.5906	248.6688	224.8066	223.1902	202.5329	200.4479	208.1881	210.1970	226.9997	234.2808	257.7965	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	22.4879	18.0406	16.2436	11.9007	9.1925	7.5103	8.3857	10.9000	14.1581	18.5761	20.9817	23.1129	(232)

Full SAP Calculation Printout



Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-19.6330	-29.0747	-43.8727	-51.8635	-58.1494	-55.0904	-54.4210	-50.2749	-43.3460	-34.3570	-22.0756	-16.8151	(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	-7.2167	-15.5046	-31.4282	-48.1131	-64.5165	-65.1547	-64.3856	-54.0981	-39.1101	-22.4650	-9.7282	-5.6828	(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												1673.1462	(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												2729.3470	(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)												181.4902	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-906.3769	(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												3763.6065	(238)

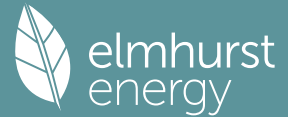
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1673.1462	0.2100	351.3607	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2729.3470	0.2100	573.1629	(264)
Space and water heating			924.5236	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	181.4902	0.1443	26.1946	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-478.9732	0.1336	-63.9743	
PV Unit electricity exported	-427.4037	0.1253	-53.5711	
Total			-117.5453	(269)
Total CO2, kg/year			845.1021	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.5200	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1673.1462	1.1300	1890.6552	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2729.3470	1.1300	3084.1621	(278)
Space and water heating			4974.8173	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	181.4902	1.5338	278.3757	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-478.9732	1.4936	-715.3834	
PV Unit electricity exported	-427.4037	0.4601	-196.6313	
Total			-912.0148	(283)
Total Primary energy kWh/year			4471.2790	(286)
Target Primary Energy Rate (TPER)			60.9600	(287)

Full SAP Calculation Printout



Property Reference	FLAT B2- 2B4P			Issued on Date	12/09/2024
Assessment Reference	FLAT B2-2B4P_Baseline	Prop Type Ref	BLOCK B		
Property	Hornsey Police Station, 98, Tottenham Ln., London , N8 7EJ				
SAP Rating	86 B	DER	16.68	TER	11.52
Environmental	87 B	% DER < TER			-44.79
CO ₂ Emissions (t/year)	1.01	DFEE	45.43	TFEE	28.31
Compliance Check	See BREL	% DFEE < TFEE			-60.45
% DPER < TPER	-45.17	DPER	88.50	TPER	60.96
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

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)
Ground floor	73.3500 (1b)	2.5000 (2b)	183.3750 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.3500		183.3750 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	183.3750 (5)

2. Ventilation rate

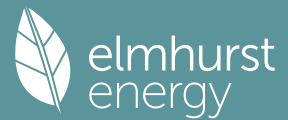
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1091 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	8.0000 (17)
Infiltration rate	0.5091 (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) = 0.5091 (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	0.6491	0.6363	0.6236	0.5600	0.5472	0.4836	0.4836	0.4709	0.5091	0.5472	0.5727	0.5982 (22b)
Effective ac	0.7106	0.7025	0.6944	0.6568	0.6497	0.6169	0.6169	0.6109	0.6296	0.6497	0.6640	0.6789 (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
Window North (Uw = 1.60)			5.9000	1.5038	8.8722		(27)
Door			3.4100	1.6000	5.4560		(26)
Window S (Uw = 1.60)			5.6400	1.5038	8.4812		(27)
External Wall	48.5800	14.9500	33.6300	0.2600	8.7438	190.0000	6389.7000 (29a)
Total net area of external elements Aum(A, m ²)			48.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.5532		(33)
Party Wall 1			56.3700	0.0000	0.0000	180.0000	10146.6000 (32)
Party Floor 1			73.3500			40.0000	2934.0000 (32d)
Party Ceiling 1			73.3500			30.0000	2200.5000 (32b)
Internal Wall 1			73.1500			75.0000	5486.2500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	27157.0500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							370.2393 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				5.5200	0.5000	2.7600	
E3 Sill				5.5200	0.0400	0.2208	
E4 Jamb				25.3200	0.0500	1.2660	
E7 Party floor between dwellings (in blocks of flats)				19.4300	0.0700	1.3601	
E7 Party floor between dwellings (in blocks of flats)				19.4300	0.0700	1.3601	

Full SAP Calculation Printout



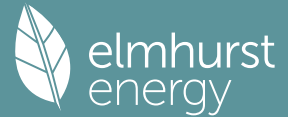
E16 Corner (normal)						12.5000	0.0900	1.1250				
E25 Staggered party wall between dwellings						2.5000	0.1200	0.3000				
E18 Party wall between dwellings						17.5000	0.0600	1.0500				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						22.5500	0.0000	0.0000				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						22.5500	0.0000	0.0000				
E17 Corner (inverted - internal area greater than external area)						10.0000	-0.0900	-0.9000				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												8.5420 (36)
Point Thermal bridges												0.0000
Total fabric heat loss									(33) + (36) + (36a) =			40.0952 (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	43.0034	42.5085	42.0233	39.7445	39.3182	37.3334	37.3334	36.9658	38.0979	39.3182	40.1807	41.0824 (38)
Average = Sum(39)m / 12 =	83.0986	82.6036	82.1185	79.8397	79.4133	77.4286	77.4286	77.0610	78.1931	79.4133	80.2758	81.1776 (39)
												79.8376
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1329	1.1262	1.1195	1.0885	1.0827	1.0556	1.0556	1.0506	1.0660	1.0827	1.0944	1.1067 (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												2.3246 (42)
Hot water usage for mixer showers												
	63.1961	62.2464	60.8625	58.2146	56.2605	54.0814	52.8427	54.2162	55.7217	58.0615	60.7662	62.9540 (42a)
Hot water usage for baths												
	27.2996	26.8942	26.3232	25.2705	24.4823	23.6082	23.1361	23.7030	24.3203	25.2556	26.3300	27.2073 (42b)
Hot water usage for other uses												
	38.4366	37.0389	35.6412	34.2435	32.8458	31.4481	31.4481	32.8458	34.2435	35.6412	37.0389	38.4366 (42c)
Average daily hot water use (litres/day)												118.5181 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	128.9323	126.1795	122.8269	117.7286	113.5886	109.1377	107.4269	110.7650	114.2856	118.9583	124.1351	128.5979 (44)
Energy conte	204.1973	179.6779	188.7804	161.1646	152.9121	134.1975	129.9236	137.1502	140.9255	161.4253	176.8532	201.3532 (45)
Energy content (annual)												
Distribution loss	(46)m = 0.15 x (45)m											
	30.6296	26.9517	28.3171	24.1747	22.9368	20.1296	19.4885	20.5725	21.1388	24.2138	26.5280	30.2030 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3800 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7452 (55)
Total storage loss												
	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (56)
If cylinder contains dedicated solar storage												
	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (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												
	250.5609	221.5547	235.1440	206.0326	199.2757	179.0655	176.2872	183.5138	185.7935	207.7889	221.7212	247.7168 (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	250.5609	221.5547	235.1440	206.0326	199.2757	179.0655	176.2872	183.5138	185.7935	207.7889	221.7212	247.7168 (64)
12Total per year (kWh/year)												2514.4548 (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												
	104.9865	93.2443	99.8604	89.4816	87.9341	80.5151	80.2905	82.6933	82.7521	90.7648	94.6981	104.0408 (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	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	108.2292	119.8252	108.2292	111.8369	108.2292	111.8369	108.2292	108.2292	111.8369	108.2292	111.8369	108.2292 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	204.9862	207.1133	201.7530	190.3417	175.9369	162.3984	153.3539	151.2267	156.5870	167.9984	182.4032	195.9416 (68)
Pumps, fans	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232 (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)	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853 (71)
Total internal gains	141.1108	138.7564	134.2209	124.2800	118.1911	111.8265	107.9173	111.1469	114.9335	121.9957	131.5251	139.8398 (72)
	515.1957	526.5644	505.0726	487.3280	463.2266	443.9312	427.3699	428.4724	441.2269	459.0927	486.6347	504.8802 (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											
North	5.9000											15.8255 (74)
North	1.8800											2.4244 (74)
East	3.7600											8.9558 (76)
Solar gains	27.2058	52.3961	88.1159	137.2719	179.8030	190.0683	178.4251	144.8552	104.8105	62.3043	33.6805	22.5789 (83)
Total gains	542.4015	578.9605	593.1885	624.6000	643.0296	633.9995	605.7949	573.3276	546.0374	521.3971	520.3152	527.4590 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	90.7792	91.3231	91.8627	94.4846	94.9919	97.4269	97.4269	97.8916	96.4743	94.9919	93.9713	92.9275	
alpha	7.0519	7.0882	7.1242	7.2990	7.3328	7.4951	7.4951	7.5261	7.4316	7.3328	7.2648	7.1952	
util living area	0.9992	0.9984	0.9965	0.9849	0.9316	0.7509	0.5591	0.6118	0.8760	0.9871	0.9979	0.9993 (86)	
MIT	20.1024	20.2014	20.3625	20.6254	20.8510	20.9791	20.9978	20.9960	20.9345	20.6675	20.3636	20.1090 (87)	
Th 2	20.4335	20.4369	20.4402	20.4558	20.4587	20.4722	20.4722	20.4747	20.4670	20.4587	20.4528	20.4466 (88)	
util rest of house	0.9990	0.9981	0.9955	0.9805	0.9116	0.6993	0.4936	0.5450	0.8369	0.9825	0.9973	0.9992 (89)	
MIT 2	19.5858	19.6875	19.8510	20.1246	20.3418	20.4601	20.4714	20.4731	20.4232	20.1695	19.8629	19.6034 (90)	
Living area fraction	fLA = Living area / (4) =												0.3887 (91)
MIT	19.7866	19.8872	20.0498	20.3193	20.5397	20.6618	20.6760	20.6763	20.6220	20.3631	20.0575	19.7999 (92)	
Temperature adjustment													-0.1500
adjusted MIT	19.6366	19.7372	19.8998	20.1693	20.3897	20.5118	20.5260	20.5263	20.4720	20.2131	19.9075	19.6499 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9986	0.9974	0.9943	0.9776	0.9087	0.7034	0.5004	0.5517	0.8373	0.9798	0.9965	0.9989 (94)
Useful gains	541.6469	577.4562	589.8161	610.6177	584.3017	445.9252	303.1196	316.2916	457.2109	510.8646	518.4841	526.8580 (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	1274.4502	1225.6080	1100.3746	899.7365	690.0784	457.7434	303.9844	317.9792	498.2426	763.4056	1028.1353	1254.1860 (97)
Space heating kWh	545.2056	435.5580	379.8555	208.1655	78.6978	0.0000	0.0000	0.0000	0.0000	187.8905	366.9488	541.1321 (98a)
Space heating requirement - total per year (kWh/year)												2743.4539
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	545.2056	435.5580	379.8555	208.1655	78.6978	0.0000	0.0000	0.0000	0.0000	187.8905	366.9488	541.1321 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2743.4539
Space heating per m2												(98c) / (4) = 37.4022 (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	545.2056	435.5580	379.8555	208.1655	78.6978	0.0000	0.0000	0.0000	0.0000	187.8905	366.9488	541.1321 (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)	609.1683	486.6570	424.4195	232.5872	87.9305	0.0000	0.0000	0.0000	0.0000	209.9335	409.9987	604.6168 (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	250.5609	221.5547	235.1440	206.0326	199.2757	179.0655	176.2872	183.5138	185.7935	207.7889	221.7212	247.7168 (64)
Efficiency of water heater	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	279.9563	247.5471	262.7307	230.2040	222.6544	200.0732	196.9689	205.0434	207.5905	232.1663	247.7332	276.7786 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	44.0220	35.3161	31.7982	23.2967	17.9951	14.7021	16.4157	21.3377	27.7156	36.3644	41.0735	45.2455 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-20.5710	-30.5630	-46.2692	-54.7715	-61.3281	-58.0384	-57.3762	-53.1339	-45.8476	-36.2466	-23.1823	-17.6063 (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												3065.3116 (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												2809.4467 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												41.0000 (230c)
central heating pump												41.0000 (231)
Total electricity for the above, kWh/year												355.2826 (232)
Electricity for lighting (calculated in Appendix L)												
Energy saving/generation technologies (Appendices M ,N and Q)												-504.9341 (233)
PV generation												

Full SAP Calculation Printout



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	5766.1067 (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	3065.3116	0.2100	643.7154 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2809.4467	0.2100	589.9838 (264)
Space and water heating			1233.6992 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	355.2826	0.1443	51.2783 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-504.9341	0.1335	-67.4276
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-67.4276 (269)
Total CO2, kg/year			1223.2370 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			16.6800 (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	3065.3116	1.1300	3463.8021 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2809.4467	1.1300	3174.6747 (278)
Space and water heating			6638.4768 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	355.2826	1.5338	544.9443 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-504.9341	1.4935	-754.1056
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-754.1056 (283)
Total Primary energy kWh/year			6491.3403 (286)
Dwelling Primary energy Rate (DPER)			88.5000 (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)
Ground floor	73.3500 (1b)	x 2.5000 (2b)	= 183.3750 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.3500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 183.3750 (5)

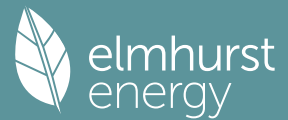
2. Ventilation rate

	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	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1636 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4136 (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) =	0.4136 (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	1.1750	1.1750 (22a)
Adj infilt rate	0.5273	0.5170	0.5067	0.4550	0.4446	0.3929	0.3929	0.3826	0.4136	0.4446	0.4653	0.4860 (22b)
Effective ac	0.6390	0.6336	0.6284	0.6035	0.5988	0.5772	0.5772	0.5732	0.5855	0.5988	0.6083	0.6181 (25)

Full SAP Calculation Printout



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	
TER Opaque door			3.4100	1.0000	3.4100			(26)
TER Opening Type (Uw = 1.20)			11.5400	1.1450	13.2137			(27)
External Wall	48.5800	14.9500	33.6300	0.1800	6.0534			(29a)
Total net area of external elements Aum(A, m2)			48.5800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.6771			(33)
Party Wall 1			56.3700	0.0000	0.0000			(32)

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

380.2393 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.5200	0.0500	0.2760
E3 Sill	5.5200	0.0500	0.2760
E4 Jamb	25.3200	0.0500	1.2660
E7 Party floor between dwellings (in blocks of flats)	19.4300	0.0700	1.3601
E7 Party floor between dwellings (in blocks of flats)	19.4300	0.0700	1.3601
E16 Corner (normal)	12.5000	0.0900	1.1250
E25 Staggered party wall between dwellings	2.5000	0.0600	0.1500
E18 Party wall between dwellings	17.5000	0.0600	1.0500
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.5500	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.5500	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000

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

5.9632 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 28.6403 (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	38.6709	38.3442	38.0239	36.5197	36.2382	34.9281	34.9281	34.6855	35.4327	36.2382	36.8076	37.4028	(38)
Average = Sum(39)m / 12 =	67.3112	66.9845	66.6643	65.1600	64.8786	63.5684	63.5684	63.3258	64.0731	64.8786	65.4479	66.0432	(39)

Heat transfer coeff

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9177	0.9132	0.9089	0.8883	0.8845	0.8666	0.8666	0.8633	0.8735	0.8845	0.8923	0.9004	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

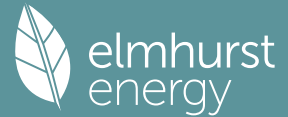
Assumed occupancy												2.3246 (42)
Hot water usage for mixer showers												
63.1961	62.2464	60.8625	58.2146	56.2605	54.0814	52.8427	54.2162	55.7217	58.0615	60.7662	62.9540	(42a)
Hot water usage for baths												
27.2996	26.8942	26.3232	25.2705	24.4823	23.6082	23.1361	23.7030	24.3203	25.2556	26.3300	27.2073	(42b)
Hot water usage for other uses												
38.4366	37.0389	35.6412	34.2435	32.8458	31.4481	31.4481	32.8458	34.2435	35.6412	37.0389	38.4366	(42c)
Average daily hot water use (litres/day)												118.5181 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	128.9323	126.1795	122.8269	117.7286	113.5886	109.1377	107.4269	110.7650	114.2856	118.9583	124.1351	128.5979	(44)
Energy conte	204.1973	179.6779	188.7804	161.1646	152.9121	134.1975	129.9236	137.1502	140.9255	161.4253	176.8532	201.3532	(45)
Energy content (annual)										Total = Sum(45)m =			1968.5608
Distribution loss (46)m = 0.15 x (45)m	30.6296	26.9517	28.3171	24.1747	22.9368	20.1296	19.4885	20.5725	21.1388	24.2138	26.5280	30.2030	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(61)
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	250.7922	221.7636	235.3753	206.2564	199.5070	179.2894	176.5185	183.7451	186.0174	208.0202	221.9451	247.9481	(62)
WWHRS	-28.8906	-25.5511	-26.7556	-22.1547	-20.6474	-17.6681	-16.5611	-17.6110	-18.2801	-21.5503	-24.4138	-28.3556	(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	221.9015	196.2125	208.6196	184.1017	178.8596	161.6212	159.9574	166.1341	167.7372	186.4699	197.5313	219.5925	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			2248.7385 (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	105.1715	93.4115	100.0454	89.6607	88.1192	80.6941	80.4755	82.8784	82.9312	90.9498	94.8772	104.2259	(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	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.2292	119.8252	108.2292	111.8369	108.2292	111.8369	108.2292	108.2292	111.8369	108.2292	111.8369	108.2292	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	204.9862	207.1133	201.7530	190.3417	175.9369	162.3984	153.3539	151.2267	156.5870	167.9984	182.4032	195.9416	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	(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)	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	(71)
Water heating gains (Table 5)	141.3596	139.0052	134.4696	124.5288	118.4398	112.0752	108.1660	111.3957	115.1822	122.2444	131.7739	140.0885	(72)
Total internal gains													

Full SAP Calculation Printout



515.4444 526.8131 505.3214 487.5768 463.4753 444.1799 427.6186 428.7211 441.4756 459.3415 486.8834 505.1289 (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	
North	7.7800		10.6334		0.6300		0.7000		0.7700		25.2827	(74)
East	3.7600		19.6403		0.6300		0.7000		0.7700		22.5687	(76)
Solar gains	47.8514	92.4657	154.8090	237.9157	307.6046	323.2113	304.2085	249.6607	183.2745	109.9013	59.3300	39.6363 (83)
Total gains	563.2958	619.2789	660.1304	725.4924	771.0800	767.3912	731.8271	678.3818	624.7501	569.2427	546.2134	544.7652 (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	115.0978	115.6592	116.2148	118.8977	119.4134	121.8746	121.8746	122.3415	120.9147	119.4134	118.3746	117.3078
alpha	8.6732	8.7106	8.7477	8.9265	8.9609	9.1250	9.1250	9.1561	9.0610	8.9609	8.8916	8.8205
util living area	0.9988	0.9966	0.9884	0.9324	0.7618	0.5294	0.3822	0.4293	0.6983	0.9582	0.9957	0.9990 (86)
MIT	20.4008	20.5075	20.6644	20.8800	20.9829	20.9994	21.0000	20.9999	20.9938	20.8615	20.6083	20.3954 (87)
Th 2	20.1525	20.1563	20.1600	20.1774	20.1807	20.1959	20.1959	20.1988	20.1901	20.1807	20.1741	20.1672 (88)
util rest of house	0.9981	0.9949	0.9828	0.9049	0.7033	0.4633	0.3123	0.3546	0.6213	0.9344	0.9932	0.9986 (89)
MIT 2	19.4613	19.6003	19.8010	20.0697	20.1698	20.1957	20.1959	20.1988	20.1872	20.0573	19.7438	19.4665 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.8265	19.9529	20.1366	20.3847	20.4858	20.5081	20.5085	20.5102	20.5007	20.3699	20.0798	19.8275 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.8265	19.9529	20.1366	20.3847	20.4858	20.5081	20.5085	20.5102	20.5007	20.3699	20.0798	19.8275 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9978	0.9944	0.9826	0.9126	0.7257	0.4890	0.3395	0.3836	0.6514	0.9408	0.9929	0.9983 (94)
Useful gains	562.0727	615.8274	648.6194	662.1011	559.5817	375.2847	248.4457	260.2543	406.9585	535.5574	542.3215	543.8461 (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	1045.1049	1008.3111	909.0712	748.3431	570.0117	375.5674	248.4543	260.2792	410.1125	633.8565	849.5017	1032.0913 (97)
Space heating kWh	359.3759	263.7491	193.7761	62.0942	7.7599	0.0000	0.0000	0.0000	0.0000	73.1345	221.1697	363.2544 (98a)
Space heating requirement - total per year (kWh/year)												1544.3139
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	359.3759	263.7491	193.7761	62.0942	7.7599	0.0000	0.0000	0.0000	0.0000	73.1345	221.1697	363.2544 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1544.3139
Space heating per m2												(98c) / (4) = 21.0540 (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	359.3759	263.7491	193.7761	62.0942	7.7599	0.0000	0.0000	0.0000	0.0000	73.1345	221.1697	363.2544 (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)	389.3564	285.7520	209.9416	67.2743	8.4072	0.0000	0.0000	0.0000	0.0000	79.2357	239.6205	393.5584 (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	221.9015	196.2125	208.6196	184.1017	178.8596	161.6212	159.9574	166.1341	167.7372	186.4699	197.5313	219.5925 (64)
Efficiency of water heater	85.1346	84.7238	83.8946	81.8934	80.1377	79.8000	79.8000	79.8000	79.8000	82.1454	84.3139	79.8000 (216)
Fuel for water heating, kWh/month	260.6479	231.5906	248.6688	224.8066	223.1902	202.5329	200.4479	208.1881	210.1970	226.9997	234.2808	257.7965 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.4879	18.0406	16.2436	11.9007	9.1925	7.5103	8.3857	10.9000	14.1581	18.5761	20.9817	23.1129 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-19.6330	-29.0747	-43.8727	-51.8635	-58.1494	-55.0904	-54.4210	-50.2749	-43.3460	-34.3570	-22.0756	-16.8151 (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)	-7.2167	-15.5046	-31.4282	-48.1131	-64.5165	-65.1547	-64.3856	-54.0981	-39.1101	-22.4650	-9.7282	-5.6828 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												

Full SAP Calculation Printout



(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												1673.1462	(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												2729.3470	(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)												181.4902	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-906.3769	(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												3763.6065	(238)

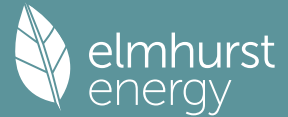
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1673.1462	0.2100	351.3607	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2729.3470	0.2100	573.1629	(264)
Space and water heating			924.5236	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	181.4902	0.1443	26.1946	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-478.9732	0.1336	-63.9743	
PV Unit electricity exported	-427.4037	0.1253	-53.5711	
Total			-117.5453	(269)
Total CO2, kg/year			845.1021	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.5200	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1673.1462	1.1300	1890.6552	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2729.3470	1.1300	3084.1621	(278)
Space and water heating			4974.8173	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	181.4902	1.5338	278.3757	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-478.9732	1.4936	-715.3834	
PV Unit electricity exported	-427.4037	0.4601	-196.6313	
Total			-912.0148	(283)
Total Primary energy kWh/year			4471.2790	(286)
Target Primary Energy Rate (TPER)			60.9600	(287)

Full SAP Calculation Printout



Property Reference	FLAT B2- 2B4P				Issued on Date	12/09/2024
Assessment Reference	FLAT B2-2B4P_Belean	Prop Type Ref	BLOCK B			
Property	Hornsey Police Station, 98, Tottenham Ln., London , N8 7EJ					
SAP Rating	82 B	DER	13.13	TER	11.52	
Environmental	90 B	% DER < TER				-13.98
CO ₂ Emissions (t/year)	0.84	DFEE	25.58	TFEE	28.31	
Compliance Check	See BREL	% DFEE < TFEE				9.66
% DPER < TPER	-29.68	DPER	79.05	TPER	60.96	
Assessor Details	Mr. Mirza Baig				Assessor ID	CK52-0001
Client	Archanaeum Ltd, ARCHANAUM					

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)
Ground floor	73.3500 (1b)	2.5000 (2b)	183.3750 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.3500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	183.3750 (5)

2. Ventilation rate

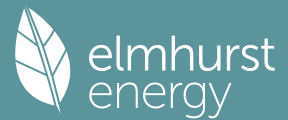
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2000 (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	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												46.2000 (23c)
Effective ac	0.5240	0.5190	0.5140	0.4890	0.4840	0.4590	0.4590	0.4540	0.4690	0.4840	0.4940	0.5040 (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
Window North (Uw = 1.20)			5.9000	1.1450	6.7557		(27)
Door			3.4100	0.9800	3.3418		(26)
Window S (Uw = 1.20)			5.6400	1.1450	6.4580		(27)
External Wall	48.5800	14.9500	33.6300	0.1800	6.0534	190.0000	6389.7000 (29a)
Total net area of external elements Aum(A, m ²)			48.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.6089		(33)
Party Wall 1			56.3700	0.0000	0.0000	180.0000	10146.6000 (32)
Party Floor 1			73.3500			40.0000	2934.0000 (32d)
Party Ceiling 1			73.3500			30.0000	2200.5000 (32b)
Internal Wall 1			73.1500			75.0000	5486.2500 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 27157.0500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							370.2393 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	5.5200	0.0410	0.2263
E3 Sill	5.5200	0.0210	0.1159
E4 Jamb	25.3200	0.0160	0.4051
E7 Party floor between dwellings (in blocks of flats)	19.4300	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	19.4300	0.0000	0.0000
E16 Corner (normal)	12.5000	0.0540	0.6750
E25 Staggered party wall between dwellings	2.5000	0.1200	0.3000
E18 Party wall between dwellings	17.5000	0.0600	1.0500
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.5500	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.5500	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			1.8724 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	24.4813 (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	31.7092	31.4066	31.1041	29.5912	29.2887	27.7758	27.7758	27.4732	28.3809	29.2887	29.8938	30.4989	(38)
Heat transfer coeff	56.1905	55.8879	55.5854	54.0725	53.7700	52.2571	52.2571	51.9545	52.8622	53.7700	54.3751	54.9802	(39)
Average = Sum(39)m / 12 =												53.9969	
HLP	0.7661	0.7619	0.7578	0.7372	0.7331	0.7124	0.7124	0.7083	0.7207	0.7331	0.7413	0.7496	(40)
HLP (average)												0.7362	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3246 (42)
Hot water usage for mixer showers	63.1961	62.2464	60.8625	58.2146	56.2605	54.0814	52.8427	54.2162	55.7217	58.0615	60.7662	62.9540	(42a)
Hot water usage for baths	27.2996	26.8942	26.3232	25.2705	24.4823	23.6082	23.1361	23.7030	24.3203	25.2556	26.3300	27.2073	(42b)
Hot water usage for other uses	38.4366	37.0389	35.6412	34.2435	32.8458	31.4481	31.4481	32.8458	34.2435	35.6412	37.0389	38.4366	(42c)
Average daily hot water use (litres/day)												118.5181	(43)
Daily hot water use	128.9323	126.1795	122.8269	117.7286	113.5886	109.1377	107.4269	110.7650	114.2856	118.9583	124.1351	128.5979	(44)
Energy conte	204.1973	179.6779	188.7804	161.1646	152.9121	134.1975	129.9236	137.1502	140.9255	161.4253	176.8532	201.3532	(45)
Energy content (annual)										Total = Sum(45)m =		1968.5608	
Distribution loss (46)m = 0.15 x (45)m	30.6296	26.9517	28.3171	24.1747	22.9368	20.1296	19.4885	20.5725	21.1388	24.2138	26.5280	30.2030	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3800	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7452	(55)
Total storage loss	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012	(56)
If cylinder contains dedicated solar storage	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012	(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	250.5609	221.5547	235.1440	206.0326	199.2757	179.0655	176.2872	183.5138	185.7935	207.7889	221.7212	247.7168	(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	250.5609	221.5547	235.1440	206.0326	199.2757	179.0655	176.2872	183.5138	185.7935	207.7889	221.7212	247.7168	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2514.4548	(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	104.9865	93.2443	99.8604	89.4816	87.9341	80.5151	80.2905	82.6933	82.7521	90.7648	94.6981	104.0408	(65)

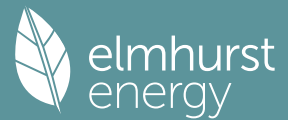
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	108.2292	119.8252	108.2292	111.8369	108.2292	111.8369	108.2292	108.2292	111.8369	108.2292	111.8369	108.2292	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	204.9862	207.1133	201.7530	190.3417	175.9369	162.3984	153.3539	151.2267	156.5870	167.9984	182.4032	195.9416	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	34.6232	(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)	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	(71)
Water heating gains (Table 5)	141.1108	138.7564	134.2209	124.2800	118.1911	111.8265	107.9173	111.1469	114.9335	121.9957	131.5251	139.8398	(72)
Total internal gains	515.1957	526.5644	505.0726	487.3280	463.2266	443.9312	427.3699	428.4724	441.2269	459.0927	486.6347	504.8802	(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
North	5.9000	10.6334	0.5200	0.7000	0.7700	15.8255 (74)
North	1.8800	10.6334	0.2500	0.7000	0.7700	2.4244 (74)
East	3.7600	19.6403	0.2500	0.7000	0.7700	8.9558 (76)

Full SAP Calculation Printout



Solar gains	27.2058	52.3961	88.1159	137.2719	179.8030	190.0683	178.4251	144.8552	104.8105	62.3043	33.6805	22.5789 (83)
Total gains	542.4015	578.9605	593.1885	624.6000	643.0296	633.9995	605.7949	573.3276	546.0374	521.3971	520.3152	527.4590 (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	134.2509	134.9777	135.7124	139.5094	140.2944	144.3559	144.3559	145.1966	142.7034	140.2944	138.7331	137.2061
alpha	9.9501	9.9985	10.0475	10.3006	10.3530	10.6237	10.6237	10.6798	10.5136	10.3530	10.2489	10.1471
util living area	0.9982	0.9956	0.9874	0.9311	0.7641	0.5272	0.3795	0.4168	0.6648	0.9403	0.9931	0.9985 (86)
MIT	20.5572	20.6391	20.7541	20.9186	20.9902	20.9998	21.0000	21.0000	20.9980	20.9227	20.7324	20.5562 (87)
Th 2	20.6170	20.6190	20.6211	20.6314	20.6335	20.6438	20.6438	20.6458	20.6397	20.6335	20.6293	20.6252 (88)
util rest of house	0.9978	0.9947	0.9847	0.9184	0.7374	0.4980	0.3488	0.3847	0.6312	0.9266	0.9914	0.9982 (89)
MIT 2	20.1980	20.2813	20.3968	20.5634	20.6266	20.6437	20.6438	20.6458	20.6385	20.5703	20.3833	20.2043 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.3376	20.4204	20.5357	20.7015	20.7679	20.7821	20.7822	20.7835	20.7782	20.7073	20.5190	20.3411 (92)
Temperature adjustment												
adjusted MIT	20.1876	20.2704	20.3857	20.5515	20.6179	20.6321	20.6322	20.6335	20.6282	20.5573	20.3690	20.1911 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9972	0.9936	0.9826	0.9154	0.7363	0.4970	0.3478	0.3836	0.6301	0.9235	0.9900	0.9978 (94)
Useful gains	540.8993	575.2595	582.8785	571.7569	473.4529	315.1252	210.7111	219.9442	344.0719	481.5094	515.0948	526.2727 (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	892.7333	859.0187	771.8406	630.0239	479.5158	315.2199	210.7130	219.9491	345.0971	535.4037	721.5037	879.1923 (97)
Space heating kWh	261.7645	190.6862	140.5878	41.9523	4.5108	0.0000	0.0000	0.0000	0.0000	40.0973	148.6145	262.5722 (98a)
Space heating requirement - total per year (kWh/year)												1090.7856
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	261.7645	190.6862	140.5878	41.9523	4.5108	0.0000	0.0000	0.0000	0.0000	40.0973	148.6145	262.5722 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1090.7856
Space heating per m2												(98c) / (4) = 14.8710 (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	261.7645	190.6862	140.5878	41.9523	4.5108	0.0000	0.0000	0.0000	0.0000	40.0973	148.6145	262.5722 (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)	292.4743	213.0572	157.0814	46.8740	5.0400	0.0000	0.0000	0.0000	0.0000	44.8015	166.0497	293.3767 (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	250.5609	221.5547	235.1440	206.0326	199.2757	179.0655	176.2872	183.5138	185.7935	207.7889	221.7212	247.7168 (64)
Efficiency of water heater	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	279.9563	247.5471	262.7307	230.2040	222.6544	200.0732	196.9689	205.0434	207.5905	232.1663	247.7332	276.7786 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	98.4855	88.9547	98.4855	95.3086	98.4855	95.3086	98.4855	98.4855	95.3086	98.4855	95.3086	98.4855 (231)
Lighting	25.8580	20.7442	18.6779	13.6842	10.5701	8.6358	9.6424	12.5335	16.2798	21.3600	24.1261	26.5766 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.3006	-32.1083	-49.5009	-59.9931	-68.7946	-66.0717	-65.5363	-59.9082	-50.5065	-38.7851	-24.2319	-18.1966 (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												1218.7548 (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												2809.4467 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Table 4g: in-use factor = 2.5000, SFP = 5.0000)

Full SAP Calculation Printout



mechanical ventilation fans (SFP = 5.0000)	1118.5875 (230a)
central heating pump	41.0000 (230c)
Total electricity for the above, kWh/year	1159.5875 (231)
Electricity for lighting (calculated in Appendix L)	208.6886 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-554.9339 (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	4841.5437 (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	1218.7548	0.2100	255.9385 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2809.4467	0.2100	589.9838 (264)
Space and water heating			845.9223 (265)
Pumps, fans and electric keep-hot	1159.5875	0.1387	160.8491 (267)
Energy for lighting	208.6886	0.1443	30.1202 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-554.9339	0.1330	-73.8174
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-73.8174 (269)
Total CO2, kg/year			963.0742 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			13.1300 (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	1218.7548	1.1300	1377.1929 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2809.4467	1.1300	3174.6747 (278)
Space and water heating			4551.8677 (279)
Pumps, fans and electric keep-hot	1159.5875	1.5128	1754.2240 (281)
Energy for lighting	208.6886	1.5338	320.0936 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-554.9339	1.4915	-827.6998
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-827.6998 (283)
Total Primary energy kWh/year			5798.4854 (286)
Dwelling Primary energy Rate (DPER)			79.0500 (287)

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

1. Overall dwelling characteristics

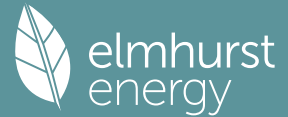
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	73.3500 (1b)	x 2.5000 (2b)	= 183.3750 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.3500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 183.3750 (5)

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	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1636 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4136 (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) = 0.4136 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)

Full SAP Calculation Printout



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 infiltr rate												
Effective ac	0.5273	0.5170	0.5067	0.4550	0.4446	0.3929	0.3929	0.3826	0.4136	0.4446	0.4653	0.4860 (22b)
	0.6390	0.6336	0.6284	0.6035	0.5988	0.5772	0.5772	0.5732	0.5855	0.5988	0.6083	0.6181 (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
TER Opaque door			3.4100	1.0000	3.4100		(26)
TER Opening Type (Uw = 1.20)			11.5400	1.1450	13.2137		(27)
External Wall	48.5800	14.9500	33.6300	0.1800	6.0534		(29a)
Total net area of external elements Aum (A, m ²)			48.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.6771		(33)
Party Wall 1			56.3700	0.0000	0.0000		(32)

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

380.2393 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.5200	0.0500	0.2760
E3 Sill	5.5200	0.0500	0.2760
E4 Jamb	25.3200	0.0500	1.2660
E7 Party floor between dwellings (in blocks of flats)	19.4300	0.0700	1.3601
E7 Party floor between dwellings (in blocks of flats)	19.4300	0.0700	1.3601
E16 Corner (normal)	12.5000	0.0900	1.1250
E25 Staggered party wall between dwellings	2.5000	0.0600	0.1500
E18 Party wall between dwellings	17.5000	0.0600	1.0500
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.5500	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	22.5500	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	10.0000	-0.0900	-0.9000

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

5.9632 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 28.6403 (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	38.6709	38.3442	38.0239	36.5197	36.2382	34.9281	34.9281	34.6855	35.4327	36.2382	36.8076	37.4028 (38)
Heat transfer coeff	67.3112	66.9845	66.6643	65.1600	64.8786	63.5684	63.5684	63.3258	64.0731	64.8786	65.4479	66.0432 (39)
Average = Sum(39)m / 12 =												65.1587

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9177	0.9132	0.9089	0.8883	0.8845	0.8666	0.8666	0.8633	0.8735	0.8845	0.8923	0.9004 (40)
HLP (average)												0.8883
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

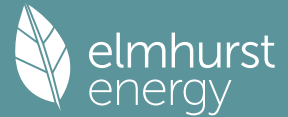
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3246 (42)
Hot water usage for mixer showers													
63.1961	62.2464	60.8625	58.2146	56.2605	54.0814	52.8427	54.2162	55.7217	58.0615	60.7662	62.9540	(42a)	
Hot water usage for baths													
27.2996	26.8942	26.3232	25.2705	24.4823	23.6082	23.1361	23.7030	24.3203	25.2556	26.3300	27.2073	(42b)	
Hot water usage for other uses													
38.4366	37.0389	35.6412	34.2435	32.8458	31.4481	31.4481	32.8458	34.2435	35.6412	37.0389	38.4366	(42c)	
Average daily hot water use (litres/day)												118.5181 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
128.9323	126.1795	122.8269	117.7286	113.5886	109.1377	107.4269	110.7650	114.2856	118.9583	124.1351	128.5979	(44)	
Energy content (annual)													
204.1973	179.6779	188.7804	161.1646	152.9121	134.1975	129.9236	137.1502	140.9255	161.4253	176.8532	201.3532	(45)	
Distribution loss (46)m = 0.15 x (45)m													
30.6296	26.9517	28.3171	24.1747	22.9368	20.1296	19.4885	20.5725	21.1388	24.2138	26.5280	30.2030	(46)	
Water storage loss:													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7527 (55)	
Total storage loss													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage													
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month													
250.7922	221.7636	235.3753	206.2564	199.5070	179.2894	176.5185	183.7451	186.0174	208.0202	221.9451	247.9481	(62)	
WWHRS	-28.8906	-25.5511	-26.7556	-22.1547	-20.6474	-17.6681	-16.5611	-17.6110	-18.2801	-21.5503	-24.4138	-28.3556 (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													
221.9015	196.2125	208.6196	184.1017	178.8596	161.6212	159.9574	166.1341	167.7372	186.4699	197.5313	219.5925	(64)	
12Total per year (kWh/year)													
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
												0.0000 (64a)	
Heat gains from water heating, kWh/month													
105.1715	93.4115	100.0454	89.6607	88.1192	80.6941	80.4755	82.8784	82.9312	90.9498	94.8772	104.2259	(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	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316	116.2316 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	108.2292	119.8252	108.2292	111.8369	108.2292	111.8369	108.2292	108.2292	111.8369	108.2292	111.8369	108.2292 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	204.9862	207.1133	201.7530	190.3417	175.9369	162.3984	153.3539	151.2267	156.5870	167.9984	182.4032	195.9416 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												

Full SAP Calculation Printout



Pumps, fans	34.6232 3.0000	34.6232 3.0000	34.6232 3.0000	34.6232 3.0000	34.6232 3.0000	34.6232 0.0000	34.6232 0.0000	34.6232 0.0000	34.6232 0.0000	34.6232 3.0000	34.6232 3.0000	34.6232 (69) 3.0000 (70)
Losses e.g. evaporation	(negative values) (Table 5)											
Water heating gains	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	-92.9853	(71)
141.3596	139.0052	134.4696	124.5288	118.4398	112.0752	108.1660	111.3957	115.1822	122.2444	131.7739	140.0885	(72)
Total internal gains	515.4444	526.8131	505.3214	487.5768	463.4753	444.1799	427.6186	428.7211	441.4756	459.3415	486.8834	505.1289 (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
North					7.7800	10.6334	0.6300	0.7000			0.7700			25.2827 (74)
East					3.7600	19.6403	0.6300	0.7000			0.7700			22.5687 (76)
Solar gains	47.8514	92.4657	154.8090	237.9157	307.6046	323.2113	304.2085	249.6607	183.2745	109.9013	59.3300			39.6363 (83)
Total gains	563.2958	619.2789	660.1304	725.4924	771.0800	767.3912	731.8271	678.3818	624.7501	569.2427	546.2134			544.7652 (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	115.0978	115.6592	116.2148	118.8977	119.4134	121.8746	121.8746	122.3415	120.9147	119.4134	118.3746	117.3078
alpha	8.6732	8.7106	8.7477	8.9265	8.9609	9.1250	9.1250	9.1561	9.0610	8.9609	8.8916	8.8205
util living area	0.9988	0.9966	0.9884	0.9324	0.7618	0.5294	0.3822	0.4293	0.6983	0.9582	0.9957	0.9990 (86)
MIT	20.4008	20.5075	20.6644	20.8800	20.9829	20.9994	21.0000	20.9999	20.9938	20.8615	20.6083	20.3954 (87)
Th 2	20.1525	20.1563	20.1600	20.1774	20.1807	20.1959	20.1959	20.1988	20.1901	20.1807	20.1741	20.1672 (88)
util rest of house	0.9981	0.9949	0.9828	0.9049	0.7033	0.4633	0.3123	0.3546	0.6213	0.9344	0.9932	0.9986 (89)
MIT 2	19.4613	19.6003	19.8010	20.0697	20.1698	20.1957	20.1959	20.1988	20.1872	20.0573	19.7438	19.4665 (90)
Living area fraction	19.8265	19.9529	20.1366	20.3847	20.4858	20.5081	20.5085	20.5102	20.5007	20.3699	20.0798	19.8275 (92)
MIT	19.8265	19.9529	20.1366	20.3847	20.4858	20.5081	20.5085	20.5102	20.5007	20.3699	20.0798	19.8275 (93)
Temperature adjustment	19.8265	19.9529	20.1366	20.3847	20.4858	20.5081	20.5085	20.5102	20.5007	20.3699	20.0798	19.8275 (93)
adjusted MIT	19.8265	19.9529	20.1366	20.3847	20.4858	20.5081	20.5085	20.5102	20.5007	20.3699	20.0798	19.8275 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9978	0.9944	0.9826	0.9126	0.7257	0.4890	0.3395	0.3836	0.6514	0.9408	0.9929	0.9983 (94)
Useful gains	562.0727	615.8274	648.6194	662.1011	559.5817	375.2847	248.4457	260.2543	406.9585	535.5574	542.3215	543.8461 (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	1045.1049	1008.3111	909.0712	748.3431	570.0117	375.5674	248.4543	260.2792	410.1125	633.8565	849.5017	1032.0913 (97)
Space heating kWh	359.3759	263.7491	193.7761	62.0942	7.7599	0.0000	0.0000	0.0000	0.0000	73.1345	221.1697	363.2544 (98a)
Space heating requirement - total per year (kWh/year)												1544.3139
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	359.3759	263.7491	193.7761	62.0942	7.7599	0.0000	0.0000	0.0000	0.0000	73.1345	221.1697	363.2544 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1544.3139
Space heating per m ²										(98c) / (4) =		21.0540 (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	359.3759	263.7491	193.7761	62.0942	7.7599	0.0000	0.0000	0.0000	0.0000	73.1345	221.1697	363.2544 (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)	389.3564	285.7520	209.9416	67.2743	8.4072	0.0000	0.0000	0.0000	0.0000	79.2357	239.6205	393.5584 (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	221.9015	196.2125	208.6196	184.1017	178.8596	161.6212	159.9574	166.1341	167.7372	186.4699	197.5313	219.5925 (64)
Efficiency of water heater (217)m	85.1346	84.7238	83.8946	81.8934	80.1377	79.8000	79.8000	79.8000	79.8000	82.1454	84.3139	79.8000 (216)
Fuel for water heating, kWh/month	260.6479	231.5906	248.6688	224.8066	223.1902	202.5329	200.4479	208.1881	210.1970	226.9997	234.2808	257.7965 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.4879	18.0406	16.2436	11.9007	9.1925	7.5103	8.3857	10.9000	14.1581	18.5761	20.9817	23.1129 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-19.6330	-29.0747	-43.8727	-51.8635	-58.1494	-55.0904	-54.4210	-50.2749	-43.3460	-34.3570	-22.0756	-16.8151 (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)

Full SAP Calculation Printout



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	-7.2167	-15.5046	-31.4282	-48.1131	-64.5165	-65.1547	-54.0981	-39.1101	-22.4650	-9.7282	-5.6828	(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											1673.1462	(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											2729.3470	(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)											181.4902	(232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation											-906.3769	(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											3763.6065	(238)

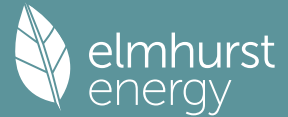
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1673.1462	0.2100	351.3607 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2729.3470	0.2100	573.1629 (264)
Space and water heating			924.5236 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	181.4902	0.1443	26.1946 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-478.9732	0.1336	-63.9743
PV Unit electricity exported	-427.4037	0.1253	-53.5711
Total			-117.5453 (269)
Total CO2, kg/year			845.1021 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.5200 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1673.1462	1.1300	1890.6552 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2729.3470	1.1300	3084.1621 (278)
Space and water heating			4974.8173 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	181.4902	1.5338	278.3757 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-478.9732	1.4936	-715.3834
PV Unit electricity exported	-427.4037	0.4601	-196.6313
Total			-912.0148 (283)
Total Primary energy kWh/year			4471.2790 (286)
Target Primary Energy Rate (TPER)			60.9600 (287)

Full SAP Calculation Printout



Property Reference	FLAT B3-2B3P				Issued on Date	12/09/2024	
Assessment Reference	FLAT B3-2B3P			Prop Type Ref	BLOCK B		
Property	Hornsey Police Station, 98 , Tottenham Ln , London , N8 7EJ						
SAP Rating	85 B	DER	2.72	TER	11.92		
Environmental	98 A	% DER < TER				77.18	
CO ₂ Emissions (t/year)	0.16	DFEE	27.18	TFEE	28.78		
Compliance Check	See BREL	% DFEE < TFEE				5.57	
% DPER < TPER	55.16	DPER	28.34	TPER	63.20		
Assessor Details	Mr. Mirza Baig				Assessor ID	CK52-0001	
Client	Archanaeum Ltd, ARCHANAUM						

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)
Ground floor	69.0200 (1b)	2.5000 (2b)	172.5500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0200		172.5500 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	172.5500 (5)

2. Ventilation rate

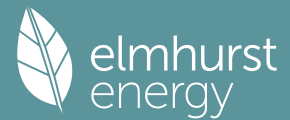
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2000 (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	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												73.6000 (23c)
Effective ac	0.3870	0.3820	0.3770	0.3520	0.3470	0.3220	0.3220	0.3170	0.3320	0.3470	0.3570	0.3670 (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
Door			3.4100	0.9800	3.3418		(26)
Window S (Uw = 1.20)			9.0400	1.1450	10.3511		(27)
External Wall	69.4300	12.4500	56.9800	0.1800	10.2564	190.0000	10826.2000 (29a)
Total net area of external elements Aum(A, m ²)			69.4300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.9493		(33)
Party Wall 1			40.6000	0.0000	0.0000	180.0000	7308.0000 (32)
Party Floor 1			69.0200			40.0000	2760.8000 (32d)
Party Ceiling 1			69.0200			30.0000	2070.6000 (32b)
Internal Wall 1			78.3500			75.0000	5876.2500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	28841.8500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							417.8767 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.3200	0.0410	0.1771	

Full SAP Calculation Printout



E3 Sill						4.3200		0.0210		0.0907		
E4 Jamb						16.8600		0.0160		0.2698		
E7 Party floor between dwellings (in blocks of flats)						27.7700		0.0000		0.0000		
E7 Party floor between dwellings (in blocks of flats)						27.7700		0.0000		0.0000		
E16 Corner (normal)						12.5000		0.0540		0.6750		
E25 Staggered party wall between dwellings						7.5000		0.1200		0.9000		
E18 Party wall between dwellings						15.0000		0.0600		0.9000		
P3 Party wall - intermediate floor between dwellings (in blocks of flats)						16.2400		0.0000		0.0000		
P3 Party wall - intermediate floor between dwellings (in blocks of flats)						16.2400		0.0000		0.0000		
E17 Corner (inverted - internal area greater than external area)						7.5000		-0.0900		-0.6750		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											2.3376	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	26.2869 (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	22.0364	21.7517	21.4669	20.0434	19.7587	18.3352	18.3352	18.0505	18.9046	19.7587	20.3281	20.8975 (38)
Average = Sum(39)m / 12 =	48.3233	48.0386	47.7539	46.3304	46.0456	44.6221	44.6221	44.3374	45.1915	46.0456	46.6151	47.1845 (39)
												46.2592
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7001	0.6960	0.6919	0.6713	0.6671	0.6465	0.6465	0.6424	0.6548	0.6671	0.6754	0.6836 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.6702

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.2221 (42)
Hot water usage for mixer showers												
61.4769	60.5531	59.2068	56.6309	54.7300	52.6101	51.4052	52.7413	54.2059	56.4820	59.1132	61.2414 (42a)	
Hot water usage for baths												
26.5603	26.1659	25.6104	24.5862	23.8193	22.9689	22.5095	23.0611	23.6617	24.5717	25.6170	26.4705 (42b)	
Hot water usage for other uses												
37.3865	36.0270	34.6675	33.3080	31.9485	30.5890	30.5890	31.9485	33.3080	34.6675	36.0270	37.3865 (42c)	
Average daily hot water use (litres/day)												115.2930 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	125.4238	122.7459	119.4847	114.5251	110.4978	106.1680	104.5037	107.7509	111.1756	115.7212	120.7571	125.0984 (44)
Energy conte	198.6406	174.7886	183.6435	156.7791	148.7512	130.5459	126.3882	133.4181	137.0906	157.0325	172.0407	195.8739 (45)
Energy content (annual)										Total = Sum(45)m =		1914.9930
Distribution loss (46)m = 0.15 x (45)m												
29.7961	26.2183	27.5465	23.5169	22.3127	19.5819	18.9582	20.0127	20.5636	23.5549	25.8061	29.3811 (46)	
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.1500 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6210 (55)
Total storage loss												
19.2510	17.3880	19.2510	18.6300	19.2510	18.6300	19.2510	19.2510	18.6300	19.2510	18.6300	19.2510 (56)	
If cylinder contains dedicated solar storage												
19.2510	17.3880	19.2510	18.6300	19.2510	18.6300	19.2510	19.2510	18.6300	19.2510	18.6300	19.2510 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
241.1540	213.1878	226.1569	197.9211	191.2646	171.6879	168.9016	175.9315	178.2326	199.5459	213.1827	238.3873 (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)	
FV 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	241.1540	213.1878	226.1569	197.9211	191.2646	171.6879	168.9016	175.9315	178.2326	199.5459	213.1827	238.3873 (64)
12Total per year (kWh/year)												2416 (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	100.0587	88.8366	95.0722	85.0427	83.4705	76.3201	76.0348	78.3722	78.4962	86.2240	90.1171	99.1388 (65)

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

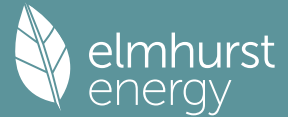
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050 (66)
107.0722	118.5442	107.0722	110.6413	107.0722	110.6413	107.0722	110.6413	107.0722	110.6413	107.0722	110.6413	107.0722 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	194.9991	197.0226	191.9234	181.0681	167.3651	154.4862	145.8823	143.8589	148.9580	159.8133	173.5163	186.3952 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105 (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)	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840 (71)
Water heating gains (Table 5)	134.4875	132.1973	127.7852	118.1148	112.1915	106.0002	102.1973	105.3390	109.0225	115.8925	125.1627	133.2511 (72)
Total internal gains	492.8903	504.0955	483.1123	466.1556	442.9603	427.4591	411.4833	412.6016	424.9532	439.1095	465.6517	483.0499 (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											
East	5.6400											13.4338 (76)
West	3.4000											8.0984 (80)

Solar gains	21.5321	42.1214	69.3680	101.1691	123.9865	126.9222	120.8351	103.7956	80.6778	49.9806	26.8480	17.7070 (83)

Full SAP Calculation Printout



Total gains 514.4224 546.2169 552.4803 567.3247 566.9468 554.3813 532.3184 516.3972 505.6311 489.0901 492.4998 500.7569 (84)

7. Mean internal temperature (heating season)

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

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	165.7922	166.7747	167.7691	172.9239	173.9931	179.5438	179.5438	180.6968	177.2816	173.9931	171.8677	169.7937	21.0000 (85)
alpha	12.0528	12.1183	12.1846	12.5283	12.5995	12.9696	12.9696	13.0465	12.8188	12.5995	12.4578	12.3196	
util living area	0.9984	0.9956	0.9864	0.9204	0.7498	0.5151	0.3688	0.3950	0.6162	0.9163	0.9919	0.9987	(86)
Living	20.6855	20.7538	20.8418	20.9587	20.9966	21.0000	21.0000	21.0000	20.9997	20.9669	20.8286	20.6857	
Non living	20.0599	20.1306	20.2192	20.3392	20.3684	20.3883	20.3883	20.3920	20.3809	20.3500	20.2208	20.0733	
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	20.8391	20.7538	20.8418	20.9587	20.9966	21.0000	21.0000	21.0000	20.9997	20.9669	20.8286	20.7297	(87)
Th 2	20.3407	20.3444	20.3480	20.3663	20.3700	20.3883	20.3883	20.3920	20.3810	20.3700	20.3626	20.3553	(88)
util rest of house	0.9976	0.9934	0.9797	0.8920	0.7016	0.4659	0.3176	0.3427	0.5612	0.8819	0.9874	0.9981	(89)
MIT 2	20.1971	20.1306	20.2192	20.3392	20.3684	20.3883	20.3883	20.3920	20.3809	20.3500	20.2208	20.1128	(90)
Living area fraction									fLA = Living area / (4) =			0.3806	(91)
MIT	20.4414	20.3678	20.4562	20.5750	20.6075	20.6211	20.6211	20.6234	20.6164	20.5848	20.4521	20.3476	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.4414	20.3678	20.4562	20.5750	20.6075	20.6211	20.6211	20.6234	20.6164	20.5848	20.4521	20.3476	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9977	0.9935	0.9810	0.9020	0.7200	0.4846	0.3371	0.3626	0.5822	0.8946	0.9882	0.9980	(94)
Useful gains	513.2571	542.6808	541.9823	511.7527	408.2090	268.6635	179.4314	187.2550	294.3669	437.5175	486.6869	499.7782	(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	780.0077	743.0511	666.4610	540.9059	410.1527	268.6751	179.4315	187.2553	294.4873	459.7575	622.4095	761.9154	(97)
Space heating kWh	198.4624	134.6488	92.6121	20.9903	1.4461	0.0000	0.0000	0.0000	0.0000	16.5465	97.7203	195.0300	(98a)
Space heating requirement - total per year (kWh/year)												757.4566	
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	198.4624	134.6488	92.6121	20.9903	1.4461	0.0000	0.0000	0.0000	0.0000	16.5465	97.7203	195.0300	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												757.4566	
Space heating per m2										(98c) / (4) =		10.9745	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)	0.0000 (201)
Efficiency of main space heating system 1 (in %)	1.0000 (202)
Efficiency of main space heating system 2 (in %)	312.4017 (206)
Efficiency of secondary/supplementary heating system, %	0.0000 (207)
	0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	198.4624	134.6488	92.6121	20.9903	1.4461	0.0000	0.0000	0.0000	0.0000	16.5465	97.7203	195.0300	(98)
Space heating efficiency (main heating system 1)	312.4017	312.4017	312.4017	312.4017	312.4017	0.0000	0.0000	0.0000	0.0000	312.4017	312.4017	312.4017	(210)
Space heating fuel (main heating system)	63.5280	43.1012	29.6452	6.7190	0.4629	0.0000	0.0000	0.0000	0.0000	5.2966	31.2803	62.4293	(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	241.1540	213.1878	226.1569	197.9211	191.2646	171.6879	168.9016	175.9315	178.2326	199.5459	213.1827	238.3873	(64)
Efficiency of water heater (217)m	191.8629	191.8629	191.8629	191.8629	191.8629	191.8629	191.8629	191.8629	191.8629	191.8629	191.8629	191.8629	(216)
Fuel for water heating, kWh/month	125.6908	111.1146	117.8742	103.1576	99.6882	89.4847	88.0324	91.6965	92.8958	104.0044	111.1120	124.2488	(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	13.0159	11.7563	13.0159	12.5961	13.0159	12.5961	13.0159	13.0159	12.5961	13.0159	12.5961	13.0159	(231)
Lighting	25.2805	20.2810	18.2608	13.3786	10.3340	8.4430	9.4271	12.2536	15.9163	20.8830	23.5873	25.9832	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-18.0222	-30.4023	-52.6014	-68.0424	-80.1347	-77.2795	-75.8108	-67.8431	-53.9928	-37.6622	-21.0773	-14.8525	(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												242.4624	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												191.8629	
Water heating fuel used												1259.0002	(219)
Space cooling fuel												0.0000	(221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.7280)	
Mechanical ventilation fans (SFP = 0.7280)	153.2520 (230a)
Total electricity for the above, kWh/year	153.2520 (231)
Electricity for lighting (calculated in Appendix L)	204.0284 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-597.7212 (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	1261.0218 (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	242.4624	0.1585	38.4285 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1259.0002	0.1410	177.4992 (264)
Space and water heating			215.9277 (265)
Pumps, fans and electric keep-hot	153.2520	0.1387	21.2579 (267)
Energy for lighting	204.0284	0.1443	29.4476 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-597.7212	0.1318	-78.7576
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-78.7576 (269)
Total CO2, kg/year			187.8757 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.7200 (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	242.4624	1.5867	384.7214 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1259.0002	1.5213	1915.3332 (278)
Space and water heating			2300.0547 (279)
Pumps, fans and electric keep-hot	153.2520	1.5128	231.8396 (281)
Energy for lighting	204.0284	1.5338	312.9455 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-597.7212	1.4868	-888.7033
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-888.7033 (283)
Total Primary energy kWh/year			1956.1366 (286)
Dwelling Primary energy Rate (DPER)			28.3400 (287)

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

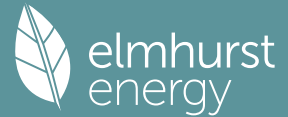
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	69.0200 (1b)	x 2.5000 (2b)	= 172.5500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	172.5500 (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) = 0.1159 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3659 (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) = 0.3659 (21)

Full SAP Calculation Printout



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													
Effective ac	0.4665	0.4574	0.4482	0.4025	0.3934	0.3476	0.3476	0.3385	0.3659	0.3934	0.4116	0.4299	(22b)
	0.6088	0.6046	0.6005	0.5810	0.5774	0.5604	0.5604	0.5573	0.5669	0.5774	0.5847	0.5924	(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
TER Opaque door			3.4100	1.0000	3.4100		(26)
TER Opening Type (Uw = 1.20)			9.0400	1.1450	10.3511		(27)
External Wall	69.4300	12.4500	56.9800	0.1800	10.2564		(29a)
Total net area of external elements Aum(A, m ²)			69.4300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	24.0175		(33)
Party Wall 1			40.6000	0.0000	0.0000		(32)

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

427.8767 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	4.3200	0.0500	0.2160
E3 Sill	4.3200	0.0500	0.2160
E4 Jamb	16.8600	0.0500	0.8430
E7 Party floor between dwellings (in blocks of flats)	27.7700	0.0700	1.9439
E7 Party floor between dwellings (in blocks of flats)	27.7700	0.0700	1.9439
E16 Corner (normal)	12.5000	0.0900	1.1250
E25 Staggered party wall between dwellings	7.5000	0.0600	0.4500
E18 Party wall between dwellings	15.0000	0.0600	0.9000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	16.2400	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	16.2400	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	7.5000	-0.0900	-0.6750

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

6.9628 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 30.9803 (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	34.6675	34.4269	34.1910	33.0832	32.8759	31.9110	31.9110	31.7323	32.2827	32.8759	33.2952	33.7336	(38)
Heat transfer coeff	65.6478	65.4072	65.1714	64.0635	63.8562	62.8914	62.8914	62.7127	63.2630	63.8562	64.2756	64.7139	(39)
Average = Sum(39)m / 12 =												64.0625	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9511	0.9477	0.9442	0.9282	0.9252	0.9112	0.9112	0.9086	0.9166	0.9252	0.9313	0.9376	(40)
HLP (average)												0.9282	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

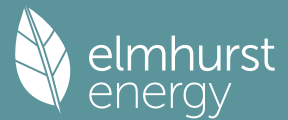
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2221 (42)
Hot water usage for mixer showers	61.4769	60.5531	59.2068	56.6309	54.7300	52.6101	51.4052	52.7413	54.2059	56.4820	59.1132	61.2414 (42a)	
Hot water usage for baths	26.5603	26.1659	25.6104	24.5862	23.8193	22.9689	22.5095	23.0611	23.6617	24.5717	25.6170	26.4705 (42b)	
Hot water usage for other uses	37.3865	36.0270	34.6675	33.3080	31.9485	30.5890	30.5890	31.9485	33.3080	34.6675	36.0270	37.3865 (42c)	
Average daily hot water use (litres/day)												115.2930 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	125.4238	122.7459	119.4847	114.5251	110.4978	106.1680	104.5037	107.7509	111.1756	115.7212	120.7571	125.0984 (44)	
Energy conte	198.6406	174.7886	183.6435	156.7791	148.7512	130.5459	126.3882	133.4181	137.0906	157.0325	172.0407	195.8739 (45)	
Energy content (annual)										Total = Sum (45)m =		1914.9930	
Distribution loss (46)m = 0.15 x (45)m	29.7961	26.2183	27.5465	23.5169	22.3127	19.5819	18.9582	20.0127	20.5636	23.5549	25.8061	29.3811 (46)	
Water storage loss:													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7527 (55)	
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month	245.2355	216.8743	230.2384	201.8710	195.3461	175.6378	172.9831	180.0130	182.1825	203.6274	217.1325	242.4688 (62)	
WWHRS	-28.1047	-24.8560	-26.0278	-21.5520	-20.0857	-17.1875	-16.1105	-17.1319	-17.7828	-20.9640	-23.7497	-27.5842 (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	217.1308	192.0183	204.2106	180.3189	175.2604	158.4503	156.8726	162.8811	164.3996	182.6634	193.3828	214.8846 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2202.4734 (64)	
Electric shower(s)												2202 (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													
	103.3239	91.7858	98.3374	88.2025	86.7357	79.4800	79.3000	81.6374	81.6561	89.4892	93.2770	102.4040 (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	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	107.0722	118.5442	107.0722	110.6413	107.0722	110.6413	107.0722	107.0722	110.6413	107.0722	110.6413	107.0722 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												

Full SAP Calculation Printout



Cooking gains	194.9991	197.0226	191.9234	181.0681	167.3651	154.4862	145.8823	143.8589	148.9580	159.8133	173.5163	186.3952 (68)
	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105 (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)	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840 (71)
Water heating gains (Table 5)	138.8762	136.5860	132.1739	122.5035	116.5803	110.3889	106.5860	109.7278	113.4113	120.2812	129.5514	137.6398 (72)
Total internal gains	500.2790	511.4842	490.5010	473.5443	450.3490	431.8478	415.8720	416.9903	429.3420	446.4982	473.0405	490.4387 (73)

6. Solar gains

[Jan]												Gains W	
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c	Access factor Table 6d			
East					5.6400	19.6403	0.6300		0.7000	0.7700		33.8531	(76)
West					3.4000	19.6403	0.6300		0.7000	0.7700		20.4079	(80)
Solar gains	54.2610	106.1460	174.8073	254.9460	312.4459	319.8440	304.5045	261.5649	203.3081	125.9511	67.6571	44.6216	(83)
Total gains	554.5400	617.6302	665.3083	728.4903	762.7949	751.6918	720.3765	678.5552	632.6501	572.4494	540.6975	535.0602	(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	124.9599	125.4196	125.8735	128.0502	128.4659	130.4368	130.4368	130.8085	129.6705	128.4659	127.6278	126.7632
alpha	9.3307	9.3613	9.3916	9.5367	9.5644	9.6958	9.6958	9.7206	9.6447	9.5644	9.5085	9.4509
util living area	0.9991	0.9972	0.9887	0.9307	0.7616	0.5349	0.3841	0.4251	0.6839	0.9579	0.9967	0.9994 (86)
MIT	20.4482	20.5550	20.7075	20.9008	20.9868	20.9996	21.0000	21.0000	20.9961	20.8818	20.6384	20.4369 (87)
Th 2	20.1242	20.1272	20.1301	20.1436	20.1461	20.1580	20.1580	20.1602	20.1534	20.1461	20.1410	20.1356 (88)
util rest of house	0.9987	0.9956	0.9825	0.8999	0.6993	0.4649	0.3106	0.3475	0.6034	0.9312	0.9945	0.9990 (89)
MIT 2	19.4909	19.6294	19.8234	20.0588	20.1384	20.1578	20.1580	20.1602	20.1518	20.0459	19.7477	19.4860 (90)
Living area fraction	19.8553	19.9817	20.1599	20.3793	20.4613	20.4782	20.4785	20.4798	20.4732	20.3641	20.0867	19.8479 (92)
Temperature adjustment	19.8553	19.9817	20.1599	20.3793	20.4613	20.4782	20.4785	20.4798	20.4732	20.3641	20.0867	19.8479 (93)
adjusted MIT	19.8553	19.9817	20.1599	20.3793	20.4613	20.4782	20.4785	20.4798	20.4732	20.3641	20.0867	19.8479 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9985	0.9953	0.9828	0.9093	0.7230	0.4916	0.3386	0.3770	0.6343	0.9392	0.9943	0.9989 (94)
Useful gains	553.6880	614.7243	653.8459	662.4242	551.4749	369.4953	243.9172	255.8436	401.2735	537.6171	537.5990	534.4519 (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	1021.1696	986.4518	890.2370	735.4050	559.4662	369.6884	243.9217	255.8557	403.1860	623.4968	834.7257	1012.6382 (97)
Space heating kWh	347.8064	249.8009	175.8750	52.5462	5.9455	0.0000	0.0000	0.0000	0.0000	63.8945	213.9312	355.7706 (98a)
Space heating requirement - total per year (kWh/year)												1465.5702
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	347.8064	249.8009	175.8750	52.5462	5.9455	0.0000	0.0000	0.0000	0.0000	63.8945	213.9312	355.7706 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1465.5702
Space heating per m ²										(98c) / (4) =		21.2340 (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)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	347.8064	249.8009	175.8750	52.5462	5.9455	0.0000	0.0000	0.0000	0.0000	63.8945	213.9312	355.7706 (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)	376.8216	270.6402	190.5472	56.9297	6.4415	0.0000	0.0000	0.0000	0.0000	69.2248	231.7781	385.4503 (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	217.1308	192.0183	204.2106	180.3189	175.2604	158.4503	156.8726	162.8811	164.3996	182.6634	193.3828	214.8846 (64)
Efficiency of water heater (217)m	85.1107	84.6508	83.7266	81.6677	80.0663	79.8000	79.8000	79.8000	79.8000	81.9525	84.2868	79.8000 (216)
Fuel for water heating, kWh/month	255.1158	226.8358	243.9017	220.7958	218.8942	198.5592	196.5821	204.1116	206.0146	222.8895	229.4344	252.2641 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.2475	17.8478	16.0699	11.7735	9.0942	7.4300	8.2960	10.7835	14.0067	18.3776	20.7574	22.8658 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-18.5264	-27.4622	-41.4774	-49.0780	-55.0681	-52.1904	-51.5646	-47.6235	-41.0323	-32.4819	-20.8434	-15.8650 (233a)

Full SAP Calculation Printout



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	-6.7383	-14.4854	-29.3784	-44.9968	-60.3565	-60.9563	-60.2286	-50.5882	-36.5563	-20.9858	-9.0829	-5.3048	(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												1587.8334	(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												2675.3989	(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)												179.5499	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-852.8716	(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												3675.9106	(238)

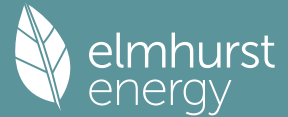
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1587.8334	0.2100	333.4450 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2675.3989	0.2100	561.8338 (264)
Space and water heating			895.2788 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	179.5499	0.1443	25.9146 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-453.2133	0.1335	-60.5241
PV Unit electricity exported	-399.6583	0.1253	-50.0890
Total			-110.6132 (269)
Total CO2, kg/year			822.5095 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.9200 (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	1587.8334	1.1300	1794.2517 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2675.3989	1.1300	3023.2008 (278)
Space and water heating			4817.4525 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	179.5499	1.5338	275.3997 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-453.2133	1.4935	-676.8734
PV Unit electricity exported	-399.6583	0.4600	-183.8505
Total			-860.7239 (283)
Total Primary energy kWh/year			4362.2291 (286)
Target Primary Energy Rate (TPER)			63.2000 (287)

Full SAP Calculation Printout



Property Reference	FLAT B3-2B3P			Issued on Date	12/09/2024
Assessment Reference	FLAT B3-2B3P_Baseline	Prop Type Ref	BLOCK B		
Property	Hornsey Police Station, 98 , Tottenham Ln , London , N8 7EJ				
SAP Rating	85 B	DER	18.30	TER	11.92
Environmental	86 B	% DER < TER			-53.52
CO ₂ Emissions (t/year)	1.04	DFEE	48.88	TFEE	28.78
Compliance Check	See BREL	% DFEE < TFEE			-69.82
% DPER < TPER	-54.07	DPER	97.37	TPER	63.20
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, ARCHANAUM				

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)
Ground floor	69.0200 (1b)	2.5000 (2b)	172.5500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	172.5500 (5)

2. Ventilation rate

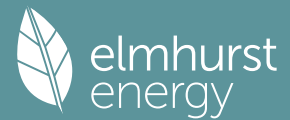
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1159 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	8.0000 (17)
Infiltration rate	0.5159 (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) = 0.5159 (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	0.6578	0.6449	0.6320	0.5675	0.5546	0.4901	0.4901	0.4772	0.5159	0.5546	0.5804	0.6062 (22b)
Effective ac	0.7163	0.7079	0.6997	0.6610	0.6538	0.6201	0.6201	0.6139	0.6331	0.6538	0.6684	0.6837 (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
Door			3.4100	1.6000	5.4560		(26)
Window S (Uw = 1.60)			9.0400	1.5038	13.5940		(27)
External Wall	69.4300	12.4500	56.9800	0.2600	14.8148	190.0000	10826.2000 (29a)
Total net area of external elements Aum(A, m ²)			69.4300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		33.8648		(33)
Party Wall 1			40.6000	0.0000	0.0000	180.0000	7308.0000 (32)
Party Floor 1			69.0200			40.0000	2760.8000 (32d)
Party Ceiling 1			69.0200			30.0000	2070.6000 (32b)
Internal Wall 1			78.3500			75.0000	5876.2500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	28841.8500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							417.8767 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				4.3200	0.5000		2.1600
E3 Sill				4.3200	0.0400		0.1728
E4 Jamb				16.8600	0.0500		0.8430
E7 Party floor between dwellings (in blocks of flats)				27.7700	0.0700		1.9439
E7 Party floor between dwellings (in blocks of flats)				27.7700	0.0700		1.9439
E16 Corner (normal)				12.5000	0.0900		1.1250

Full SAP Calculation Printout



E25 Staggered party wall between dwellings	7.5000	0.1200	0.9000
E18 Party wall between dwellings	15.0000	0.0600	0.9000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	16.2400	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	16.2400	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	7.5000	-0.0900	-0.6750
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.3136 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	43.1784 (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	40.7894	40.3111	39.8422	37.6399	37.2279	35.3097	35.3097	34.9545	36.0486	37.2279	38.0614	38.9329 (38)
Average = Sum(39)m / 12 =	83.9678	83.4895	83.0206	80.8183	80.4063	78.4881	78.4881	78.1329	79.2270	80.4063	81.2398	82.1113 (39)
												80.8163
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2166	1.2096	1.2028	1.1709	1.1650	1.1372	1.1372	1.1320	1.1479	1.1650	1.1770	1.1897 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

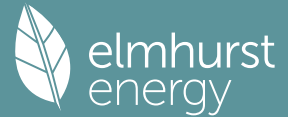
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.2221 (42)
Hot water usage for mixer showers	61.4769	60.5531	59.2068	56.6309	54.7300	52.6101	51.4052	52.7413	54.2059	56.4820	59.1132	61.2414 (42a)
Hot water usage for baths	26.5603	26.1659	25.6104	24.5862	23.8193	22.9689	22.5095	23.0611	23.6617	24.5717	25.6170	26.4705 (42b)
Hot water usage for other uses	37.3865	36.0270	34.6675	33.3080	31.9485	30.5890	30.5890	31.9485	33.3080	34.6675	36.0270	37.3865 (42c)
Average daily hot water use (litres/day)												115.2930 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	125.4238	122.7459	119.4847	114.5251	110.4978	106.1680	104.5037	107.7509	111.1756	115.7212	120.7571	125.0984 (44)
Energy content (annual)	198.6406	174.7886	183.6435	156.7791	148.7512	130.5459	126.3882	133.4181	137.0906	157.0325	172.0407	195.8739 (45)
Distribution loss (46)m = 0.15 x (45)m	29.7961	26.2183	27.5465	23.5169	22.3127	19.5819	18.9582	20.0127	20.5636	23.5549	25.8061	29.3811 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3800 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7452 (55)
Total storage loss	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (56)
If cylinder contains dedicated solar storage	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (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												
	245.0042	216.6654	230.0071	201.6471	195.1148	175.4139	172.7518	179.7817	181.9586	203.3961	216.9087	242.2375 (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	245.0042	216.6654	230.0071	201.6471	195.1148	175.4139	172.7518	179.7817	181.9586	203.3961	216.9087	242.2375 (64)
12Total per year (kWh/year)												2460.8870 (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	2461 (64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	103.1389	91.6186	98.1523	88.0235	86.5507	79.3009	79.1150	81.4524	81.4770	89.3042	93.0979	102.2190 (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	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.0722	118.5442	107.0722	110.6413	107.0722	110.6413	107.0722	107.0722	110.6413	107.0722	110.6413	107.0722 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	194.9991	197.0226	191.9234	181.0681	167.3651	154.4862	145.8823	143.8589	148.9580	159.8133	173.5163	186.3952 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105 (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)	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840 (71)
Water heating gains (Table 5)	138.6275	136.3373	131.9252	122.2548	116.3315	110.1402	106.3373	109.4790	113.1625	120.0325	129.3027	137.3911 (72)
Total internal gains	500.0303	511.2355	490.2523	473.2956	450.1003	431.5991	415.6233	416.7416	429.0932	446.2495	472.7917	490.1899 (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	5.6400		19.6403		0.2500		0.7000		0.7700		13.4338 (76)	
West	3.4000		19.6403		0.2500		0.7000		0.7700		8.0984 (80)	
Solar gains	21.5321	42.1214	69.3680	101.1691	123.9865	126.9222	120.8351	103.7956	80.6778	49.9806	26.8480	17.7070 (83)
Total gains	521.5624	553.3569	559.6203	574.4647	574.0868	558.5213	536.4584	520.5372	509.7711	496.2301	499.6398	507.8969 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	95.4130	95.9597	96.5017	99.1313	99.6393	102.0744	102.0744	102.5384	101.1225	99.6393	98.6170	97.5704
alpha	7.3609	7.3973	7.4334	7.6088	7.6426	7.8050	7.8050	7.8359	7.7415	7.6426	7.5745	7.5047
util living area	0.9996	0.9992	0.9982	0.9927	0.9657	0.8342	0.6362	0.6783	0.9140	0.9924	0.9988	0.9996 (86)
MIT	20.1133	20.2029	20.3495	20.5875	20.8042	20.9630	20.9959	20.9935	20.9181	20.6518	20.3627	20.1197 (87)
Th 2	20.3917	20.3952	20.3986	20.4145	20.4175	20.4314	20.4314	20.4340	20.4261	20.4175	20.4115	20.4052 (88)
util rest of house	0.9994	0.9989	0.9976	0.9901	0.9521	0.7816	0.5579	0.6008	0.8779	0.9891	0.9984	0.9996 (89)
MIT 2	19.5563	19.6488	19.7981	20.0484	20.2612	20.4099	20.4299	20.4315	20.3716	20.1151	19.8223	19.5742 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.7683	19.8597	20.0080	20.2536	20.4679	20.6204	20.6453	20.6454	20.5796	20.3194	20.0280	19.7818 (92)
Temperature adjustment	-0.1500											
adjusted MIT	19.6183	19.7097	19.8580	20.1036	20.3179	20.4704	20.4953	20.4954	20.4296	20.1694	19.8780	19.6318 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9992	0.9986	0.9969	0.9883	0.9493	0.7856	0.5669	0.6094	0.8782	0.9873	0.9980	0.9994 (94)
Useful gains	521.1587	552.5573	557.8976	567.7437	544.9869	438.7537	304.0937	317.2257	447.6840	489.9197	498.6190	507.5779 (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	1286.2458	1236.4513	1108.9873	905.4527	692.9296	460.7605	305.7386	319.9860	501.4761	769.4412	1038.0830	1267.1247 (97)
Space heating kWh	569.2249	459.5767	410.0108	243.1505	110.0694	0.0000	0.0000	0.0000	0.0000	207.9640	388.4141	565.1029 (98a)
Space heating requirement - total per year (kWh/year)	2953.5132											
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	569.2249	459.5767	410.0108	243.1505	110.0694	0.0000	0.0000	0.0000	0.0000	207.9640	388.4141	565.1029 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2953.5132											
Space heating per m2	(98c) / (4) = 42.7921 (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	569.2249	459.5767	410.0108	243.1505	110.0694	0.0000	0.0000	0.0000	0.0000	207.9640	388.4141	565.1029 (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)	636.0054	513.4936	458.1126	271.6765	122.9826	0.0000	0.0000	0.0000	0.0000	232.3621	433.9822	631.3998 (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	245.0042	216.6654	230.0071	201.6471	195.1148	175.4139	172.7518	179.7817	181.9586	203.3961	216.9087	242.2375 (64)
Efficiency of water heater	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	273.7477	242.0842	256.9911	225.3041	218.0054	195.9932	193.0188	200.8734	203.3057	227.2582	242.3561	270.6564 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	43.5514	34.9385	31.4583	23.0477	17.8027	14.5449	16.2402	21.1096	27.4193	35.9756	40.6344	44.7618 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-19.5116	-29.0090	-43.9435	-52.0493	-58.3062	-55.1915	-54.5726	-50.5355	-43.5896	-34.4306	-21.9990	-16.6980 (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	3300.0148 (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	2749.5944 (219)											
Space cooling fuel	0.0000 (221)											
Electricity for pumps and fans:												
central heating pump	41.0000 (230c)											
Total electricity for the above, kWh/year	41.0000 (231)											
Electricity for lighting (calculated in Appendix L)	351.4844 (232)											
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation	-479.8365 (233)											
Wind generation	0.0000 (234)											
Hydro-electric generation (Appendix N)	0.0000 (235a)											

Full SAP Calculation Printout



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	5962.2571 (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	3300.0148	0.2100	693.0031 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2749.5944	0.2100	577.4148 (264)
Space and water heating			1270.4179 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	351.4844	0.1443	50.7301 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-479.8365	0.1335	-64.0693
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-64.0693 (269)
Total CO2, kg/year			1262.7659 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			18.3000 (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	3300.0148	1.1300	3729.0167 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2749.5944	1.1300	3107.0417 (278)
Space and water heating			6836.0584 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	351.4844	1.5338	539.1185 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-479.8365	1.4934	-716.5972
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-716.5972 (283)
Total Primary energy kWh/year			6720.6045 (286)
Dwelling Primary energy Rate (DPER)			97.3700 (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)
Ground floor	69.0200 (1b)	x 2.5000 (2b)	= 172.5500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 172.5500 (5)

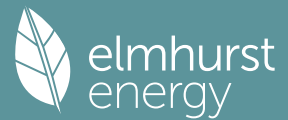
2. Ventilation rate

	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) =	0.1159 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3659	(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) =	0.3659	(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	0.4665	0.4574	0.4482	0.4025	0.3934	0.3476	0.3476	0.3385	0.3659	0.3934	0.4116	0.4299 (22b)
Effective ac	0.6088	0.6046	0.6005	0.5810	0.5774	0.5604	0.5604	0.5573	0.5669	0.5774	0.5847	0.5924 (25)

Full SAP Calculation Printout



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	
TER Opaque door			3.4100	1.0000	3.4100			(26)
TER Opening Type (Uw = 1.20)			9.0400	1.1450	10.3511			(27)
External Wall	69.4300	12.4500	56.9800	0.1800	10.2564			(29a)
Total net area of external elements Aum(A, m2)			69.4300					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.0175			(33)
Party Wall 1			40.6000	0.0000	0.0000			(32)

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

427.8767 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	4.3200	0.0500	0.2160	
E2 Other lintels (including other steel lintels)	4.3200	0.0500	0.2160	
E3 Sill	16.8600	0.0500	0.8430	
E4 Jamb	27.7700	0.0700	1.9439	
E7 Party floor between dwellings (in blocks of flats)	27.7700	0.0700	1.9439	
E16 Corner (normal)	12.5000	0.0900	1.1250	
E25 Staggered party wall between dwellings	7.5000	0.0600	0.4500	
E18 Party wall between dwellings	15.0000	0.0600	0.9000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	16.2400	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	16.2400	0.0000	0.0000	
E17 Corner (inverted - internal area greater than external area)	7.5000	-0.0900	-0.6750	

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

6.9628 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 30.9803 (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	34.6675	34.4269	34.1910	33.0832	32.8759	31.9110	31.9110	31.7323	32.2827	32.8759	33.2952	33.7336	(38)
Average = Sum(39)m / 12 =	65.6478	65.4072	65.1714	64.0635	63.8562	62.8914	62.8914	62.7127	63.2630	63.8562	64.2756	64.7139	(39)
												64.0625	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9511	0.9477	0.9442	0.9282	0.9252	0.9112	0.9112	0.9086	0.9166	0.9252	0.9313	0.9376	(40)
HLP (average)												0.9282	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

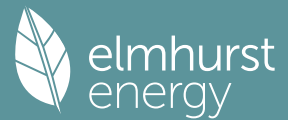
Assumed occupancy													2.2221 (42)
Hot water usage for mixer showers	61.4769	60.5531	59.2068	56.6309	54.7300	52.6101	51.4052	52.7413	54.2059	56.4820	59.1132	61.2414	(42a)
Hot water usage for baths	26.5603	26.1659	25.6104	24.5862	23.8193	22.9689	22.5095	23.0611	23.6617	24.5717	25.6170	26.4705	(42b)
Hot water usage for other uses	37.3865	36.0270	34.6675	33.3080	31.9485	30.5890	30.5890	31.9485	33.3080	34.6675	36.0270	37.3865	(42c)
Average daily hot water use (litres/day)												115.2930	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	125.4238	122.7459	119.4847	114.5251	110.4978	106.1680	104.5037	107.7509	111.1756	115.7212	120.7571	125.0984	(44)
Energy conte	198.6406	174.7886	183.6435	156.7791	148.7512	130.5459	126.3882	133.4181	137.0906	157.0325	172.0407	195.8739	(45)
Energy content (annual)										Total = Sum(45)m =		1914.9930	
Distribution loss (46)m = 0.15 x (45)m	29.7961	26.2183	27.5465	23.5169	22.3127	19.5819	18.9582	20.0127	20.5636	23.5549	25.8061	29.3811	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	245.2355	216.8743	230.2384	201.8710	195.3461	175.6378	172.9831	180.0130	182.1825	203.6274	217.1325	242.4688	(62)
WWHRS	-28.1047	-24.8560	-26.0278	-21.5520	-20.0857	-17.1875	-16.1105	-17.1319	-17.7828	-20.9640	-23.7497	-27.5842	(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	217.1308	192.0183	204.2106	180.3189	175.2604	158.4503	156.8726	162.8811	164.3996	182.6634	193.3828	214.8846	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2202.4734	(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	103.3239	91.7858	98.3374	88.2025	86.7357	79.4800	79.3000	81.6374	81.6561	89.4892	93.2770	102.4040	(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	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.0722	118.5442	107.0722	110.6413	107.0722	110.6413	107.0722	107.0722	110.6413	107.0722	110.6413	107.0722	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	194.9991	197.0226	191.9234	181.0681	167.3651	154.4862	145.8823	143.8589	148.9580	159.8133	173.5163	186.3952	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	(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)	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	(71)
Water heating gains (Table 5)	138.8762	136.5860	132.1739	122.5035	116.5803	110.3889	106.5860	109.7278	113.4113	120.2812	129.5514	137.6398	(72)
Total internal gains	500.2790	511.4842	490.5010	473.5443	450.3490	431.8478	415.8720	416.9903	429.3420	446.4982	473.0405	490.4387	(73)

Full SAP Calculation Printout



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					5.6400	19.6403	0.6300	0.7000	0.7700			33.8531 (76)
West					3.4000	19.6403	0.6300	0.7000	0.7700			20.4079 (80)
Solar gains	54.2610	106.1460	174.8073	254.9460	312.4459	319.8440	304.5045	261.5649	203.3081	125.9511	67.6571	44.6216 (83)
Total gains	554.5400	617.6302	665.3083	728.4903	762.7949	751.6918	720.3765	678.5552	632.6501	572.4494	540.6975	535.0602 (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	124.9599	125.4196	125.8735	128.0502	128.4659	130.4368	130.4368	130.8085	129.6705	128.4659	127.6278	126.7632
alpha	9.3307	9.3613	9.3916	9.5367	9.5644	9.6958	9.6958	9.7206	9.6447	9.5644	9.5085	9.4509
util living area	0.9991	0.9972	0.9887	0.9307	0.7616	0.5349	0.3841	0.4251	0.6839	0.9579	0.9967	0.9994 (86)
MIT	20.4482	20.5550	20.7075	20.9008	20.9868	20.9996	21.0000	21.0000	20.9961	20.8818	20.6384	20.4369 (87)
Th 2	20.1242	20.1272	20.1301	20.1436	20.1461	20.1580	20.1580	20.1602	20.1534	20.1461	20.1410	20.1356 (88)
util rest of house	0.9987	0.9956	0.9825	0.8999	0.6993	0.4649	0.3106	0.3475	0.6034	0.9312	0.9945	0.9990 (89)
MIT 2	19.4909	19.6294	19.8234	20.0588	20.1384	20.1578	20.1580	20.1602	20.1518	20.0459	19.7477	19.4860 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	19.8553	19.9817	20.1599	20.3793	20.4613	20.4782	20.4785	20.4798	20.4732	20.3641	20.0867	19.8479 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.8553	19.9817	20.1599	20.3793	20.4613	20.4782	20.4785	20.4798	20.4732	20.3641	20.0867	19.8479 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9985	0.9953	0.9828	0.9093	0.7230	0.4916	0.3386	0.3770	0.6343	0.9392	0.9943	0.9989 (94)
Useful gains	553.6880	614.7243	653.8459	662.4242	551.4749	369.4953	243.9172	255.8436	401.2735	537.6171	537.5990	534.4519 (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	1021.1696	986.4518	890.2370	735.4050	559.4662	369.6884	243.9217	255.8557	403.1860	623.4968	834.7257	1012.6382 (97)
Space heating kWh	347.8064	249.8009	175.8750	52.5462	5.9455	0.0000	0.0000	0.0000	0.0000	63.8945	213.9312	355.7706 (98a)
Space heating requirement - total per year (kWh/year)	1465.5702											
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	347.8064	249.8009	175.8750	52.5462	5.9455	0.0000	0.0000	0.0000	0.0000	63.8945	213.9312	355.7706 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1465.5702											
Space heating per m2	(98c) / (4) = 21.2340 (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	347.8064	249.8009	175.8750	52.5462	5.9455	0.0000	0.0000	0.0000	0.0000	63.8945	213.9312	355.7706 (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)	376.8216	270.6402	190.5472	56.9297	6.4415	0.0000	0.0000	0.0000	0.0000	69.2248	231.7781	385.4503 (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	217.1308	192.0183	204.2106	180.3189	175.2604	158.4503	156.8726	162.8811	164.3996	182.6634	193.3828	214.8846 (64)
Efficiency of water heater	85.1107	84.6508	83.7266	81.6677	80.0663	79.8000	79.8000	79.8000	79.8000	81.9525	84.2868	79.8000 (216)
Fuel for water heating, kWh/month	255.1158	226.8358	243.9017	220.7958	218.8942	198.5592	196.5821	204.1116	206.0146	222.8895	229.4344	252.2641 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.2475	17.8478	16.0699	11.7735	9.0942	7.4300	8.2960	10.7835	14.0067	18.3776	20.7574	22.8658 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-18.5264	-27.4622	-41.4774	-49.0780	-55.0681	-52.1904	-51.5646	-47.6235	-41.0323	-32.4819	-20.8434	-15.8650 (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	-6.7383	-14.4854	-29.3784	-44.9968	-60.3565	-60.9563	-60.2286	-50.5882	-36.5563	-20.9858	-9.0829	-5.3048 (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)												

Full SAP Calculation Printout



(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												1587.8334	(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												2675.3989	(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)												179.5499	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-852.8716	(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												3675.9106	(238)

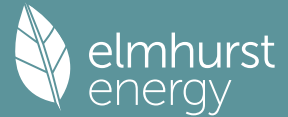
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1587.8334	0.2100	333.4450	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2675.3989	0.2100	561.8338	(264)
Space and water heating			895.2788	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	179.5499	0.1443	25.9146	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-453.2133	0.1335	-60.5241	
PV Unit electricity exported	-399.6583	0.1253	-50.0890	
Total			-110.6132	(269)
Total CO2, kg/year			822.5095	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.9200	(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	1587.8334	1.1300	1794.2517	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2675.3989	1.1300	3023.2008	(278)
Space and water heating			4817.4525	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	179.5499	1.5338	275.3997	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-453.2133	1.4935	-676.8734	
PV Unit electricity exported	-399.6583	0.4600	-183.8505	
Total			-860.7239	(283)
Total Primary energy kWh/year			4362.2291	(286)
Target Primary Energy Rate (TPER)			63.2000	(287)

Full SAP Calculation Printout



Property Reference	FLAT B3-2B3P				Issued on Date	12/09/2024
Assessment Reference	FLAT B3-2B3P_BeLean	Prop Type Ref	BLOCK B			
Property	Hornsey Police Station, 98 , Tottenham Ln , London , N8 7EJ					
SAP Rating	82 B	DER	14.06	TER	11.92	
Environmental	89 B	% DER < TER				-17.95
CO ₂ Emissions (t/year)	0.85	DFEE	27.18	TFEE	28.78	
Compliance Check	See BREL	% DFEE < TFEE				5.57
% DPER < TPER	-32.90	DPER	83.99	TPER	63.20	
Assessor Details	Mr. Mirza Baig				Assessor ID	CK52-0001
Client	Archanaeum Ltd, ARCHANAUM					

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)
Ground floor	69.0200 (1b)	2.5000 (2b)	172.5500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	172.5500 (5)

2. Ventilation rate

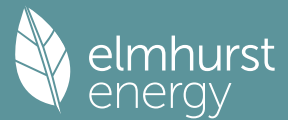
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2000 (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	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												46.2000 (23c)
Effective ac	0.5240	0.5190	0.5140	0.4890	0.4840	0.4590	0.4590	0.4540	0.4690	0.4840	0.4940	0.5040 (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
Door			3.4100	0.9800	3.3418		(26)
Window S (Uw = 1.20)			9.0400	1.1450	10.3511		(27)
External Wall	69.4300	12.4500	56.9800	0.1800	10.2564	190.0000	10826.2000 (29a)
Total net area of external elements Aum(A, m ²)			69.4300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	23.9493		(33)
Party Wall 1			40.6000	0.0000	0.0000	180.0000	7308.0000 (32)
Party Floor 1			69.0200			40.0000	2760.8000 (32a)
Party Ceiling 1			69.0200			30.0000	2070.6000 (32b)
Internal Wall 1			78.3500			75.0000	5876.2500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	28841.8500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							417.8767 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.3200	0.0410	0.1771	

Full SAP Calculation Printout



E3 Sill								4.3200	0.0210	0.0907		
E4 Jamb								16.8600	0.0160	0.2698		
E7 Party floor between dwellings (in blocks of flats)								27.7700	0.0000	0.0000		
E7 Party floor between dwellings (in blocks of flats)								27.7700	0.0000	0.0000		
E16 Corner (normal)								12.5000	0.0540	0.6750		
E25 Staggered party wall between dwellings								7.5000	0.1200	0.9000		
E18 Party wall between dwellings								15.0000	0.0600	0.9000		
P3 Party wall - intermediate floor between dwellings (in blocks of flats)								16.2400	0.0000	0.0000		
P3 Party wall - intermediate floor between dwellings (in blocks of flats)								16.2400	0.0000	0.0000		
E17 Corner (inverted - internal area greater than external area)								7.5000	-0.0900	-0.6750		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											2.3376	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss									(33) + (36) + (36a) =		26.2869	(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	29.8373	29.5526	29.2679	27.8444	27.5597	26.1361	26.1361	25.8514	26.7056	27.5597	28.1291	28.6985 (38)
Average = Sum(39)m / 12 =	56.1243	55.8396	55.5549	54.1313	53.8466	52.4231	52.4231	52.1384	52.9925	53.8466	54.4160	54.9855 (39)
												54.0602
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8132	0.8090	0.8049	0.7843	0.7802	0.7595	0.7595	0.7554	0.7678	0.7802	0.7884	0.7967 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.7833

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.2221 (42)
Hot water usage for mixer showers												
	61.4769	60.5531	59.2068	56.6309	54.7300	52.6101	51.4052	52.7413	54.2059	56.4820	59.1132	61.2414 (42a)
Hot water usage for baths												
	26.5603	26.1659	25.6104	24.5862	23.8193	22.9689	22.5095	23.0611	23.6617	24.5717	25.6170	26.4705 (42b)
Hot water usage for other uses												
	37.3865	36.0270	34.6675	33.3080	31.9485	30.5890	30.5890	31.9485	33.3080	34.6675	36.0270	37.3865 (42c)
Average daily hot water use (litres/day)												115.2930 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	125.4238	122.7459	119.4847	114.5251	110.4978	106.1680	104.5037	107.7509	111.1756	115.7212	120.7571	125.0984 (44)
Energy conte	198.6406	174.7886	183.6435	156.7791	148.7512	130.5459	126.3882	133.4181	137.0906	157.0325	172.0407	195.8739 (45)
Energy content (annual)										Total = Sum(45)m =		1914.9930
Distribution loss (46)m = 0.15 x (45)m												
	29.7961	26.2183	27.5465	23.5169	22.3127	19.5819	18.9582	20.0127	20.5636	23.5549	25.8061	29.3811 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3800 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7452 (55)
Total storage loss												
	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (56)
If cylinder contains dedicated solar storage												
	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (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												
	245.0042	216.6654	230.0071	201.6471	195.1148	175.4139	172.7518	179.7817	181.9586	203.3961	216.9087	242.2375 (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												
	245.0042	216.6654	230.0071	201.6471	195.1148	175.4139	172.7518	179.7817	181.9586	203.3961	216.9087	242.2375 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2460.8870 (64)
Electric shower(s)												2461 (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												
	103.1389	91.6186	98.1523	88.0235	86.5507	79.3009	79.1150	81.4524	81.4770	89.3042	93.0979	102.2190 (65)

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

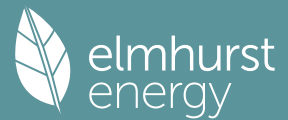
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	107.0722	118.5442	107.0722	110.6413	107.0722	110.6413	107.0722	107.0722	110.6413	107.0722	110.6413	107.0722 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	194.9991	197.0226	191.9234	181.0681	167.3651	154.4862	145.8823	143.8589	148.9580	159.8133	173.5163	186.3952 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105 (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)												
	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840 (71)
Water heating gains (Table 5)												
	138.6275	136.3373	131.9252	122.2548	116.3315	110.1402	106.3373	109.4790	113.1625	120.0325	129.3027	137.3911 (72)
Total internal gains												
	500.0303	511.2355	490.2523	473.2956	450.1003	431.5991	415.6233	416.7416	429.0932	446.2495	472.7917	490.1899 (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				5.6400	19.6403	0.2500	0.7000			0.7700		13.4338 (76)
West				3.4000	19.6403	0.2500	0.7000			0.7700		8.0984 (80)

Solar gains	21.5321	42.1214	69.3680	101.1691	123.9865	126.9222	120.8351	103.7956	80.6778	49.9806	26.8480	17.7070 (83)

Full SAP Calculation Printout



Total gains 521.5624 553.3569 559.6203 574.4647 574.0868 558.5213 536.4584 520.5372 509.7711 496.2301 499.6398 507.8969 (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	142.7479	143.4757	144.2110	148.0035	148.7860	152.8263	152.8263	153.6608	151.1841	148.7860	147.2291	145.7044
alpha	10.5165	10.5650	10.6141	10.8669	10.9191	11.1884	11.1884	11.2441	11.0789	10.9191	10.8153	10.7136
util living area	0.9991	0.9977	0.9935	0.9626	0.8411	0.5999	0.4300	0.4607	0.7121	0.9602	0.9961	0.9993 (86)
MIT	20.6404	20.6953	20.7726	20.8901	20.9572	20.9718	20.9721	20.9722	20.9697	20.9049	20.7655	20.6403 (87)
Th 2	20.5934	20.5955	20.5975	20.6079	20.6099	20.6202	20.6202	20.6223	20.6161	20.6099	20.6058	20.6017 (88)
util rest of house	0.9988	0.9971	0.9918	0.9533	0.8138	0.5646	0.3929	0.4229	0.6744	0.9487	0.9950	0.9991 (89)
MIT 2	20.2518	20.3085	20.3871	20.5106	20.5713	20.5922	20.5923	20.5945	20.5867	20.5270	20.3879	20.2593 (90)
Living area fraction	fLA = Living area / (4) = 0.3806 (91)											
MIT	20.3997	20.4557	20.5338	20.6551	20.7182	20.7366	20.7369	20.7383	20.7325	20.6709	20.5316	20.4043 (92)
Temperature adjustment	-0.1500											
adjusted MIT	20.2497	20.3057	20.3838	20.5051	20.5682	20.5866	20.5869	20.5883	20.5825	20.5209	20.3816	20.2543 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9986	0.9966	0.9907	0.9505	0.8107	0.5615	0.3896	0.4195	0.6711	0.9457	0.9942	0.9989 (94)
Useful gains	520.8185	551.4795	554.3961	546.0273	465.4231	313.6204	209.0014	218.3636	342.0993	469.2646	496.7569	507.3181 (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	895.1678	860.2488	771.3143	628.1974	477.5221	313.8381	209.0048	218.3708	343.5247	534.2050	722.7323	882.7516 (97)
Space heating kWh	278.5159	207.4929	161.3871	59.1624	9.0016	0.0000	0.0000	0.0000	0.0000	48.3157	162.7023	279.3225 (98a)
Space heating requirement - total per year (kWh/year)	1205.9005											
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	278.5159	207.4929	161.3871	59.1624	9.0016	0.0000	0.0000	0.0000	0.0000	48.3157	162.7023	279.3225 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1205.9005											
Space heating per m2	(98c) / (4) = 17.4718 (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	278.5159	207.4929	161.3871	59.1624	9.0016	0.0000	0.0000	0.0000	0.0000	48.3157	162.7023	279.3225 (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)	311.1909	231.8357	180.3208	66.1033	10.0577	0.0000	0.0000	0.0000	0.0000	53.9840	181.7903	312.0922 (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	245.0042	216.6654	230.0071	201.6471	195.1148	175.4139	172.7518	179.7817	181.9586	203.3961	216.9087	242.2375 (64)
Efficiency of water heater	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	273.7477	242.0842	256.9911	225.3041	218.0054	195.9932	193.0188	200.8734	203.3057	227.2582	242.3561	270.6564 (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	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	92.8773	83.8892	92.8773	89.8812	92.8773	89.8812	92.8773	92.8773	89.8812	92.8773	89.8812	92.8773 (231)
Lighting	24.0058	19.2583	17.3400	12.7040	9.8130	8.0173	8.9517	11.6358	15.1137	19.8300	22.3979	24.6730 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-20.1674	-30.4058	-46.8859	-56.8370	-65.1877	-62.6113	-62.1012	-56.7592	-47.8419	-36.7304	-22.9438	-17.2279 (233a)
(233a)m	-20.1674	-30.4058	-46.8859	-56.8370	-65.1877	-62.6113	-62.1012	-56.7592	-47.8419	-36.7304	-22.9438	-17.2279 (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)
(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)	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												
Space heating fuel - main system 1	1347.3748 (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	2749.5944 (219)											
Space cooling fuel	0.0000 (221)											

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Table 4g: in-use factor = 2.5000, SFP = 5.0000)

mechanical ventilation fans (SFP = 5.0000)

1052.5550 (230a)

central heating pump

41.0000 (230c)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	1093.5550 (231)
Electricity for lighting (calculated in Appendix L)	193.7405 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-525.6994 (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	4858.5654 (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	1347.3748	0.2100	282.9487 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2749.5944	0.2100	577.4148 (264)
Space and water heating			860.3635 (265)
Pumps, fans and electric keep-hot	1093.5550	0.1387	151.6896 (267)
Energy for lighting	193.7405	0.1443	27.9627 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-525.6994	0.1330	-69.9265
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-69.9265 (269)
Total CO2, kg/year			970.0893 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			14.0600 (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	1347.3748	1.1300	1522.5335 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2749.5944	1.1300	3107.0417 (278)
Space and water heating			4629.5752 (279)
Pumps, fans and electric keep-hot	1093.5550	1.5128	1654.3300 (281)
Energy for lighting	193.7405	1.5338	297.1656 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-525.6994	1.4915	-784.0880
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-784.0880 (283)
Total Primary energy kWh/year			5796.9829 (286)
Dwelling Primary energy Rate (DPER)			83.9900 (287)

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

1. Overall dwelling characteristics

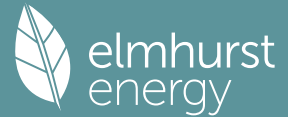
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	69.0200 (1b)	x 2.5000 (2b)	= 172.5500 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 172.5500 (5)

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) = 0.1159 (8)
Pressure Test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3659 (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) = 0.3659 (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												

Full SAP Calculation Printout



Effective ac	0.4665	0.4574	0.4482	0.4025	0.3934	0.3476	0.3476	0.3385	0.3659	0.3934	0.4116	0.4299 (22b)
	0.6088	0.6046	0.6005	0.5810	0.5774	0.5604	0.5604	0.5573	0.5669	0.5774	0.5847	0.5924 (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
TER Opaque door			3.4100	1.0000	3.4100		(26)
TER Opening Type (Uw = 1.20)			9.0400	1.1450	10.3511		(27)
External Wall	69.4300	12.4500	56.9800	0.1800	10.2564		(29a)
Total net area of external elements Aum(A, m2)			69.4300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	24.0175		(33)
Party Wall 1			40.6000	0.0000	0.0000		(32)

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

427.8767 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	4.3200	0.0500	0.2160
E3 Sill	4.3200	0.0500	0.2160
E4 Jamb	16.8600	0.0500	0.8430
E7 Party floor between dwellings (in blocks of flats)	27.7700	0.0700	1.9439
E7 Party floor between dwellings (in blocks of flats)	27.7700	0.0700	1.9439
E16 Corner (normal)	12.5000	0.0900	1.1250
E25 Staggered party wall between dwellings	7.5000	0.0600	0.4500
E18 Party wall between dwellings	15.0000	0.0600	0.9000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	16.2400	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	16.2400	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	7.5000	-0.0900	-0.6750

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

6.9628 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 30.9803 (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	34.6675	34.4269	34.1910	33.0832	32.8759	31.9110	31.9110	31.7323	32.2827	32.8759	33.2952	33.7336 (38)
Heat transfer coeff	65.6478	65.4072	65.1714	64.0635	63.8562	62.8914	62.8914	62.7127	63.2630	63.8562	64.2756	64.7139 (39)
Average = Sum(39)m / 12 =												64.0625

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9511	0.9477	0.9442	0.9282	0.9252	0.9112	0.9112	0.9086	0.9166	0.9252	0.9313	0.9376 (40)
HLP (average)												0.9282
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

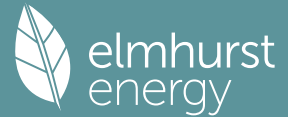
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2221 (42)
Hot water usage for mixer showers	61.4769	60.5531	59.2068	56.6309	54.7300	52.6101	51.4052	52.7413	54.2059	56.4820	59.1132	61.2414 (42a)
Hot water usage for baths	26.5603	26.1659	25.6104	24.5862	23.8193	22.9689	22.5095	23.0611	23.6617	24.5717	25.6170	26.4705 (42b)
Hot water usage for other uses	37.3865	36.0270	34.6675	33.3080	31.9485	30.5890	30.5890	31.9485	33.3080	34.6675	36.0270	37.3865 (42c)
Average daily hot water use (litres/day)												115.2930 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	125.4238	122.7459	119.4847	114.5251	110.4978	106.1680	104.5037	107.7509	111.1756	115.7212	120.7571	125.0984 (44)
Energy conte	198.6406	174.7886	183.6435	156.7791	148.7512	130.5459	126.3882	133.4181	137.0906	157.0325	172.0407	195.8739 (45)
Energy content (annual)										Total = Sum(45)m =		1914.9930
Distribution loss (46)m = 0.15 x (45)m	29.7961	26.2183	27.5465	23.5169	22.3127	19.5819	18.9582	20.0127	20.5636	23.5549	25.8061	29.3811 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	245.2355	216.8743	230.2384	201.8710	195.3461	175.6378	172.9831	180.0130	182.1825	203.6274	217.1325	242.4688 (62)
WWHRS	-28.1047	-24.8560	-26.0278	-21.5520	-20.0857	-17.1875	-16.1105	-17.1319	-17.7828	-20.9640	-23.7497	-27.5842 (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	217.1308	192.0183	204.2106	180.3189	175.2604	158.4503	156.8726	162.8811	164.3996	182.6634	193.3828	214.8846 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2202.4734 (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 (64a)
Heat gains from water heating, kWh/month	103.3239	91.7858	98.3374	88.2025	86.7357	79.4800	79.3000	81.6374	81.6561	89.4892	93.2770	102.4040 (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	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050	111.1050 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.0722	118.5442	107.0722	110.6413	107.0722	110.6413	107.0722	107.0722	110.6413	107.0722	110.6413	107.0722 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	194.9991	197.0226	191.9234	181.0681	167.3651	154.4862	145.8823	143.8589	148.9580	159.8133	173.5163	186.3952 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105	34.1105 (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)

Full SAP Calculation Printout



Losses e.g. evaporation (negative values) (Table 5)	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840	-88.8840 (71)
Water heating gains (Table 5)	138.9762	136.5860	132.1739	122.5035	116.5803	110.3889	106.5860	109.7278	113.4113	120.2812	129.5514	137.6398 (72)
Total internal gains	500.2790	511.4842	490.5010	473.5443	450.3490	431.8478	415.8720	416.9903	429.3420	446.4982	473.0405	490.4387 (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			5.6400	19.6403	0.6300	0.7000	0.7700	33.8531 (76)				
West			3.4000	19.6403	0.6300	0.7000	0.7700	20.4079 (80)				
Solar gains	54.2610	106.1460	174.8073	254.9460	312.4459	319.8440	304.5045	261.5649	203.3081	125.9511	67.6571	44.6216 (83)
Total gains	554.5400	617.6302	665.3083	728.4903	762.7949	751.6918	720.3765	678.5552	632.6501	572.4494	540.6975	535.0602 (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	124.9599	125.4196	125.8735	128.0502	128.4659	130.4368	130.4368	130.8085	129.6705	128.4659	127.6278	126.7632
alpha	9.3307	9.3613	9.3916	9.5367	9.5644	9.6958	9.6958	9.7206	9.6447	9.5644	9.5085	9.4509
util living area	0.9991	0.9972	0.9887	0.9307	0.7616	0.5349	0.3841	0.4251	0.6839	0.9579	0.9967	0.9994 (86)
MIT	20.4482	20.5550	20.7075	20.9008	20.9868	20.9996	21.0000	21.0000	20.9961	20.8818	20.6384	20.4369 (87)
Th 2	20.1242	20.1272	20.1301	20.1436	20.1461	20.1580	20.1580	20.1602	20.1534	20.1461	20.1410	20.1356 (88)
util rest of house	0.9987	0.9956	0.9825	0.8999	0.6993	0.4649	0.3106	0.3475	0.6034	0.9312	0.9945	0.9990 (89)
MIT 2	19.4909	19.6294	19.8234	20.0588	20.1384	20.1578	20.1580	20.1602	20.1518	20.0459	19.7477	19.4860 (90)
Living area fraction									f _{LA} = Living area / (4) =			0.3806 (91)
MIT	19.8553	19.9817	20.1599	20.3793	20.4613	20.4782	20.4785	20.4798	20.4732	20.3641	20.0867	19.8479 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8553	19.9817	20.1599	20.3793	20.4613	20.4782	20.4785	20.4798	20.4732	20.3641	20.0867	19.8479 (93)

8. Space heating requirement

Utilisation	0.9985	0.9953	0.9828	0.9093	0.7230	0.4916	0.3386	0.3770	0.6343	0.9392	0.9943	0.9989 (94)
Useful gains	553.6880	614.7243	653.8459	662.4242	551.4749	369.4953	243.9172	255.8436	401.2735	537.6171	537.5990	534.4519 (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	1021.1696	986.4518	890.2370	735.4050	559.4662	369.6884	243.9217	255.8557	403.1860	623.4968	834.7257	1012.6382 (97)
Space heating kWh	347.8064	249.8009	175.8750	52.5462	5.9455	0.0000	0.0000	0.0000	0.0000	63.8945	213.9312	355.7706 (98a)
Space heating requirement - total per year (kWh/year)												1465.5702
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	347.8064	249.8009	175.8750	52.5462	5.9455	0.0000	0.0000	0.0000	0.0000	63.8945	213.9312	355.7706 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1465.5702
Space heating per m ²										(98c) / (4) =		21.2340 (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	347.8064	249.8009	175.8750	52.5462	5.9455	0.0000	0.0000	0.0000	0.0000	63.8945	213.9312	355.7706 (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)	376.8216	270.6402	190.5472	56.9297	6.4415	0.0000	0.0000	0.0000	0.0000	69.2248	231.7781	385.4503 (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	217.1308	192.0183	204.2106	180.3189	175.2604	158.4503	156.8726	162.8811	164.3996	182.6634	193.3828	214.8846 (64)
Efficiency of water heater	85.1107	84.6508	83.7266	81.6677	80.0663	79.8000	79.8000	79.8000	79.8000	81.9525	84.2868	79.8000 (216)
Fuel for water heating, kWh/month	255.1158	226.8358	243.9017	220.7958	218.8942	198.5592	196.5821	204.1116	206.0146	222.8895	229.4344	252.2641 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.2475	17.8478	16.0699	11.7735	9.0942	7.4300	8.2960	10.7835	14.0067	18.3776	20.7574	22.8658 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-18.5264	-27.4622	-41.4774	-49.0780	-55.0681	-52.1904	-51.5646	-47.6235	-41.0323	-32.4819	-20.8434	-15.8650 (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)

Full SAP Calculation Printout



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	-6.7383	-14.4854	-29.3784	-44.9968	-60.3565	-60.2286	-50.5882	-36.5563	-20.9858	-9.0829	-5.3048		(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												1587.8334	(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												2675.3989	(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)												179.5499	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-852.8716	(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												3675.9106	(238)

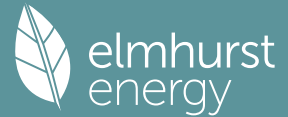
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1587.8334	0.2100	333.4450 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2675.3989	0.2100	561.8338 (264)
Space and water heating			895.2788 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	179.5499	0.1443	25.9146 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-453.2133	0.1335	-60.5241
PV Unit electricity exported	-399.6583	0.1253	-50.0890
Total			-110.6132 (269)
Total CO2, kg/year			822.5095 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.9200 (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	1587.8334	1.1300	1794.2517 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2675.3989	1.1300	3023.2008 (278)
Space and water heating			4817.4525 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	179.5499	1.5338	275.3997 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-453.2133	1.4935	-676.8734
PV Unit electricity exported	-399.6583	0.4600	-183.8505
Total			-860.7239 (283)
Total Primary energy kWh/year			4362.2291 (286)
Target Primary Energy Rate (TPER)			63.2000 (287)

Full SAP Calculation Printout



Property Reference	FLAT C2-1B2P				Issued on Date	12/09/2024
Assessment Reference	FLAT C2-1B2P	Prop Type Ref		BLOCK C		
Property	Hornsey Police Station, 88/90 , Tottenham Ln. , London , N8 7EJ					
SAP Rating	83 B	DER	4.52	TER	15.64	
Environmental	97 A	% DER < TER				71.10
CO ₂ Emissions (t/year)	0.2	DFEE	40.30	TFEE	41.76	
Compliance Check	See BREL	% DFEE < TFEE				3.49
% DPER < TPER	42.90	DPER	47.33	TPER	82.88	
Assessor Details	Mr. Mirza Baig				Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M					

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)
Ground floor	50.7400 (1b)	2.6000 (2b)	131.9240 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.7400		131.9240 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	131.9240 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.2000	(18)
Number of sides sheltered	0	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2000 (21)

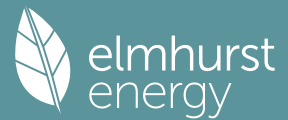
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												73.6000 (23c)
Effective ac	0.3870	0.3820	0.3770	0.3520	0.3470	0.3220	0.3220	0.3170	0.3320	0.3470	0.3570	0.3670 (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
Window North (Uw = 1.20)			4.0900	1.1450	4.6832		(27)
Door			3.4100	0.9800	3.3418		(26)
Window S (Uw = 1.20)			8.2400	1.1450	9.4351		(27)
GF			50.4400	0.0700	3.5308	110.0000	(28a)
External Wall	50.4400	15.7400	34.7000	0.1800	6.2460	190.0000	(29a)
Total net area of external elements Aum(A, m ²)			100.8800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.2369		(33)
Party Wall 1			24.3300	0.0000	0.0000	180.0000	(32)
Party Ceiling 1			50.4400			30.0000	(32b)
Internal Wall 1			65.2000			75.0000	(32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22924.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							451.7935 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

SAP 10 Online 2.15.14 Page 2 of 7

Full SAP Calculation Printout



Total gains 435.0867 480.8669 515.5844 560.3780 584.5608 577.3265 553.6872 523.2768 490.0283 444.8689 422.9834 420.3549 (84)

7. Mean internal temperature (heating season)

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

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	128.9650	129.5361	130.1122	133.0716	133.6797	136.8054	136.8054	137.4482	135.5377	133.6797	132.4690	131.2800	21.0000 (85)
alpha	9.5977	9.6357	9.6741	9.8714	9.9120	10.1204	10.1204	10.1632	10.0358	9.9120	9.8313	9.7520	
util living area	0.9990	0.9968	0.9871	0.9221	0.7455	0.5157	0.3699	0.4072	0.6580	0.9492	0.9959	0.9992 (86)	
Living	20.4870	20.5892	20.7357	20.9178	20.9905	20.9998	21.0000	21.0000	20.9977	20.9034	20.6742	20.4795	
Non living	19.6505	19.7550	19.9009	20.0784	20.1305	20.1527	20.1528	20.1564	20.1449	20.0739	19.8554	19.6557	
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	20.7376	20.5892	20.7357	20.9178	20.9905	20.9998	21.0000	21.0000	20.9977	20.9034	20.6742	20.5523 (87)	
Th 2	20.1058	20.1094	20.1130	20.1310	20.1346	20.1528	20.1528	20.1564	20.1455	20.1346	20.1274	20.1202 (88)	
util rest of house	0.9984	0.9949	0.9797	0.8879	0.6820	0.4476	0.2987	0.3326	0.5786	0.9175	0.9930	0.9988 (89)	
MIT 2	19.8729	19.7550	19.9009	20.0784	20.1305	20.1527	20.1528	20.1564	20.1449	20.0739	19.8554	19.7207 (90)	
Living area fraction									fLA = Living area / (4) =			0.4687 (91)	
MIT	20.2781	20.1459	20.2921	20.4718	20.5336	20.5497	20.5498	20.5518	20.5445	20.4626	20.2391	20.1105 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.2781	20.1459	20.2921	20.4718	20.5336	20.5497	20.5498	20.5518	20.5445	20.4626	20.2391	20.1105 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9985	0.9950	0.9815	0.9025	0.7119	0.4795	0.3320	0.3676	0.6160	0.9311	0.9935	0.9988 (94)	
Useful gains	434.4404	478.4503	506.0601	505.7458	416.1216	276.8511	183.8483	192.3406	301.8481	414.2057	420.2347	419.8427 (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	788.9368	749.4643	674.9959	553.7367	420.7831	276.9362	183.8500	192.3452	302.7748	469.8028	631.5969	771.7413 (97)	
Space heating kWh	263.7454	182.1214	125.6882	34.5535	3.4681	0.0000	0.0000	0.0000	0.0000	41.3643	152.1807	261.8126 (98a)	
Space heating requirement - total per year (kWh/year)												1064.9342	
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	263.7454	182.1214	125.6882	34.5535	3.4681	0.0000	0.0000	0.0000	0.0000	41.3643	152.1807	261.8126 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1064.9342	
Space heating per m2										(98c) / (4) =		20.9881 (99)	

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

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)	0.0000 (201)
Efficiency of main space heating system 1 (in %)	1.0000 (202)
Efficiency of main space heating system 2 (in %)	237.6864 (206)
Efficiency of secondary/supplementary heating system, %	0.0000 (207)
	0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	263.7454	182.1214	125.6882	34.5535	3.4681	0.0000	0.0000	0.0000	0.0000	41.3643	152.1807	261.8126 (98)	
Space heating efficiency (main heating system 1)	237.6864	237.6864	237.6864	237.6864	237.6864	0.0000	0.0000	0.0000	0.0000	237.6864	237.6864	237.6864 (210)	
Space heating fuel (main heating system)	110.9636	76.6225	52.8799	14.5374	1.4591	0.0000	0.0000	0.0000	0.0000	17.4029	64.0259	110.1504 (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	213.5047	188.8592	200.5963	176.0997	170.5608	153.5181	151.3100	157.3611	159.1506	177.6881	189.2359	211.1231 (64)	
Efficiency of water heater (217)m	194.2835	194.2835	194.2835	194.2835	194.2835	194.2835	194.2835	194.2835	194.2835	194.2835	194.2835	194.2835 (216)	
Fuel for water heating, kWh/month	109.8934	97.2080	103.2493	90.6405	87.7896	79.0176	77.8810	80.9956	81.9167	91.4581	97.4019	108.6675 (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	9.9514	8.9884	9.9514	9.6304	9.9514	9.6304	9.9514	9.9514	9.6304	9.9514	9.6304	9.9514 (231)	
Lighting	16.2352	13.0245	11.7271	8.5918	6.6365	5.4221	6.0541	7.8693	10.2215	13.4111	15.1478	16.6864 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-6.5649	-11.5345	-20.9038	-28.4497	-34.7801	-34.0692	-33.3691	-29.0583	-22.1609	-14.6616	-7.8139	-5.3673 (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												448.0417 (211)	
Space heating fuel - main system 2												0.0000 (213)	
Space heating fuel - secondary												0.0000 (215)	
Efficiency of water heater												194.2835	
Water heating fuel used												1106.1192 (219)	
Space cooling fuel												0.0000 (221)	

Full SAP Calculation Printout



Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.7280)	
Mechanical ventilation fans (SFP = 0.7280)	117.1696 (230a)
Total electricity for the above, kWh/year	117.1696 (231)
Electricity for lighting (calculated in Appendix L)	131.0275 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-248.7333 (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	1553.6248 (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	448.0417	0.1578	70.6980 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1106.1192	0.1409	155.8639 (264)
Space and water heating			226.5619 (265)
Pumps, fans and electric keep-hot	117.1696	0.1387	16.2529 (267)
Energy for lighting	131.0275	0.1443	18.9113 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-248.7333	0.1310	-32.5723
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-32.5723 (269)
Total CO2, kg/year			229.1537 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.5200 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	448.0417	1.5841	709.7585 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1106.1192	1.5210	1682.4481 (278)
Space and water heating			2392.2066 (279)
Pumps, fans and electric keep-hot	117.1696	1.5128	177.2542 (281)
Energy for lighting	131.0275	1.5338	200.9744 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-248.7333	1.4838	-369.0636
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-369.0636 (283)
Total Primary energy kWh/year			2401.3716 (286)
Dwelling Primary energy Rate (DPER)			47.3300 (287)

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

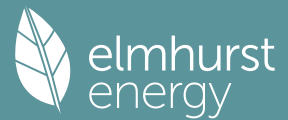
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.7400 (1b)	x 2.6000 (2b)	= 131.9240 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.7400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	131.9240 (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) = 0.1516 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4016 (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) = 0.4016 (21)

Full SAP Calculation Printout



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												
Effective ac	0.5120	0.5020	0.4920	0.4418	0.4317	0.3815	0.3815	0.3715	0.4016	0.4317	0.4518	0.4719 (22b)
	0.6311	0.6260	0.6210	0.5976	0.5932	0.5728	0.5728	0.5690	0.5806	0.5932	0.6021	0.6113 (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
TER Opaque door			3.4100	1.0000	3.4100		(26)
TER Opening Type (Uw = 1.20)			9.2800	1.1450	10.6260		(27)
GF			50.4400	0.1300	6.5572		(28a)
External Wall	50.4400	12.6900	37.7500	0.1800	6.7950		(29a)
Total net area of external elements Aum(A, m2)			100.8800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		27.3882		(33)
Party Wall 1			24.3300	0.0000	0.0000		(32)

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

461.7343 (35)

List of Thermal Bridges

K1 Element	Length W/m2K	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.0500	0.0500	0.2525
E3 Sill	0.9000	0.0500	0.0450
E4 Jamb	19.2200	0.0500	0.9610
E5 Ground floor (normal)	19.4000	0.1600	3.1040
E7 Party floor between dwellings (in blocks of flats)	19.4000	0.0700	1.3580
E16 Corner (normal)	5.2000	0.0900	0.4680
E25 Staggered party wall between dwellings	2.6000	0.0600	0.1560
E18 Party wall between dwellings	5.2000	0.0600	0.3120
P1 Party wall - Ground floor	9.3600	0.0800	0.7488
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	9.3600	0.0000	0.0000

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

7.4053 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 34.7935 (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	27.4746	27.2530	27.0358	26.0155	25.8246	24.9359	24.9359	24.7713	25.2782	25.8246	26.2108	26.6145 (38)
Heat transfer coeff	62.2681	62.0465	61.8292	60.8089	60.6180	59.7294	59.7294	59.5648	60.0717	60.6180	61.0042	61.4079 (39)
Average = Sum(39)m / 12 =												60.8080

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2272	1.2228	1.2186	1.1984	1.1947	1.1772	1.1772	1.1739	1.1839	1.1947	1.2023	1.2102 (40)
HLP (average)												1.1984
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

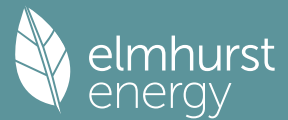
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7119 (42)
Hot water usage for mixer showers	52.9225	52.1272	50.9682	48.7508	47.1144	45.2895	44.2522	45.4024	46.6632	48.6226	50.8876	52.7197 (42a)	
Hot water usage for baths	22.8816	22.5418	22.0633	21.1809	20.5202	19.7876	19.3919	19.8671	20.3845	21.1684	22.0689	22.8043 (42b)	
Hot water usage for other uses	32.1616	30.9921	29.8226	28.6531	27.4836	26.3140	26.3140	27.4836	28.6531	29.8226	30.9921	32.1616 (42c)	
Average daily hot water use (litres/day)												99.2455 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.9657	105.6611	102.8541	98.5848	95.1182	91.3912	89.9582	92.7531	95.7008	99.6136	103.9487	107.6856 (44)	
Energy content (annual)	170.9913	150.4600	158.0829	134.9577	128.0474	112.3761	108.7966	114.8477	118.0086	135.1747	148.0939	168.6097 (45)	
Distribution loss (46)m = 0.15 x (45)m	25.6487	22.5690	23.7124	20.2436	19.2071	16.8564	16.3195	17.2272	17.7013	20.2762	22.2141	25.2914 (46)	
Water storage loss:													
Store volume												150.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.7527 (55)	
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)	
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month	217.5863	192.5457	204.6778	180.0495	174.6423	157.4680	155.3915	161.4426	163.1005	181.7696	193.1858	215.2046 (62)	
WWHRS	-24.1940	-21.3973	-22.4061	-18.5531	-17.2908	-14.7959	-13.8688	-14.7481	-15.3084	-18.0469	-20.4449	-23.7459 (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	193.3923	171.1484	182.2718	161.4964	157.3515	142.6721	141.5228	146.6945	147.7921	163.7227	172.7408	191.4586 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1972.2639 (64)	
Electric shower(s)												1972 (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	94.1305	83.6965	89.8385	80.9469	79.8517	73.4385	73.4508	75.4628	75.3113	82.2215	85.3147	93.3386 (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	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	76.6474	84.8596	76.6474	79.2023	76.6474	79.2023	76.6474	76.6474	79.2023	76.6474	79.2023	76.6474 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												

Full SAP Calculation Printout



Cooking gains	149.1557	150.7035	146.8032	138.4998	128.0183	118.1672	111.5861	110.0383	113.9386	122.2420	132.7235	142.5746 (68)
Pumps, fans	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595 (69)
Losses e.g. evaporation	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)	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762 (71)
Total internal gains	126.5196	124.5484	120.7507	112.4262	107.3275	101.9980	98.7242	101.4285	104.5991	110.5128	118.4927	125.4552 (72)
	404.0012	411.7900	395.8798	381.8069	363.6718	348.0461	335.6362	336.7927	346.4186	361.0807	382.0970	396.3557 (73)

6. Solar gains

[Jan]												Gains
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	W
East					6.2000	19.6403	0.6300		0.7000		0.7700	37.2144 (76)
West					3.0800	19.6403	0.6300		0.7000		0.7700	18.4871 (80)
Solar gains	55.7015	108.9640	179.4482	261.7145	320.7409	328.3354	312.5887	268.5091	208.7057	129.2950	69.4533	45.8062 (83)
Total gains	459.7027	520.7541	575.3280	643.5214	684.4128	676.3815	648.2250	605.3018	555.1243	490.3757	451.5502	442.1619 (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	104.5140	104.8873	105.2558	107.0219	107.3590	108.9563	108.9563	109.2573	108.3354	107.3590	106.6793	105.9780
alpha	7.9676	7.9925	8.0171	8.1348	8.1573	8.2638	8.2638	8.2838	8.2224	8.1573	8.1120	8.0652
util living area	0.9992	0.9974	0.9896	0.9403	0.7878	0.5630	0.4053	0.4523	0.7283	0.9682	0.9972	0.9994 (86)
MIT	20.2715	20.3979	20.5890	20.8355	20.9690	20.9981	20.9999	20.9997	20.9871	20.8040	20.4996	20.2586 (87)
Th 2	19.8983	19.9018	19.9052	19.9212	19.9243	19.9383	19.9383	19.9409	19.9329	19.9243	19.9182	19.9118 (88)
util rest of house	0.9986	0.9957	0.9830	0.9077	0.7126	0.4709	0.3076	0.3484	0.6258	0.9429	0.9951	0.9990 (89)
MIT 2	19.0736	19.2376	19.4808	19.7822	19.9068	19.9378	19.9383	19.9409	19.9281	19.7581	19.3811	19.0679 (90)
Living area fraction	19.6350	19.7814	20.0002	20.2759	20.4046	20.4347	20.4358	20.4371	20.4244	20.2482	19.9053	19.6259 (91)
MIT	19.6350	19.7814	20.0002	20.2759	20.4046	20.4347	20.4358	20.4371	20.4244	20.2482	19.9053	19.6259 (92)
Temperature adjustment	19.6350	19.7814	20.0002	20.2759	20.4046	20.4347	20.4358	20.4371	20.4244	20.2482	19.9053	19.6259 (93)
adjusted MIT	19.6350	19.7814	20.0002	20.2759	20.4046	20.4347	20.4358	20.4371	20.4244	20.2482	19.9053	19.6259 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9985	0.9955	0.9837	0.9199	0.7477	0.5142	0.3534	0.3972	0.6745	0.9521	0.9950	0.9989 (94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (95)
Heat loss rate W	954.8797	923.3390	834.7076	691.7537	527.6576	348.5036	229.1115	240.4707	379.9184	584.8579	781.1774	947.2758 (97)
Space heating kWh	368.9365	272.1149	199.9544	71.8605	11.8694	0.0000	0.0000	0.0000	0.0000	87.7799	238.9506	376.1812 (98a)
Space heating requirement - total per year (kWh/year)	368.9365	272.1149	199.9544	71.8605	11.8694	0.0000	0.0000	0.0000	0.0000	87.7799	238.9506	1627.6473
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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Space heating kWh	368.9365	272.1149	199.9544	71.8605	11.8694	0.0000	0.0000	0.0000	0.0000	87.7799	238.9506	376.1812 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	368.9365	272.1149	199.9544	71.8605	11.8694	0.0000	0.0000	0.0000	0.0000	87.7799	238.9506	1627.6473
Space heating per m ²	(98c) / (4) = 32.0782 (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)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	368.9365	272.1149	199.9544	71.8605	11.8694	0.0000	0.0000	0.0000	0.0000	87.7799	238.9506	376.1812 (98)
Space heating fuel (main heating system)	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 efficiency (main heating system 2)	399.7145	294.8157	216.6353	77.8553	12.8596	0.0000	0.0000	0.0000	0.0000	95.1028	258.8847	407.5636 (211)
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 (212)
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 (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	193.3923	171.1484	182.2718	161.4964	157.3515	142.6721	141.5228	146.6945	147.7921	163.7227	172.7408	191.4586 (64)
Efficiency of water heater (217)m	85.4843	85.0945	84.2679	82.3708	80.3714	79.8000	79.8000	79.8000	79.8000	82.7263	84.7877	79.8000 (216)
Fuel for water heating, kWh/month	226.2314	201.1275	216.3004	196.0602	195.7805	178.7871	177.3468	183.8277	185.2031	197.9088	203.7334	223.8083 (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	15.9258	12.7763	11.5036	8.4280	6.5101	5.3188	5.9387	7.7193	10.0267	13.1555	14.8591	16.3684 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-17.4667	-25.5296	-38.0409	-44.4106	-49.3421	-46.6192	-46.0801	-42.7985	-37.2292	-29.9469	-19.5325	-14.9995 (233a)

Full SAP Calculation Printout



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	-7.2978	-15.5875	-31.4119	-47.8014	-63.7970	-64.2872	-63.4995	-53.4684	-38.8230	-22.4620	-9.8012	-5.7511	(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												1763.4316	(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												2386.1151	(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)												128.5304	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-835.9839	(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												3528.0933	(238)

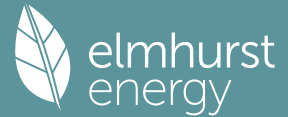
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1763.4316	0.2100	370.3206	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2386.1151	0.2100	501.0842	(264)
Space and water heating			871.4048	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	128.5304	0.1443	18.5509	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-411.9959	0.1338	-55.1276	
PV Unit electricity exported	-423.9880	0.1255	-53.2211	
Total			-108.3488	(269)
Total CO2, kg/year			793.5362	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.6400	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1763.4316	1.1300	1992.6777	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2386.1151	1.1300	2696.3101	(278)
Space and water heating			4688.9878	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	128.5304	1.5338	197.1443	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-411.9959	1.4945	-615.7200	
PV Unit electricity exported	-423.9880	0.4607	-195.3512	
Total			-811.0712	(283)
Total Primary energy kWh/year			4205.1617	(286)
Target Primary Energy Rate (TPER)			82.8800	(287)

Full SAP Calculation Printout



Property Reference	FLAT C2-1B2P				Issued on Date	12/09/2024
Assessment Reference	FLAT C2-1B2P_Baseline	Prop Type Ref	BLOCK C			
Property	Hornsey Police Station, 88/90 , Tottenham Ln. , London , N8 7EJ					
SAP Rating	83 B	DER	24.48	TER	15.64	
Environmental	83 B	% DER < TER				-56.52
CO ₂ Emissions (t/year)	1.04	DFEE	70.03	TFEE	41.76	
Compliance Check	See BREL	% DFEE < TFEE				-67.72
% DPER < TPER	-56.12	DPER	129.39	TPER	82.88	
Assessor Details	Mr. Mirza Baig				Assessor ID	CK52-0001
Client	Archanaeum Ltd, ARCHANAUM					

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)
Ground floor	50.7400 (1b)	2.6000 (2b)	131.9240 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.7400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	131.9240 (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) = 0.1516 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	8.0000 (17)
Infiltration rate	0.5516 (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) = 0.5516 (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	0.7033	0.6895	0.6757	0.6068	0.5930	0.5240	0.5240	0.5102	0.5516	0.5930	0.6206	0.6481 (22b)
Effective ac	0.7473	0.7377	0.7283	0.6841	0.6758	0.6373	0.6373	0.6302	0.6521	0.6758	0.6925	0.7100 (25)

3. Heat losses and heat loss parameter

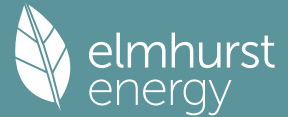
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Window North (Uw = 1.60)			4.0900	1.5038	6.1504		(27)
Door			3.4100	1.6000	5.4560		(26)
Window S (Uw = 1.60)			8.2400	1.5038	12.3910		(27)
GF			50.4400	0.1800	9.0792	110.0000	5548.4000 (28a)
External Wall	50.4400	15.7400	34.7000	0.2600	9.0220	190.0000	6593.0000 (29a)
Total net area of external elements Aum(A, m ²)			100.8800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.0986		(33)
Party Wall 1			24.3300	0.0000	0.0000	180.0000	4379.4000 (32)
Party Ceiling 1			50.4400			30.0000	1513.2000 (32b)
Internal Wall 1			65.2000			75.0000	4890.0000 (32c)

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
(28)...(30) + (32) + (32a)...(32e) = 22924.0000 (34)
451.7935 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.0500	0.5000	2.5250
E3 Sill	0.9000	0.0400	0.0360
E4 Jamb	19.2200	0.0500	0.9610
E5 Ground floor (normal)	19.4000	0.1600	3.1040
E7 Party floor between dwellings (in blocks of flats)	19.4000	0.0700	1.3580

Full SAP Calculation Printout



E16 Corner (normal)	5.2000	0.0900	0.4680
E25 Staggered party wall between dwellings	2.6000	0.1200	0.3120
E18 Party wall between dwellings	5.2000	0.0600	0.3120
P1 Party wall - Ground floor	9.3600	0.0800	0.7488
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	9.3600	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.8248 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	51.9234 (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	32.5341	32.1160	31.7062	29.7814	29.4213	27.7448	27.7448	27.4343	28.3905	29.4213	30.1498	30.9115 (38)
Average = Sum(39)m / 12 =	84.4575	84.0394	83.6296	81.7047	81.3446	79.6681	79.6681	79.3577	80.3139	81.3446	82.0732	82.8348 (39)
												81.7030
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.6645	1.6563	1.6482	1.6103	1.6032	1.5701	1.5701	1.5640	1.5829	1.6032	1.6175	1.6325 (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												1.7119 (42)
Hot water usage for mixer showers												
	52.9225	52.1272	50.9682	48.7508	47.1144	45.2895	44.2522	45.4024	46.6632	48.6226	50.8876	52.7197 (42a)
Hot water usage for baths												
	22.8816	22.5418	22.0633	21.1809	20.5202	19.7876	19.3919	19.8671	20.3845	21.1684	22.0689	22.8043 (42b)
Hot water usage for other uses												
	32.1616	30.9921	29.8226	28.6531	27.4836	26.3140	26.3140	27.4836	28.6531	29.8226	30.9921	32.1616 (42c)
Average daily hot water use (litres/day)												99.2455 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	107.9657	105.6611	102.8541	98.5848	95.1182	91.3912	89.9582	92.7531	95.7008	99.6136	103.9487	107.6856 (44)
Energy content (annual)	170.9913	150.4600	158.0829	134.9577	128.0474	112.3761	108.7966	114.8477	118.0086	135.1747	148.0939	168.6097 (45)
Distribution loss (46)m = 0.15 x (45)m												1648.4466
	25.6487	22.5690	23.7124	20.2436	19.2071	16.8564	16.3195	17.2272	17.7013	20.2762	22.2141	25.2914 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3800 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7452 (55)
Total storage loss												
	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (56)
If cylinder contains dedicated solar storage												
	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (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												
	217.3549	192.3368	204.4465	179.8257	174.4110	157.2441	155.1602	161.2113	162.8766	181.5383	192.9619	214.9733 (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												
	217.3549	192.3368	204.4465	179.8257	174.4110	157.2441	155.1602	161.2113	162.8766	181.5383	192.9619	214.9733 (64)
12Total per year (kWh/year)												2194.3406 (64)
Electric shower(s)												2194 (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												
	93.9455	83.5294	89.6534	80.7678	79.6666	73.2595	73.2658	75.2777	75.1323	82.0365	85.1356	93.1536 (65)

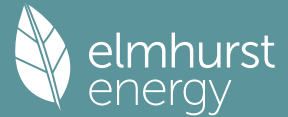
5. Internal gains (see Table 5 and 5a)

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	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	75.2319	83.2925	75.2319	77.7397	75.2319	77.7397	75.2319	75.2319	77.7397	75.2319	77.7397	75.2319 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	149.1557	150.7035	146.8032	138.4998	128.0183	118.1672	111.5861	110.0383	113.9386	122.2420	132.7235	142.5746 (68)
Pumps, fans	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595 (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)
Water heating gains (Table 5)	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762 (71)
Total internal gains	126.2708	124.2997	120.5019	112.1775	107.0788	101.7492	98.4755	101.1797	104.3504	110.2641	118.2439	125.2064 (72)
	402.3370	409.9742	394.2156	380.0956	362.0076	346.3347	333.9721	335.1286	344.7072	359.4166	380.3856	394.6915 (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				4.0900	19.6403		0.5200		0.7000		0.7700	20.2631 (80)
East				8.2400	19.6403		0.2500		0.7000		0.7700	19.6266 (76)
Solar gains	39.8897	78.0327	128.5088	187.4224	229.6932	235.1318	223.8551	192.2882	149.4610	92.5924	49.7378	32.8034 (83)
Total gains	442.2267	488.0069	522.7244	567.5180	591.7008	581.4665	557.8272	527.4168	494.1683	452.0089	430.1234	427.4949 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	75.3963	75.7714	76.1427	77.9365	78.2815	79.9288	79.9288	80.2415	79.2861	78.2815	77.5866	76.8732
alpha	6.0264	6.0514	6.0762	6.1958	6.2188	6.3286	6.3286	6.3494	6.2857	6.2188	6.1724	6.1249
util living area	0.9994	0.9987	0.9966	0.9861	0.9431	0.8008	0.6156	0.6701	0.9069	0.9905	0.9985	0.9995 (86)
MIT	19.8185	19.9430	20.1547	20.4736	20.7563	20.9455	20.9912	20.9856	20.8696	20.5110	20.1279	19.8196 (87)
Th 2	20.1677	20.1719	20.1759	20.1949	20.1984	20.2149	20.2149	20.2180	20.2086	20.1984	20.1912	20.1837 (88)
util rest of house	0.9992	0.9982	0.9953	0.9805	0.9188	0.7298	0.5124	0.5671	0.8596	0.9857	0.9979	0.9993 (89)
MIT 2	19.0719	19.1996	19.4141	19.7453	20.0172	20.1866	20.2123	20.2132	20.1276	19.7868	19.4002	19.0860 (90)
Living area fraction									fLA = Living area /	(4) =		0.4687 (91)
MIT	19.4218	19.5480	19.7612	20.0867	20.3636	20.5423	20.5774	20.5752	20.4753	20.1262	19.7413	19.4298 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.2718	19.3980	19.6112	19.9367	20.2136	20.3923	20.4274	20.4252	20.3253	19.9762	19.5913	19.2798 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9988	0.9976	0.9942	0.9782	0.9194	0.7471	0.5411	0.5955	0.8677	0.9839	0.9973	0.9991 (94)
Useful gains	441.7147	486.8528	519.6735	555.1375	544.0033	434.4412	301.8578	314.0799	428.8084	444.7272	428.9488	427.0995 (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	1264.4812	1218.4042	1096.4829	901.7468	692.5327	461.4605	304.9182	319.4322	499.9808	762.7015	1025.1967	1249.1344 (97)
Space heating kWh	612.1383	491.6025	429.1462	249.5587	110.5059	0.0000	0.0000	0.0000	0.0000	236.5729	429.2984	611.5940 (98a)
Space heating requirement - total per year (kWh/year)												3170.4168
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	612.1383	491.6025	429.1462	249.5587	110.5059	0.0000	0.0000	0.0000	0.0000	236.5729	429.2984	611.5940 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3170.4168
Space heating per m2										(98c) / (4) =		62.4836 (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	612.1383	491.6025	429.1462	249.5587	110.5059	0.0000	0.0000	0.0000	0.0000	236.5729	429.2984	611.5940 (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)	683.9534	549.2766	479.4929	278.8365	123.4702	0.0000	0.0000	0.0000	0.0000	264.3272	479.6631	683.3452 (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	217.3549	192.3368	204.4465	179.8257	174.4110	157.2441	155.1602	161.2113	162.8766	181.5383	192.9619	214.9733 (64)	
Efficiency of water heater	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	242.8547	214.9014	228.4318	200.9225	194.8726	175.6917	173.3634	180.1243	181.9851	202.8361	215.5999	240.1936 (219)	
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)	
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)	
Lighting	30.6004	24.5488	22.1035	16.1939	12.5087	10.2197	11.4108	14.8322	19.2656	25.2775	28.5509	31.4509 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-18.3740	-26.9102	-40.1676	-46.8699	-51.9179	-48.9586	-48.4265	-45.1322	-39.3570	-31.6451	-20.5806	-15.7709 (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													3542.3652 (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													2451.7772 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
central heating pump													41.0000 (230c)
Total electricity for the above, kWh/year													41.0000 (231)
Electricity for lighting (calculated in Appendix L)													246.9628 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-434.1105 (233)
Wind generation													0.0000 (234)
Hydro-electric generation (Appendix N)													0.0000 (235a)

Full SAP Calculation Printout



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	5847.9948 (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	3542.3652	0.2100	743.8967 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2451.7772	0.2100	514.8732 (264)
Space and water heating			1258.7699 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	246.9628	0.1443	35.6444 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-434.1105	0.1338	-58.0906
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-58.0906 (269)
Total CO2, kg/year			1242.0109 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			24.4800 (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	3542.3652	1.1300	4002.8727 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2451.7772	1.1300	2770.5083 (278)
Space and water heating			6773.3809 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	246.9628	1.5338	378.7998 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-434.1105	1.4945	-648.7848
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-648.7848 (283)
Total Primary energy kWh/year			6565.4207 (286)
Dwelling Primary energy Rate (DPER)			129.3900 (287)

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

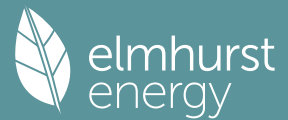
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.7400 (1b)	x 2.6000 (2b)	= 131.9240 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.7400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 131.9240 (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) = 0.1516 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4016 (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) = 0.4016 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000 (22)
Wind factor	1.2750 1.2500 1.2250 1.1000 1.0750 0.9500 0.9500 0.9250 1.0000 1.0750 1.1250 1.1750 (22a)
Adj infilt rate	0.5120 0.5020 0.4920 0.4418 0.4317 0.3815 0.3815 0.3715 0.4016 0.4317 0.4518 0.4719 (22b)
Effective ac	0.6311 0.6260 0.6210 0.5976 0.5932 0.5728 0.5728 0.5690 0.5806 0.5932 0.6021 0.6113 (25)

Full SAP Calculation Printout



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	
TER Opaque door			3.4100	1.0000	3.4100			(26)
TER Opening Type (Uw = 1.20)			9.2800	1.1450	10.6260			(27)
GF			50.4400	0.1300	6.5572			(28a)
External Wall	50.4400	12.6900	37.7500	0.1800	6.7950			(29a)
Total net area of external elements Aum(A, m ²)			100.8800					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	27.3882		(33)
Party Wall 1			24.3300	0.0000	0.0000			(32)

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

461.7343 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	5.0500	0.0500	0.2525	
E2 Other lintels (including other steel lintels)	0.9000	0.0500	0.0450	
E3 Sill	19.2200	0.0500	0.9610	
E4 Jamb	19.4000	0.1600	3.1040	
E5 Ground floor (normal)	19.4000	0.0700	1.3580	
E7 Party floor between dwellings (in blocks of flats)	5.2000	0.0900	0.4680	
E16 Corner (normal)	2.6000	0.0600	0.1560	
E25 Staggered party wall between dwellings	5.2000	0.0600	0.3120	
E18 Party wall between dwellings	9.3600	0.0800	0.7488	
P1 Party wall - Ground floor	9.3600	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				7.4053 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.0000
Point Thermal bridges				(36a) =
Total fabric heat loss				(33) + (36) + (36a) = 34.7935 (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	27.4746	27.2530	27.0358	26.0155	25.8246	24.9359	24.9359	24.7713	25.2782	25.8246	26.2108	26.6145	(38)
Heat transfer coeff	62.2681	62.0465	61.8292	60.8089	60.6180	59.7294	59.7294	59.5648	60.0717	60.6180	61.0042	61.4079	(39)
Average = Sum(39)m / 12 =												60.8080	
HLP	1.2272	1.2228	1.2186	1.1984	1.1947	1.1772	1.1772	1.1739	1.1839	1.1947	1.2023	1.2102	(40)
HLP (average)												1.1984	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

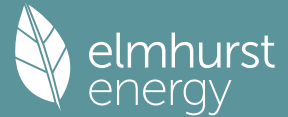
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7119 (42)
Hot water usage for mixer showers	52.9225	52.1272	50.9682	48.7508	47.1144	45.2895	44.2522	45.4024	46.6632	48.6226	50.8876	52.7197	(42a)
Hot water usage for baths	22.8816	22.5418	22.0633	21.1809	20.5202	19.7876	19.3919	19.8671	20.3845	21.1684	22.0689	22.8043	(42b)
Hot water usage for other uses	32.1616	30.9921	29.8226	28.6531	27.4836	26.3140	26.3140	27.4836	28.6531	29.8226	30.9921	32.1616	(42c)
Average daily hot water use (litres/day)												99.2455	(43)
Daily hot water use	107.9657	105.6611	102.8541	98.5848	95.1182	91.3912	89.9582	92.7531	95.7008	99.6136	103.9487	107.6856	(44)
Energy conte	170.9913	150.4600	158.0829	134.9577	128.0474	112.3761	108.7966	114.8477	118.0086	135.1747	148.0939	168.6097	(45)
Energy content (annual)										Total = Sum(45)m =		1648.4466	
Distribution loss (46)m = 0.15 x (45)m	25.6487	22.5690	23.7124	20.2436	19.2071	16.8564	16.3195	17.2272	17.7013	20.2762	22.2141	25.2914	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	217.5863	192.5457	204.6778	180.0495	174.6423	157.4680	155.3915	161.4426	163.1005	181.7696	193.1858	215.2046	(62)
WWHRS	-24.1940	-21.3973	-22.4061	-18.5531	-17.2908	-14.7959	-13.8688	-14.7481	-15.3084	-18.0469	-20.4449	-23.7459	(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	193.3923	171.1484	182.2718	161.4964	157.3515	142.6721	141.5228	146.6945	147.7921	163.7227	172.7408	191.4586	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1972.2639	(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	94.1305	83.6965	89.8385	80.9469	79.8517	73.4385	73.4508	75.4628	75.3113	82.2215	85.3147	93.3386	(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	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	76.6474	84.8596	76.6474	79.2023	76.6474	79.2023	76.6474	76.6474	79.2023	76.6474	79.2023	76.6474	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.1557	150.7035	146.8032	138.4998	128.0183	118.1672	111.5861	110.0383	113.9386	122.2420	132.7235	142.5746	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	(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)	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	(71)
Water heating gains (Table 5)	126.5196	124.5484	120.7507	112.4262	107.3275	101.9980	98.7242	101.4285	104.5991	110.5128	118.4927	125.4552	(72)
Total internal gains	404.0012	411.7900	395.8798	381.8069	363.6718	348.0461	335.6362	336.7927	346.4186	361.0807	382.0970	396.3557	(73)

Full SAP Calculation Printout



6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
East				6.2000	19.6403		0.6300		0.7000	0.7700	37.2144 (76)
West				3.0800	19.6403		0.6300		0.7000	0.7700	18.4871 (80)
Solar gains	55.7015	108.9640	179.4482	261.7145	320.7409	328.3354	312.5887	268.5091	208.7057	129.2950	45.8062 (83)
Total gains	459.7027	520.7541	575.3280	643.5214	684.4128	676.3815	648.2250	605.3018	555.1243	490.3757	442.1619 (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	104.5140	104.8873	105.2558	107.0219	107.3590	108.9563	108.9563	109.2573	108.3354	107.3590	106.6793	105.9780	
alpha	7.9676	7.9925	8.0171	8.1348	8.1573	8.2638	8.2638	8.2838	8.2224	8.1573	8.1120	8.0652	
util living area	0.9992	0.9974	0.9896	0.9403	0.7878	0.5630	0.4053	0.4523	0.7283	0.9682	0.9972	0.9994 (86)	
MIT	20.2715	20.3979	20.5890	20.8355	20.9690	20.9981	20.9999	20.9997	20.9871	20.8040	20.4996	20.2586 (87)	
Th 2	19.8983	19.9018	19.9052	19.9212	19.9243	19.9383	19.9383	19.9409	19.9329	19.9243	19.9182	19.9118 (88)	
util rest of house	0.9986	0.9957	0.9830	0.9077	0.7126	0.4709	0.3076	0.3484	0.6258	0.9429	0.9951	0.9990 (89)	
MIT 2	19.0736	19.2376	19.4808	19.7822	19.9068	19.9378	19.9383	19.9409	19.9281	19.7581	19.3811	19.0679 (90)	
Living area fraction									fLA = Living area / (4) =				0.4687 (91)
MIT	19.6350	19.7814	20.0002	20.2759	20.4046	20.4347	20.4358	20.4371	20.4244	20.2482	19.9053	19.6259 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.6350	19.7814	20.0002	20.2759	20.4046	20.4347	20.4358	20.4371	20.4244	20.2482	19.9053	19.6259 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9985	0.9955	0.9837	0.9199	0.7477	0.5142	0.3534	0.3972	0.6745	0.9521	0.9950	0.9989 (94)
Useful gains	458.9974	518.4061	565.9517	591.9475	511.7041	347.7976	229.0841	240.4015	374.4485	466.8742	449.3015	441.6559 (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	954.8797	923.3390	834.7076	691.7537	527.6576	348.5036	229.1115	240.4707	379.9184	584.8579	781.1774	947.2758 (97)
Space heating kWh	368.9365	272.1149	199.9544	71.8605	11.8694	0.0000	0.0000	0.0000	0.0000	87.7799	238.9506	376.1812 (98a)
Space heating requirement - total per year (kWh/year)												1627.6473
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	368.9365	272.1149	199.9544	71.8605	11.8694	0.0000	0.0000	0.0000	0.0000	87.7799	238.9506	376.1812 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1627.6473
Space heating per m2										(98c) / (4) =		32.0782 (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	368.9365	272.1149	199.9544	71.8605	11.8694	0.0000	0.0000	0.0000	0.0000	87.7799	238.9506	376.1812 (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)	399.7145	294.8157	216.6353	77.8553	12.8596	0.0000	0.0000	0.0000	0.0000	95.1028	258.8847	407.5636 (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	193.3923	171.1484	182.2718	161.4964	157.3515	142.6721	141.5228	146.6945	147.7921	163.7227	172.7408	191.4586 (64)
Efficiency of water heater	85.4843	85.0945	84.2679	82.3708	80.3714	79.8000	79.8000	79.8000	79.8000	82.7263	84.7877	79.8000 (216)
Fuel for water heating, kWh/month	226.2314	201.1275	216.3004	196.0602	195.7805	178.7871	177.3468	183.8277	185.2031	197.9088	203.7334	223.8083 (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	15.9258	12.7763	11.5036	8.4280	6.5101	5.3188	5.9387	7.7193	10.0267	13.1555	14.8591	16.3684 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-17.4667	-25.5296	-38.0409	-44.4106	-49.3421	-46.6192	-46.0801	-42.7985	-37.2292	-29.9469	-19.5325	-14.9995 (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)	-7.2978	-15.5875	-31.4119	-47.8014	-63.7970	-64.2872	-63.4995	-53.4684	-38.8230	-22.4620	-9.8012	-5.7511 (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)												

Full SAP Calculation Printout



(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												1763.4316	(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												2386.1151	(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)												128.5304	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-835.9839	(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												3528.0933	(238)

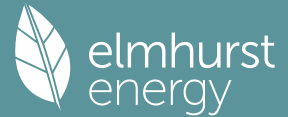
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1763.4316	0.2100	370.3206	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2386.1151	0.2100	501.0842	(264)
Space and water heating			871.4048	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	128.5304	0.1443	18.5509	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-411.9959	0.1338	-55.1276	
PV Unit electricity exported	-423.9880	0.1255	-53.2211	
Total			-108.3488	(269)
Total CO2, kg/year			793.5362	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.6400	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1763.4316	1.1300	1992.6777	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2386.1151	1.1300	2696.3101	(278)
Space and water heating			4688.9878	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	128.5304	1.5338	197.1443	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-411.9959	1.4945	-615.7200	
PV Unit electricity exported	-423.9880	0.4607	-195.3512	
Total			-811.0712	(283)
Total Primary energy kWh/year			4205.1617	(286)
Target Primary Energy Rate (TPER)			82.8800	(287)

Full SAP Calculation Printout



Property Reference	FLAT C2-1B2P			Issued on Date	12/09/2024
Assessment Reference	FLAT C2-1B2P_BeLean	Prop Type Ref	BLOCK C		
Property	Hornsey Police Station, 88/90 , Tottenham Ln. , London , N8 7EJ				
SAP Rating	81 B	DER	17.89	TER	15.64
Environmental	88 B	% DER < TER			-14.39
CO ₂ Emissions (t/year)	0.79	DFEE	39.70	TFEE	41.76
Compliance Check	See BREL	% DFEE < TFEE			4.93
% DPER < TPER	-25.07	DPER	103.66	TPER	82.88
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

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)
Ground floor	50.7400 (1b)	2.6000 (2b)	131.9240 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.7400		131.9240 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	131.9240 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2000 (21)

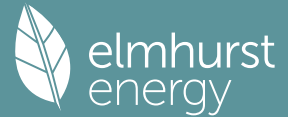
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												46.2000 (23c)
Effective ac	0.5240	0.5190	0.5140	0.4890	0.4840	0.4590	0.4590	0.4540	0.4690	0.4840	0.4940	0.5040 (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
Window North (Uw = 1.20)			4.0900	1.1450	4.6832		(27)
Door			3.4100	0.9800	3.3418		(26)
Window S (Uw = 1.20)			8.2400	1.1450	9.4351		(27)
GF			50.4400	0.0600	3.0264	110.0000	(28a)
External Wall	50.4400	15.7400	34.7000	0.1800	6.2460	190.0000	(29a)
Total net area of external elements Aum(A, m ²)			100.8800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.7325		(33)
Party Wall 1			24.3300	0.0000	0.0000	180.0000	(32)
Party Ceiling 1			50.4400			30.0000	(32b)
Internal Wall 1			65.2000			75.0000	(32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22924.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							451.7935 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

SAP 10 Online 2.15.14 Page 2 of 7

Full SAP Calculation Printout



Total gains 442.2267 488.0069 522.7244 567.5180 591.7008 581.4665 557.8272 527.4168 494.1683 452.0089 430.1234 427.4949 (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	116.1243	116.5871	117.0536	119.4432	119.9329	122.4429	122.4429	122.9575	121.4264	119.9329	118.9575	117.9979	
alpha	8.7416	8.7725	8.8036	8.9629	8.9955	9.1629	9.1629	9.1972	9.0951	8.9955	8.9305	8.8665	
util living area	0.9991	0.9975	0.9908	0.9471	0.8021	0.5709	0.4101	0.4515	0.7202	0.9653	0.9968	0.9993 (86)	
MIT	20.3840	20.4895	20.6476	20.8597	20.9749	20.9989	20.9999	20.9999	20.9922	20.8489	20.5890	20.3757 (87)	
Th 2	20.4596	20.4618	20.4639	20.4747	20.4768	20.4875	20.4875	20.4897	20.4832	20.4768	20.4725	20.4682 (88)	
util rest of house	0.9988	0.9967	0.9881	0.9330	0.7661	0.5259	0.3624	0.4015	0.6709	0.9531	0.9958	0.9991 (89)	
MIT 2	19.8820	19.9890	20.1476	20.3604	20.4602	20.4870	20.4875	20.4896	20.4791	20.3547	20.0977	19.8812 (90)	
Living area fraction									fLA = Living area / (4) =				0.4687 (91)
MIT	20.1173	20.2236	20.3819	20.5944	20.7014	20.7269	20.7277	20.7288	20.7196	20.5863	20.3280	20.1129 (92)	
Temperature adjustment												-0.1500	
adjusted MIT	19.9673	20.0736	20.2319	20.4444	20.5514	20.5769	20.5777	20.5788	20.5696	20.4363	20.1780	19.9629 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9985	0.9960	0.9866	0.9321	0.7714	0.5338	0.3708	0.4103	0.6794	0.9520	0.9950	0.9989 (94)
Useful gains	441.5795	486.0695	515.7424	528.9581	456.4344	310.3684	206.8485	216.3766	335.7164	430.3085	427.9657	427.0177 (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	859.1302	828.7541	747.0243	615.4577	469.9630	310.8350	206.8632	216.4119	339.2736	522.2526	700.0614	850.6504 (97)
Space heating kWh	310.6577	230.2840	172.0738	62.2797	10.0653	0.0000	0.0000	0.0000	0.0000	68.4064	195.9089	315.1828 (98a)
Space heating requirement - total per year (kWh/year)												1364.8585
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	310.6577	230.2840	172.0738	62.2797	10.0653	0.0000	0.0000	0.0000	0.0000	68.4064	195.9089	315.1828 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1364.8585
Space heating per m2										(98c) / (4) =		26.8991 (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	310.6577	230.2840	172.0738	62.2797	10.0653	0.0000	0.0000	0.0000	0.0000	68.4064	195.9089	315.1828 (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)	347.1036	257.3006	192.2612	69.5862	11.2461	0.0000	0.0000	0.0000	0.0000	76.4317	218.8926	352.1595 (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	217.3549	192.3368	204.4465	179.8257	174.4110	157.2441	155.1602	161.2113	162.8766	181.5383	192.9619	214.9733 (64)
Efficiency of water heater	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	242.8547	214.9014	228.4318	200.9225	194.8726	175.6917	173.3634	180.1243	181.9851	202.8361	215.5999	240.1936 (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	71.8297	64.8784	71.8297	69.5126	71.8297	69.5126	71.8297	71.8297	69.5126	71.8297	69.5126	71.8297 (231)
Lighting	16.4721	13.2145	11.8982	8.7171	6.7334	5.5012	6.1424	7.9841	10.3706	13.6068	15.3688	16.9299 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-19.0818	-28.3910	-43.2269	-51.7483	-58.8196	-56.3512	-55.9325	-51.3985	-43.7096	-34.0545	-21.5924	-16.3448 (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												1524.9816 (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												2451.7772 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Table 4g: in-use factor = 2.5000, SFP = 5.0000)												
mechanical ventilation fans (SFP = 5.0000)												804.7364 (230a)
central heating pump												41.0000 (230c)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	845.7364 (231)
Electricity for lighting (calculated in Appendix L)	132.9392 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-480.6512 (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	4474.7832 (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	1524.9816	0.2100	320.2461 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2451.7772	0.2100	514.8732 (264)
Space and water heating			835.1194 (265)
Pumps, fans and electric keep-hot	845.7364	0.1387	117.3141 (267)
Energy for lighting	132.9392	0.1443	19.1872 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-480.6512	0.1332	-64.0467
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-64.0467 (269)
Total CO2, kg/year			907.5739 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			17.8900 (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	1524.9816	1.1300	1723.2292 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2451.7772	1.1300	2770.5083 (278)
Space and water heating			4493.7375 (279)
Pumps, fans and electric keep-hot	845.7364	1.5128	1279.4300 (281)
Energy for lighting	132.9392	1.5338	203.9066 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-480.6512	1.4924	-717.3197
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-717.3197 (283)
Total Primary energy kWh/year			5259.7544 (286)
Dwelling Primary energy Rate (DPER)			103.6600 (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)
Ground floor	50.7400 (1b)	x 2.6000 (2b)	= 131.9240 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.7400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 131.9240 (5)

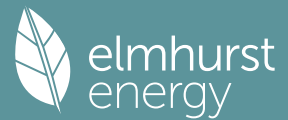
2. Ventilation rate

	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) =	0.1516 (8)
Pressure Test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4016	(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) =		0.4016 (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												

Full SAP Calculation Printout



Effective ac	0.5120	0.5020	0.4920	0.4418	0.4317	0.3815	0.3815	0.3715	0.4016	0.4317	0.4518	0.4719 (22b)
	0.6311	0.6260	0.6210	0.5976	0.5932	0.5728	0.5728	0.5690	0.5806	0.5932	0.6021	0.6113 (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
TER Opaque door			3.4100	1.0000	3.4100		(26)
TER Opening Type (Uw = 1.20)			9.2800	1.1450	10.6260		(27)
GF			50.4400	0.1300	6.5572		(28a)
External Wall	50.4400	12.6900	37.7500	0.1800	6.7950		(29a)
Total net area of external elements Aum(A, m2)			100.8800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.3882		(33)
Party Wall 1			24.3300	0.0000	0.0000		(32)

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

461.7343 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.0500	0.0500	0.2525
E3 Sill	0.9000	0.0500	0.0450
E4 Jamb	19.2200	0.0500	0.9610
E5 Ground floor (normal)	19.4000	0.1600	3.1040
E7 Party floor between dwellings (in blocks of flats)	19.4000	0.0700	1.3580
E16 Corner (normal)	5.2000	0.0900	0.4680
E25 Staggered party wall between dwellings	2.6000	0.0600	0.1560
E18 Party wall between dwellings	5.2000	0.0600	0.3120
P1 Party wall - Ground floor	9.3600	0.0800	0.7488
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	9.3600	0.0000	0.0000

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

7.4053 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 34.7935 (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	27.4746	27.2530	27.0358	26.0155	25.8246	24.9359	24.9359	24.7713	25.2782	25.8246	26.2108	26.6145 (38)
Heat transfer coeff	62.2681	62.0465	61.8292	60.8089	60.6180	59.7294	59.7294	59.5648	60.0717	60.6180	61.0042	61.4079 (39)
Average = Sum(39)m / 12 =												60.8080

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2272	1.2228	1.2186	1.1984	1.1947	1.1772	1.1772	1.1739	1.1839	1.1947	1.2023	1.2102 (40)
HLP (average)												1.1984
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7119 (42)
Hot water usage for mixer showers												
52.9225	52.1272	50.9682	48.7508	47.1144	45.2895	44.2522	45.4024	46.6632	48.6226	50.8876	52.7197 (42a)	
Hot water usage for baths												
22.8816	22.5418	22.0633	21.1809	20.5202	19.7876	19.3919	19.8671	20.3845	21.1684	22.0689	22.8043 (42b)	
Hot water usage for other uses												
32.1616	30.9921	29.8226	28.6531	27.4836	26.3140	26.3140	27.4836	28.6531	29.8226	30.9921	32.1616 (42c)	
Average daily hot water use (litres/day)												99.2455 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	107.9657	105.6611	102.8541	98.5848	95.1182	91.3912	89.9582	92.7531	95.7008	99.6136	103.9487	107.6856 (44)
Energy conte	170.9913	150.4600	158.0829	134.9577	128.0474	112.3761	108.7966	114.8477	118.0086	135.1747	148.0939	168.6097 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m	25.6487	22.5690	23.7124	20.2436	19.2071	16.8564	16.3195	17.2272	17.7013	20.2762	22.2141	25.2914 (46)

Water storage loss:

Store volume

150.0000 (47)

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

1.3938 (48)

Temperature factor from Table 2b

0.5400 (49)

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

0.7527 (55)

Total storage loss

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325 (56)
If cylinder contains dedicated solar storage												
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)

Total heat required for water heating calculated for each month

	217.5863	192.5457	204.6778	180.0495	174.6423	157.4680	155.3915	161.4426	163.1005	181.7696	193.1858	215.2046	(62)
WWHRS	-24.1940	-21.3973	-22.4061	-18.5531	-17.2908	-14.7959	-13.8688	-14.7481	-15.3084	-18.0469	-20.4449	-23.7459	(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

193.3923	171.1484	182.2718	161.4964	157.3515	142.6721	141.5228	146.6945	147.7921	163.7227	172.7408	191.4586 (64)
Total per year (kWh/year) = Sum(64)m =											1972.2639 (64)

12Total per year (kWh/year)

Electric shower(s)

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

Heat gains from water heating, kWh/month

94.1305	83.6965	89.8385	80.9469	79.8517	73.4385	73.4508	75.4628	75.3113	82.2215	85.3147	93.3386 (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	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952	85.5952 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	76.6474	84.8596	76.6474	79.2023	76.6474	79.2023	76.6474	76.6474	79.2023	76.6474	79.2023	76.6474 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	149.1557	150.7035	146.8032	138.4998	128.0183	118.1672	111.5861	110.0383	113.9386	122.2420	132.7235	142.5746 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595	31.5595 (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)

Full SAP Calculation Printout



Losses e.g. evaporation (negative values) (Table 5)	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762	-68.4762 (71)
Water heating gains (Table 5)	126.5196	124.5484	120.7507	112.4262	107.3275	101.9980	98.7242	101.4285	104.5991	110.5128	118.4927	125.4552 (72)
Total internal gains	404.0012	411.7900	395.8798	381.8069	363.6718	348.0461	335.6362	336.7927	346.4186	361.0807	382.0970	396.3557 (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					6.2000	19.6403	0.6300	0.7000			0.7700			37.2144 (76)
West					3.0800	19.6403	0.6300	0.7000			0.7700			18.4871 (80)
Solar gains	55.7015	108.9640	179.4482	261.7145	320.7409	328.3354	312.5887	268.5091	208.7057	129.2950	69.4533	45.8062 (83)		
Total gains	459.7027	520.7541	575.3280	643.5214	684.4128	676.3815	648.2250	605.3018	555.1243	490.3757	451.5502	442.1619 (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, n _{l,m} (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	104.5140	104.8873	105.2558	107.0219	107.3590	108.9563	108.9563	109.2573	108.3354	107.3590	106.6793	105.9780
alpha	7.9676	7.9925	8.0171	8.1348	8.1573	8.2638	8.2638	8.2838	8.2224	8.1573	8.1120	8.0652
util living area	0.9992	0.9974	0.9896	0.9403	0.7878	0.5630	0.4053	0.4523	0.7283	0.9682	0.9972	0.9994 (86)
MIT	20.2715	20.3979	20.5890	20.8355	20.9690	20.9981	20.9999	20.9997	20.9871	20.8040	20.4996	20.2586 (87)
Th 2	19.8983	19.9018	19.9052	19.9212	19.9243	19.9383	19.9383	19.9409	19.9329	19.9243	19.9182	19.9118 (88)
util rest of house	0.9986	0.9957	0.9830	0.9077	0.7126	0.4709	0.3076	0.3484	0.6258	0.9429	0.9951	0.9990 (89)
MIT 2	19.0736	19.2376	19.4808	19.7822	19.9068	19.9378	19.9383	19.9409	19.9281	19.7581	19.3811	19.0679 (90)
Living area fraction	19.6350	19.7814	20.0002	20.2759	20.4046	20.4347	20.4358	20.4371	20.4244	20.2482	19.9053	19.6259 (92)
MIT	19.6350	19.7814	20.0002	20.2759	20.4046	20.4347	20.4358	20.4371	20.4244	20.2482	19.9053	19.6259 (93)
Temperature adjustment												0.0000
adjusted MIT	19.6350	19.7814	20.0002	20.2759	20.4046	20.4347	20.4358	20.4371	20.4244	20.2482	19.9053	19.6259 (93)

8. Space heating requirement

Utilisation	0.9985	0.9955	0.9837	0.9199	0.7477	0.5142	0.3534	0.3972	0.6745	0.9521	0.9950	0.9989 (94)
Useful gains	458.9974	518.4061	565.9517	591.9475	511.7041	347.7976	229.0841	240.4015	374.4485	466.8742	449.3015	441.6559 (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	954.8797	923.3390	834.7076	691.7537	527.6576	348.5036	229.1115	240.4707	379.9184	584.8579	781.1774	947.2758 (97)
Space heating kWh	368.9365	272.1149	199.9544	71.8605	11.8694	0.0000	0.0000	0.0000	0.0000	87.7799	238.9506	376.1812 (98a)
Space heating requirement - total per year (kWh/year)												1627.6473
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	368.9365	272.1149	199.9544	71.8605	11.8694	0.0000	0.0000	0.0000	0.0000	87.7799	238.9506	376.1812 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1627.6473
Space heating per m ²										(98c) / (4) =		32.0782 (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	368.9365	272.1149	199.9544	71.8605	11.8694	0.0000	0.0000	0.0000	0.0000	87.7799	238.9506	376.1812 (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)	399.7145	294.8157	216.6353	77.8553	12.8596	0.0000	0.0000	0.0000	0.0000	95.1028	258.8847	407.5636 (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	193.3923	171.1484	182.2718	161.4964	157.3515	142.6721	141.5228	146.6945	147.7921	163.7227	172.7408	191.4586 (64)
Efficiency of water heater (217)m	85.4843	85.0945	84.2679	82.3708	80.3714	79.8000	79.8000	79.8000	79.8000	82.7263	84.7877	79.8000 (216)
Fuel for water heating, kWh/month	226.2314	201.1275	216.3004	196.0602	195.7805	178.7871	177.3468	183.8277	185.2031	197.9088	203.7334	223.8083 (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	15.9258	12.7763	11.5036	8.4280	6.5101	5.3188	5.9387	7.7193	10.0267	13.1555	14.8591	16.3684 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.4667	-25.5296	-38.0409	-44.4106	-49.3421	-46.6192	-46.0801	-42.7985	-37.2292	-29.9469	-19.5325	-14.9995 (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)

Full SAP Calculation Printout



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	-7.2978	-15.5875	-31.4119	-47.8014	-63.7970	-64.2872	-63.4995	-53.4684	-38.8230	-22.4620	-9.8012	-5.7511	(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												1763.4316	(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												2386.1151	(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)												128.5304	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-835.9839	(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												3528.0933	(238)

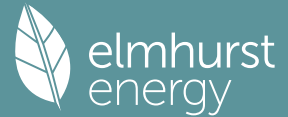
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1763.4316	0.2100	370.3206 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2386.1151	0.2100	501.0842 (264)
Space and water heating			871.4048 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	128.5304	0.1443	18.5509 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-411.9959	0.1338	-55.1276
PV Unit electricity exported	-423.9880	0.1255	-53.2211
Total			-108.3488 (269)
Total CO2, kg/year			793.5362 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.6400 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1763.4316	1.1300	1992.6777 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2386.1151	1.1300	2696.3101 (278)
Space and water heating			4688.9878 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	128.5304	1.5338	197.1443 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-411.9959	1.4945	-615.7200
PV Unit electricity exported	-423.9880	0.4607	-195.3512
Total			-811.0712 (283)
Total Primary energy kWh/year			4205.1617 (286)
Target Primary Energy Rate (TPER)			82.8800 (287)

Full SAP Calculation Printout



Property Reference	FLAT C8-3B5P				Issued on Date	12/09/2024	
Assessment Reference	FLAT C8-3B5P			Prop Type Ref	BLOCK C		
Property	Hornsey Police Station, 88/90 , Tottenham Ln. , London , N8 7EJ						
SAP Rating	82 B	DER	3.68	TER	11.35		
Environmental	97 A	% DER < TER				67.58	
CO ₂ Emissions (t/year)	0.31	DFEE	34.76	TFEE	35.33		
Compliance Check	See BREL	% DFEE < TFEE				1.61	
% DPER < TPER	35.47	DPER	38.42	TPER	59.54		
Assessor Details	Mr. Mirza Baig				Assessor ID	CK52-0001	
Client	Archanaeum Ltd, ARCHANAUM						

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)
Ground floor	95.9600 (1b)	2.5000 (2b)	239.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.9600		239.9000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	239.9000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.2000	(18)
Number of sides sheltered	0	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2000 (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	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												73.6000 (23c)
Effective ac	0.3870	0.3820	0.3770	0.3520	0.3470	0.3220	0.3220	0.3170	0.3320	0.3470	0.3570	0.3670 (25)

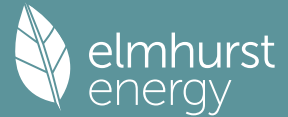
3. Heat losses and heat loss parameter

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
Window North (Uw = 1.20)			13.2100	1.1450	15.1260		(27)
Window S (Uw = 1.20)			0.7300	1.1450	0.8359		(27)
External Wall	95.1800	13.9400	81.2400	0.1800	14.6232	190.0000	15435.6000 (29a)
External Roof 1	49.5900		49.5900	0.0700	3.4713	9.0000	446.3100 (30)
Pitched Roof	46.3700		46.3700	0.0700	3.2459	9.0000	417.3300 (30)
Total net area of external elements Aum(A, m ²)			191.1400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.3022		(33)
Party Wall 1			18.9200	0.0000	0.0000	180.0000	3405.6000 (32)
Party Floor 1			95.9600			40.0000	3838.4000 (32d)
Party Ceiling 1			50.4400			30.0000	1513.2000 (32b)
Internal Wall 1			134.8400			75.0000	10113.0000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	35169.4400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		366.5010 (35)
List of Thermal Bridges		

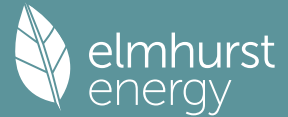
Page 2 of 7

Full SAP Calculation Printout



	m2		Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W	
North	2.9200		10.6334		0.5200		0.7000		0.7700		7.8323 (74)	
East	8.2400		19.6403		0.5200		0.7000		0.7700		40.8234 (76)	
South	2.0500		46.7521		0.5200		0.7000		0.7700		24.1763 (78)	
South	0.7300		46.7521		0.2500		0.7000		0.7700		4.1390 (78)	
Solar gains	76.9710	141.2003	216.0220	299.4263	359.6747	366.5038	349.5169	303.9576	245.2463	162.5948	94.1274	64.5676 (83)
Total gains	671.9172	750.5059	799.4565	862.5030	894.0492	881.8616	845.0965	800.4973	756.9431	691.4848	655.5018	647.1024 (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	119.5150	120.0966	120.6838	123.7085	124.3317	127.5443	127.5443	128.2069	126.2395	124.3317	123.0915	121.8758
alpha	8.9677	9.0064	9.0456	9.2472	9.2888	9.5030	9.5030	9.5471	9.4160	9.2888	9.2061	9.1251
util living area	0.9991	0.9972	0.9899	0.9419	0.7911	0.5549	0.3988	0.4378	0.6974	0.9603	0.9966	0.9994 (86)
Living	20.4102	20.5226	20.6746	20.8778	20.9800	20.9993	21.0000	20.9999	20.9948	20.8692	20.6162	20.4036
Non living	19.6736	19.7884	19.9411	20.1456	20.2266	20.2547	20.2549	20.2585	20.2458	20.1446	19.8972	19.6793
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	20.6983	20.5226	20.6746	20.8778	20.9800	20.9993	21.0000	20.9999	20.9948	20.8692	20.6162	20.4870 (87)
Th 2	20.2086	20.2122	20.2157	20.2335	20.2370	20.2549	20.2549	20.2585	20.2477	20.2370	20.2299	20.2228 (88)
util rest of house	0.9987	0.9958	0.9851	0.9182	0.7366	0.4909	0.3313	0.3673	0.6256	0.9385	0.9948	0.9990 (89)
MIT 2	19.9350	19.7884	19.9411	20.1456	20.2266	20.2547	20.2549	20.2585	20.2458	20.1446	19.8972	19.7554 (90)
Living area fraction										FLA = Living area / (4) =		0.1670 (91)
MIT	20.0625	19.9111	20.0636	20.2679	20.3524	20.3791	20.3794	20.3823	20.3709	20.2656	20.0173	19.8776 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0625	19.9111	20.0636	20.2679	20.3524	20.3791	20.3794	20.3823	20.3709	20.2656	20.0173	19.8776 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9986	0.9952	0.9839	0.9195	0.7452	0.5016	0.3425	0.3791	0.6376	0.9395	0.9941	0.9989 (94)
Useful gains	670.9791	746.8691	786.6022	793.0368	666.2527	442.3332	289.4734	303.4327	482.6140	649.6345	651.6112	646.3662 (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	1288.4417	1221.0788	1097.9647	897.7245	679.8603	442.6487	289.4806	303.4507	485.2890	759.4713	1025.1994	1256.6795 (97)
Space heating kWh	459.3922	318.6689	231.6537	75.3751	10.1241	0.0000	0.0000	0.0000	0.0000	81.7186	268.9835	454.0730 (98a)
Space heating requirement - total per year (kWh/year)												1899.9891
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	459.3922	318.6689	231.6537	75.3751	10.1241	0.0000	0.0000	0.0000	0.0000	81.7186	268.9835	454.0730 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1899.9891
Space heating per m2										(98c) / (4) =		19.7998 (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 %)												241.8826 (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	459.3922	318.6689	231.6537	75.3751	10.1241	0.0000	0.0000	0.0000	0.0000	81.7186	268.9835	454.0730 (98)
Space heating efficiency (main heating system 1)	241.8826	241.8826	241.8826	241.8826	241.8826	0.0000	0.0000	0.0000	0.0000	241.8826	241.8826	241.8826 (210)
Space heating fuel (main heating system)	189.9236	131.7452	95.7711	31.1619	4.1855	0.0000	0.0000	0.0000	0.0000	33.7844	111.2041	187.7245 (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	268.6646	237.4334	251.7158	219.9321	212.2852	190.2866	187.0139	194.9586	197.6837	221.6448	237.1795	265.5382 (64)
Efficiency of water heater (217)m	191.2622	191.2622	191.2622	191.2622	191.2622	191.2622	191.2622	191.2622	191.2622	191.2622	191.2622	191.2622 (216)
Fuel for water heating, kWh/month	140.4693	124.1403	131.6077	114.9898	110.9917	99.4899	97.7788	101.9326	103.3574	115.8853	124.0075	138.8346 (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	19.1403	17.2880	19.1403	18.5229	19.1403	18.5229	19.1403	19.1403	18.5229	19.1403	18.5229	19.1403 (231)
Lighting	28.4688	22.8387	20.5637	15.0659	11.6373	9.5078	10.6159	13.7990	17.9235	23.5167	26.5620	29.2600 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-6.6967	-11.8879	-21.8424	-30.2631	-37.3836	-36.7404	-35.9636	-31.0691	-23.4396	-15.2662	-8.0100	-5.4639 (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)												

Full SAP Calculation Printout



(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												785.5004	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												191.2622	
Water heating fuel used												1403.4849	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.7700)													
mechanical ventilation fans (SFP = 0.7700)												225.3621	(230a)
Total electricity for the above, kWh/year												225.3621	(231)
Electricity for lighting (calculated in Appendix L)												229.7594	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-264.0265	(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												2380.0803	(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 (high-rate cost)	628.4003	0.1652	103.8268	(261)
Space heating - main system 1 (low-rate cost)	157.1001	0.1387	21.7906	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating - high rate cost	982.4394	0.1480	145.3687	(264)
Water heating - low rate cost	421.0455	0.1242	52.2877	(264)
Space and water heating			323.2738	(265)
Pumps, fans and electric keep-hot	225.3621	0.1432	31.2706	(267)
Energy for lighting	229.7594	0.1490	34.2387	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-264.0265	0.1349	-35.6245	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-35.6245	(269)
Total CO2, kg/year			353.1586	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.6800	(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 (high-rate cost)	628.4003	1.2925	1015.2760	(275)
Space heating - main system 1 (low-rate cost)	157.1001	1.5026	236.0614	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating - high rate cost	982.4394	1.5531	1525.8241	(278)
Water heating - low rate cost	421.0455	1.4444	608.1716	(278)
Space and water heating			3385.3331	(279)
Pumps, fans and electric keep-hot	225.3621	1.5335	340.9627	(281)
Energy for lighting	229.7594	1.5547	357.2172	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-264.0265	1.5033	-396.9021	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-396.9021	(283)
Total Primary energy kWh/year			3686.6109	(286)
Dwelling Primary energy Rate (DPER)			38.4200	(287)

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

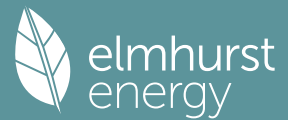
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	95.9600	(1b) x 2.5000	(2b) = 239.9000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.9600			(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =	239.9000	(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	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)

Full SAP Calculation Printout



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) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
30.0000 / (5) = 0.1251 (8)
Yes
Blower Door
5.0000 (17)
0.3751 (18)
0 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3751 (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												
Effective ac	0.4782	0.4688	0.4594	0.4126	0.4032	0.3563	0.3563	0.3469	0.3751	0.4032	0.4219	0.4407 (22b)
	0.6143	0.6099	0.6055	0.5851	0.5813	0.5635	0.5635	0.5602	0.5703	0.5813	0.5890	0.5971 (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
TER Opening Type (Uw = 1.20)			13.9400	1.1450	15.9618		(27)
External Wall	95.1800	13.9400	81.2400	0.1800	14.6232		(29a)
External Roof 1	49.5900		49.5900	0.1100	5.4549		(30)
Pitched Roof	46.3700		46.3700	0.1100	5.1007		(30)
Total net area of external elements Aum (A, m2)			191.1400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.1406		(33)
Party Wall 1			18.9200	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 371.7574 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	4.1500	0.0500	0.2075
E3 Sill	4.1500	0.0500	0.2075
E4 Jamb	14.5000	0.0500	0.7250
E7 Party floor between dwellings (in blocks of flats)	38.0700	0.0700	2.6649
E16 Corner (normal)	32.5000	0.0900	2.9250
E25 Staggered party wall between dwellings	2.5000	0.0600	0.1500
E18 Party wall between dwellings	15.0000	0.0600	0.9000
P4 Party wall - Roof (insulation at ceiling level)	7.5700	0.1200	0.9084
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.5700	0.0000	0.0000
R1 Head of roof window	3.0500	0.0800	0.2440
R2 Sill of roof window	3.0500	0.0600	0.1830
R3 Jamb of roof window	11.0900	0.0800	0.8872
R7 Flat ceiling (inverted)	20.4000	0.0400	0.8160
R9 Roof to wall (flat ceiling)	21.4500	0.0400	0.8580
E8 Balcony within a dwelling, wall insulation continuous	3.9500	0.0000	0.0000
E14 Flat roof	28.0000	0.0800	2.2400
E17 Corner (inverted - internal area greater than external area)	25.0000	-0.0900	-2.2500

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 11.6665 (36)
Point Thermal Bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 52.8071 (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	48.6349	48.2835	47.9389	46.3208	46.0180	44.6086	44.6086	44.3476	45.1515	46.0180	46.6305	47.2708 (38)
Heat transfer coeff	101.4421	101.0906	100.7461	99.1279	98.8251	97.4157	97.4157	97.1547	97.9586	98.8251	99.4376	100.0779 (39)
Average = Sum(39)m / 12 =												99.1264

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0571	1.0535	1.0499	1.0330	1.0299	1.0152	1.0152	1.0125	1.0208	1.0299	1.0362	1.0429 (40)
HLP (average)												1.0330
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.6988 (42)
Hot water usage for mixer showers												
69.4706	68.4266	66.9052	63.9945	61.8464	59.4509	58.0892	59.5991	61.2541	63.8261	66.7994	69.2044 (42a)	
Hot water usage for baths												
29.9978	29.5523	28.9250	27.7682	26.9020	25.9416	25.4228	26.0458	26.7241	27.7518	28.9324	29.8964 (42b)	
Hot water usage for other uses												
42.2689	40.7318	39.1948	37.6577	36.1207	34.5836	34.5836	36.1207	37.6577	39.1948	40.7318	42.2689 (42c)	
Average daily hot water use (litres/day)												130.2885 (43)

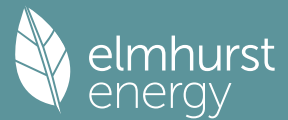
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.7373	138.7107	135.0250	129.4204	124.8691	119.9761	118.0957	121.7655	125.6359	130.7727	136.4637	141.3697 (44)
Energy conte	224.4772	197.5222	207.5284	177.1701	168.0978	147.5246	142.8265	150.7712	154.9217	177.4574	194.4175	221.3508 (45)
Energy content (annual)										Total = Sum(45)m =		2164.0653

Water storage loss:
Store volume 170.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day):
Temperature factor from Table 2b 1.5003 (48)
Enter (49) or (54) in (55) 0.5400 (49)
Total storage loss 0.8102 (55)

Total storage loss	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153 (56)
If cylinder contains dedicated solar storage	25.1153	22.6848	25.1153	24.3051	25.1153	24.3051	25.1153	25.1153	24.3051	25.1153	24.3051	25.1153 (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	272.8549	241.2182	255.9061	223.9872	216.4755	194.3417	191.2042	199.1489	201.7388	225.8351	241.2347	269.7285 (62)
WWHRS	-31.7590	-28.0880	-29.4121	-24.3544	-22.6974	-19.4223	-18.2053	-19.3595	-20.0951	-23.6899	-26.8378	-31.1709 (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)

Full SAP Calculation Printout



Output from w/h	241.0959	213.1303	226.4940	199.6328	193.7781	174.9194	172.9989	179.7893	181.6437	202.1452	214.3969	238.5576 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											2438.5820 (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	113.3408	100.6329	107.7053	96.3627	94.5947	86.5056	86.1920	88.8336	88.9652	97.7067	102.0975	112.3013 (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	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	134.0032	148.3607	134.0032	138.4700	134.0032	138.4700	134.0032	134.0032	138.4700	134.0032	138.4700	134.0032	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	249.6262	252.2166	245.6890	231.7926	214.2508	197.7641	186.7499	184.1596	190.6871	204.5836	222.1253	238.6121	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	(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)	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	(71)
Water heating gains (Table 5)	152.3398	149.7514	144.7652	133.8371	127.1434	120.1467	115.8494	119.4000	123.5627	131.3263	141.8021	150.9426	(72)
Total internal gains	602.4520	616.8113	590.9401	570.5824	541.8801	519.8634	500.0852	501.0454	516.2025	536.3957	568.8801	590.0406	(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
North	2.9200	10.6334	0.6300	0.7000	0.7700	9.4891 (74)
East	8.2400	19.6403	0.6300	0.7000	0.7700	49.4591 (76)
South	2.7800	46.7521	0.6300	0.7000	0.7700	39.7207 (78)

Solar gains	98.6690	179.9391	273.0172	375.5360	449.0663	456.8392	435.9652	380.4072	308.9277	206.5565	120.4584	82.9058 (83)
Total gains	701.1210	796.7504	863.9574	946.1184	990.9465	976.7027	936.0504	881.4526	825.1302	742.9522	689.3385	672.9463 (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	97.6853	98.0249	98.3602	99.9658	100.2721	101.7228	101.7228	101.9961	101.1591	100.2721	99.6545	99.0168
alpha	7.5124	7.5350	7.5573	7.6644	7.6848	7.7815	7.7815	7.7997	7.7439	7.6848	7.6436	7.6011
util living area	0.9992	0.9976	0.9922	0.9607	0.8489	0.6312	0.4573	0.5058	0.7809	0.9757	0.9975	0.9994 (86)
MIT	20.1888	20.3198	20.5067	20.7620	20.9362	20.9943	20.9996	20.9991	20.9741	20.7518	20.4313	20.1748 (87)
Th 2	20.0360	20.0390	20.0420	20.0559	20.0585	20.0707	20.0707	20.0730	20.0660	20.0585	20.0532	20.0477 (88)
util rest of house	0.9988	0.9965	0.9882	0.9411	0.7905	0.5434	0.3611	0.4046	0.6932	0.9593	0.9961	0.9991 (89)
MIT 2	19.0972	19.2670	19.5065	19.8294	20.0136	20.0684	20.0706	20.0728	20.0530	19.8251	19.4214	19.0886 (90)
Living area fraction	19.2796	19.4429	19.6736	19.9852	20.1677	20.2231	20.2258	20.2275	20.2068	19.9799	19.5901	19.2701 (91)
Temperature adjustment	19.2796	19.4429	19.6736	19.9852	20.1677	20.2231	20.2258	20.2275	20.2068	19.9799	19.5901	19.2701 (92)
adjusted MIT	19.2796	19.4429	19.6736	19.9852	20.1677	20.2231	20.2258	20.2275	20.2068	19.9799	19.5901	19.2701 (93)

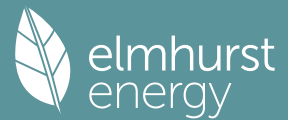
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9984	0.9954	0.9860	0.9392	0.7979	0.5581	0.3772	0.4216	0.7074	0.9575	0.9950	0.9988	(94)
Useful gains	699.9884	793.1199	851.8921	888.6354	790.6942	545.0871	353.0986	371.6049	583.7098	711.4074	685.9100	672.1377	(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	1519.5574	1470.1463	1327.1854	1098.8497	836.8223	547.7757	353.2105	371.8614	598.2162	926.9672	1241.9818	1508.1814	(97)
Space heating kWh	609.7594	454.9617	353.6182	151.3543	34.3193	0.0000	0.0000	0.0000	0.0000	160.3765	400.3717	622.0166	(98a)
Space heating requirement - total per year (kWh/year)												2786.7776	
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	609.7594	454.9617	353.6182	151.3543	34.3193	0.0000	0.0000	0.0000	0.0000	160.3765	400.3717	622.0166	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2786.7776	
Space heating per m2											(98c) / (4) =	29.0410	(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)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
609.7594	454.9617	353.6182	151.3543	34.3193	0.0000	0.0000	0.0000	0.0000	0.0000	160.3765	400.3717	622.0166 (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)

Full SAP Calculation Printout



Space heating fuel (main heating system)	660.6277	492.9163	383.1183	163.9808	37.1824	0.0000	0.0000	0.0000	0.0000	173.7557	433.7721	673.9074	(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	241.0959	213.1303	226.4940	199.6328	193.7781	174.9194	172.9989	179.7893	181.6437	202.1452	214.3969	238.5576	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.0500	85.7160	85.0547	83.4471	81.0357	79.8000	79.8000	79.8000	79.8000	83.5459	85.4395	86.1079	(217)
Fuel for water heating, kWh/month	280.1810	248.6469	266.2920	239.2329	239.1267	219.1972	216.7906	225.2999	227.6237	241.9569	250.9342	277.0449	(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	7.0685	(231)
Lighting	27.8432	22.3369	20.1119	14.7348	11.3816	9.2989	10.3827	13.4958	17.5297	22.9999	25.9783	28.6171	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-32.0778	-46.3805	-68.3397	-78.8088	-86.6460	-81.4471	-80.4258	-75.1037	-65.9938	-53.9042	-35.6677	-27.5979	(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	-14.7570	-31.3805	-63.0100	-95.5834	-127.3239	-128.3001	-126.8122	-106.9574	-77.8370	-45.2121	-19.8086	-11.6459	(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												3019.2607	(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												2932.3269	(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)												224.7107	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1581.0211	(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												4681.2771	(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	3019.2607	0.2100	634.0447 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2932.3269	0.2100	615.7886 (264)
Space and water heating			1249.8334 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	224.7107	0.1443	32.4327 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-732.3930	0.1341	-98.1915
PV Unit electricity exported	-848.6281	0.1256	-106.5873
Total			-204.7788 (269)
Total CO2, kg/year			1089.4166 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.3500 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3019.2607	1.1300	3411.7646 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2932.3269	1.1300	3313.5294 (278)
Space and water heating			6725.2940 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	224.7107	1.5338	344.6688 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-732.3930	1.4955	-1095.2709
PV Unit electricity exported	-848.6281	0.4610	-391.2363
Total			-1486.5073 (283)
Total Primary energy kWh/year			5713.5563 (286)
Target Primary Energy Rate (TPER)			59.5400 (287)

Full SAP Calculation Printout



Property Reference	FLAT C8-3B5P			Issued on Date	12/09/2024
Assessment Reference	FLAT C8-3B5P_Baseline	Prop Type Ref	BLOCK C		
Property	Hornsey Police Station, 88/90 , Tottenham Ln. , London , N8 7EJ				
SAP Rating	86 B	DER	18.60	TER	11.32
Environmental	84 B	% DER < TER			-64.31
CO ₂ Emissions (t/year)	1.47	DFEE	55.93	TFEE	35.33
Compliance Check	See BREL	% DFEE < TFEE			-58.30
% DPER < TPER	-64.55	DPER	97.64	TPER	59.34
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

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)
Ground floor	95.9600 (1b)	2.5000 (2b)	239.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	239.9000 (5)

2. Ventilation rate

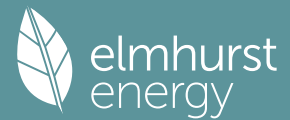
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1251 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	8.0000 (17)
Infiltration rate	0.5251 (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) = 0.5251 (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	0.6694	0.6563	0.6432	0.5776	0.5644	0.4988	0.4988	0.4857	0.5251	0.5644	0.5907	0.6169 (22b)
Effective ac	0.7241	0.7154	0.7068	0.6668	0.6593	0.6244	0.6244	0.6179	0.6378	0.6593	0.6745	0.6903 (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
Window North (Uw = 1.60)			13.2100	1.5038	19.8647		(27)
Window S (Uw = 1.60)			0.7300	1.5038	1.0977		(27)
External Wall	95.1800	13.9400	81.2400	0.2600	21.1224	190.0000	15435.6000 (29a)
External Roof 1	49.5900		49.5900	0.1600	7.9344	9.0000	446.3100 (30)
Pitched Roof	46.3700		46.3700	0.1600	7.4192	9.0000	417.3300 (30)
Total net area of external elements Aum(A, m ²)			191.1400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	57.4384		(33)
Party Wall 1			18.9200	0.0000	0.0000	180.0000	3405.6000 (32)
Party Floor 1			95.9600			40.0000	3838.4000 (32d)
Party Ceiling 1			50.4400			30.0000	1513.2000 (32b)
Internal Wall 1			134.8400			75.0000	10113.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	35169.4400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							366.5010 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				4.1500	0.5000	2.0750	
E3 Sill				4.1500	0.0400	0.1660	
E4 Jamb				14.5000	0.0500	0.7250	
E7 Party floor between dwellings (in blocks of flats)				38.0700	0.0700	2.6649	

Full SAP Calculation Printout



E16 Corner (normal)	32.5000	0.0900	2.9250
E25 Staggered party wall between dwellings	2.5000	0.1200	0.3000
E18 Party wall between dwellings	15.0000	0.0600	0.9000
P4 Party wall - Roof (insulation at ceiling level)	7.5700	0.1200	0.9084
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.5700	0.0000	0.0000
R1 Head of roof window	3.0500	0.0410	0.1250
R2 Sill of roof window	3.0500	0.0210	0.0640
R3 Jamb of roof window	11.0900	0.0160	0.1774
R7 Flat ceiling (inverted)	20.4000	0.1200	2.4480
R9 Roof to wall (flat ceiling)	21.4500	0.3200	6.8640
E8 Balcony within a dwelling, wall insulation continuous	3.9500	0.0000	0.0000
E14 Flat roof	28.0000	0.0400	1.1200
E17 Corner (inverted - internal area greater than external area)	25.0000	-0.0900	-2.2500
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			19.2128 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	76.6512 (37)

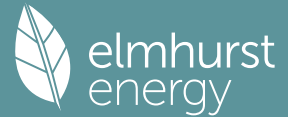
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	57.3229	56.6341	55.9589	52.7875	52.1941	49.4319	49.4319	48.9204	50.4959	52.1941	53.3945	54.6494	(38)
Average = Sum(39)m / 12 =	133.9742	133.2853	132.6101	129.4387	128.8454	126.0832	126.0832	125.5716	127.1471	128.8454	130.0457	131.3006	(39)
												129.4359	
HLP	1.3961	1.3890	1.3819	1.3489	1.3427	1.3139	1.3139	1.3086	1.3250	1.3427	1.3552	1.3683	(40)
HLP (average)												1.3489	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.6988 (42)
Hot water usage for mixer showers	69.4706	68.4266	66.9052	63.9945	61.8464	59.4509	58.0892	59.5991	61.2541	63.8261	66.7994	69.2044 (42a)
Hot water usage for baths	29.9978	29.5523	28.9250	27.7682	26.9020	25.9416	25.4228	26.0458	26.7241	27.7518	28.9324	29.8964 (42b)
Hot water usage for other uses	42.2689	40.7318	39.1948	37.6577	36.1207	34.5836	34.5836	36.1207	37.6577	39.1948	40.7318	42.2689 (42c)
Average daily hot water use (litres/day)												130.2885 (43)
Daily hot water use	141.7373	138.7107	135.0250	129.4204	124.8691	119.9761	118.0957	121.7655	125.6359	130.7727	136.4637	141.3697 (44)
Energy conte	224.4772	197.5222	207.5284	177.1701	168.0978	147.5246	142.8265	150.7712	154.9217	177.4574	194.4175	221.3508 (45)
Energy content (annual)										Total = Sum(45)m =		2164.0653
Distribution loss (46)m = 0.15 x (45)m	33.6716	29.6283	31.1293	26.5755	25.2147	22.1287	21.4240	22.6157	23.2382	26.6186	29.1626	33.2026 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3800 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7452 (55)
Total storage loss	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (56)
If cylinder contains dedicated solar storage	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (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	270.8408	239.3990	253.8920	222.0381	214.4614	192.3926	189.1901	197.1348	199.7897	223.8210	239.2855	267.7144 (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	270.8408	239.3990	253.8920	222.0381	214.4614	192.3926	189.1901	197.1348	199.7897	223.8210	239.2855	267.7144 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2709.9593 (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 (64a)
Heat gains from water heating, kWh/month	111.7296	99.1776	106.0941	94.8034	92.9834	84.9463	84.5807	87.2223	87.4059	96.0955	100.5382	110.6900 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	134.0032	148.3607	134.0032	138.4700	134.0032	138.4700	134.0032	134.0032	138.4700	134.0032	138.4700	134.0032 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	249.6262	252.2166	245.6890	231.7926	214.2508	197.7641	186.7499	184.1596	190.6871	204.5836	222.1253	238.6121 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942 (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)	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539 (71)
Water heating gains (Table 5)	150.1741	147.5857	142.5995	131.6714	124.9777	117.9810	113.6837	117.2343	121.3970	129.1606	139.6364	148.7769 (72)
Total internal gains	600.2863	614.6456	588.7744	568.4167	539.7144	517.6977	497.9195	498.8797	514.0368	534.2300	566.7144	587.8749 (73)

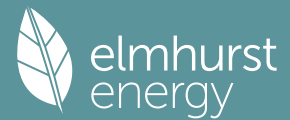
6. Solar gains							
[Jan]		Area	Solar flux	g	FF	Access	Gains
		m2	Table 6a	Specific data	Specific data	factor	W
			W/m2	or Table 6b	or Table 6c	Table 6d	
North		2.9200	10.6334	0.5200	0.7000	0.7700	7.8323 (74)
East		8.2400	19.6403	0.5200	0.7000	0.7700	40.8234 (76)

Full SAP Calculation Printout



South	2.0500		46.7521		0.5200		0.7000		0.7700		24.1763 (78)	
South	0.7300		46.7521		0.2500		0.7000		0.7700		4.1390 (78)	
Solar gains	76.9710	141.2003	216.0220	299.4263	359.6747	366.5038	349.5169	303.9576	245.2463	162.5948	94.1274	64.5676 (83)
Total gains	677.2572	755.8459	804.7965	867.8430	899.3892	884.2016	847.4365	802.8373	759.2831	696.8248	660.8418	652.4424 (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	72.9192	73.2961	73.6693	75.4742	75.8218	77.4829	77.4829	77.7985	76.8345	75.8218	75.1220	74.4040
alpha	5.8613	5.8864	5.9113	6.0316	6.0548	6.1655	6.1655	6.1866	6.1223	6.0548	6.0081	5.9603
util living area	0.9994	0.9986	0.9966	0.9871	0.9494	0.8182	0.6372	0.6904	0.9136	0.9908	0.9985	0.9995 (86)
MIT	19.7665	19.8994	20.1124	20.4357	20.7259	20.9333	20.9882	20.9814	20.8535	20.4829	20.0879	19.7674 (87)
Th 2	20.3019	20.3055	20.3090	20.3256	20.3287	20.3430	20.3430	20.3457	20.3375	20.3287	20.3224	20.3159 (88)
util rest of house	0.9992	0.9982	0.9956	0.9830	0.9318	0.7621	0.5501	0.6048	0.8776	0.9871	0.9980	0.9994 (89)
MIT 2	19.1422	19.2779	19.4934	19.8278	20.1108	20.3029	20.3385	20.3378	20.2364	19.8784	19.4801	19.1545 (90)
Living area fraction									fLA = Living area / (4) =			0.1670 (91)
MIT	19.2465	19.3817	19.5968	19.9294	20.2135	20.4082	20.4470	20.4453	20.3395	19.9794	19.5816	19.2569 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.0965	19.2317	19.4468	19.7794	20.0635	20.2582	20.2970	20.2953	20.1895	19.8294	19.4316	19.1069 (93)
8. Space heating requirement												
Utilisation	0.9988	0.9974	0.9939	0.9786	0.9232	0.7540	0.5437	0.5978	0.8678	0.9833	0.9971	Dec 0.9990 (94)
Useful gains	676.4338	753.8948	799.9193	849.2591	830.3132	666.6757	460.7933	479.9670	658.9434	685.2146	658.9492	651.8188 (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	1982.3483	1910.2076	1716.8804	1408.2142	1077.6029	713.4022	466.1283	489.1402	774.2597	1189.1662	1603.6740	1957.2795 (97)
Space heating kWh	971.6004	777.0422	682.2190	402.4476	183.9835	0.0000	0.0000	0.0000	0.0000	374.9400	680.2019	971.2628 (98a)
Space heating requirement - total per year (kWh/year)												5043.6973
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	971.6004	777.0422	682.2190	402.4476	183.9835	0.0000	0.0000	0.0000	0.0000	374.9400	680.2019	971.2628 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5043.6973
Space heating per m2										(98c) / (4) =		52.5604 (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	971.6004	777.0422	682.2190	402.4476	183.9835	0.0000	0.0000	0.0000	0.0000	374.9400	680.2019	971.2628 (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)	1085.5870	868.2036	762.2559	449.6622	205.5682	0.0000	0.0000	0.0000	0.0000	418.9273	760.0021	1085.2098 (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	270.8408	239.3990	253.8920	222.0381	214.4614	192.3926	189.1901	197.1348	199.7897	223.8210	239.2855	267.7144 (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	302.6155	267.4850	283.6782	248.0872	239.6217	214.9638	211.3856	220.2623	223.2287	250.0793	267.3581	299.1222 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	54.5055	43.7263	39.3707	28.8447	22.2804	18.2033	20.3250	26.4192	34.3159	45.0243	50.8548	56.0204 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-33.7478	-48.9371	-72.2681	-83.3149	-91.3230	-85.6826	-84.7192	-79.4479	-70.0075	-57.1062	-37.6210	-29.0190 (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												5635.4160 (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												3027.8875 (219)
Space cooling fuel												0.0000 (221)

Full SAP Calculation Printout



Electricity for pumps and fans:	
central heating pump	41.0000 (230c)
Total electricity for the above, kWh/year	41.0000 (231)
Electricity for lighting (calculated in Appendix L)	439.8904 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-773.1945 (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	8370.9995 (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	5635.4160	0.2100	1183.4374 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3027.8875	0.2100	635.8564 (264)
Space and water heating			1819.2937 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	439.8904	0.1443	63.4898 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-773.1945	0.1341	-103.6587
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-103.6587 (269)
Total CO2, kg/year			1784.8121 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			18.6000 (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	5635.4160	1.1300	6368.0201 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3027.8875	1.1300	3421.5129 (278)
Space and water heating			9789.5330 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	439.8904	1.5338	674.7186 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-773.1945	1.4955	-1156.2777
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1156.2777 (283)
Total Primary energy kWh/year			9369.9987 (286)
Dwelling Primary energy Rate (DPER)			97.6400 (287)

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

1. Overall dwelling characteristics

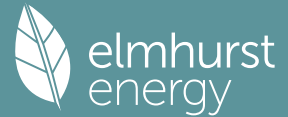
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	95.9600 (1b)	2.5000 (2b)	239.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	239.9000 (5)

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	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1251 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3751 (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) = 0.3751 (21)

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

Full SAP Calculation Printout



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												
Effective ac	0.4782	0.4688	0.4594	0.4126	0.4032	0.3563	0.3563	0.3469	0.3751	0.4032	0.4219	0.4407 (22b)
	0.6143	0.6099	0.6055	0.5851	0.5813	0.5635	0.5635	0.5602	0.5703	0.5813	0.5890	0.5971 (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
TER Opening Type (Uw = 1.20)			13.9400	1.1450	15.9618		(27)
External Wall	95.1800	13.9400	81.2400	0.1800	14.6232		(29a)
External Roof 1	49.5900		49.5900	0.1100	5.4549		(30)
Pitched Roof	46.3700		46.3700	0.1100	5.1007		(30)
Total net area of external elements Aum(A, m2)			191.1400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.1406		(33)
Party Wall 1			18.9200	0.0000	0.0000		(32)

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

371.7574 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	4.1500	0.0500	0.2075
E3 Sill	4.1500	0.0500	0.2075
E4 Jamb	14.5000	0.0500	0.7250
E7 Party floor between dwellings (in blocks of flats)	38.0700	0.0700	2.6649
E16 Corner (normal)	32.5000	0.0900	2.9250
E25 Staggered party wall between dwellings	2.5000	0.0600	0.1500
E18 Party wall between dwellings	15.0000	0.0600	0.9000
P4 Party wall - Roof (insulation at ceiling level)	7.5700	0.1200	0.9084
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.5700	0.0000	0.0000
R1 Head of roof window	3.0500	0.0800	0.2440
R2 Sill of roof window	3.0500	0.0600	0.1830
R3 Jamb of roof window	11.0900	0.0800	0.8872
R7 Flat ceiling (inverted)	20.4000	0.0400	0.8160
R9 Roof to wall (flat ceiling)	21.4500	0.0400	0.8580
E8 Balcony within a dwelling, wall insulation continuous	3.9500	0.0000	0.0000
E14 Flat roof	28.0000	0.0800	2.2400
E17 Corner (inverted - internal area greater than external area)	25.0000	-0.0900	-2.2500

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

11.6665 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 52.8071 (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	48.6349	48.2835	47.9389	46.3208	46.0180	44.6086	44.6086	44.3476	45.1515	46.0180	46.6305	47.2708 (38)
Heat transfer coeff	101.4421	101.0906	100.7461	99.1279	98.8251	97.4157	97.4157	97.1547	97.9586	98.8251	99.4376	100.0779 (39)
Average = Sum(39)m / 12 =												99.1264

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0571	1.0535	1.0499	1.0330	1.0299	1.0152	1.0152	1.0125	1.0208	1.0299	1.0362	1.0429 (40)
HLP (average)												1.0330
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

												2.6988 (42)
Assumed occupancy												
Hot water usage for mixer showers												
69.4706	68.4266	66.9052	63.9945	61.8464	59.4509	58.0892	59.5991	61.2541	63.8261	66.7994	69.2044 (42a)	
Hot water usage for baths												
29.9978	29.5523	28.9250	27.7682	26.9020	25.9416	25.4228	26.0458	26.7241	27.7518	28.9324	29.8964 (42b)	
Hot water usage for other uses												
42.2689	40.7318	39.1948	37.6577	36.1207	34.5836	34.5836	36.1207	37.6577	39.1948	40.7318	42.2689 (42c)	
Average daily hot water use (litres/day)												130.2885 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.7373	138.7107	135.0250	129.4204	124.8691	119.9761	118.0957	121.7655	125.6359	130.7727	136.4637	141.3697 (44)
Energy conte	224.4772	197.5222	207.5284	177.1701	168.0978	147.5246	142.8265	150.7712	154.9217	177.4574	194.4175	221.3508 (45)
Energy content (annual)										Total = Sum(45)m =		2164.0653
Distribution loss (46)m = 0.15 x (45)m												
	33.6716	29.6283	31.1293	26.5755	25.2147	22.1287	21.4240	22.6157	23.2382	26.6186	29.1626	33.2026 (46)

Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)

Total storage loss

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	--------------

If cylinder contains dedicated solar storage

23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	--------------

Primary loss

23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	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	0.0000 (61)
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	-------------

Total heat required for water heating calculated for each month

271.0721	239.6079	254.1233	222.2619	214.6927	192.6164	189.4214	197.3661	200.0135	224.0523	239.5094	267.9457 (62)
----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	---------------

WWHRS

-31.7590	-28.0880	-29.4121	-24.3544	-22.6974	-19.4223	-18.2053	-19.3595	-20.0951	-23.6899	-26.8378	-31.1709 (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

239.3131	211.5200	224.7112	197.9075	191.9953	173.1941	171.2161	178.0065	179.9184	200.3624	212.6716	236.7748 (64)
----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	---------------

12Total per year (kWh/year)

Electric shower(s)												2417.5910 (64)
--------------------	--	--	--	--	--	--	--	--	--	--	--	----------------

0.0000

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

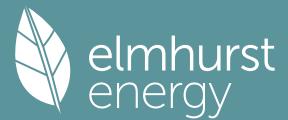
0.0000 (64a)

Heat gains from water heating, kWh/month

111.9146	99.3447	106.2791	94.9825	93.1684	85.1254	84.7657	87.4073	87.5849	96.2805	100.7173	110.8751 (65)
----------	---------	----------	---------	---------	---------	---------	---------	---------	---------	----------	---------------

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

Full SAP Calculation Printout



Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	134.0032	148.3607	134.0032	138.4700	134.0032	138.4700	134.0032	134.0032	138.4700	134.0032	138.4700	134.0032	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	249.6262	252.2166	245.6890	231.7926	214.2508	197.7641	186.7499	184.1596	190.6871	204.5836	222.1253	238.6121	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	(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)	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	(71)
Water heating gains (Table 5)	150.4229	147.8344	142.8483	131.9202	125.2264	118.2297	113.9324	117.4830	121.6457	129.4093	139.8851	149.0256	(72)
Total internal gains	600.5350	614.8944	589.0232	568.6654	539.9631	517.9465	498.1682	499.1284	514.2855	534.4787	566.9631	588.1236	(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
North				2.9200	10.6334	0.6300	0.7000	0.7700				9.4891 (74)
East				8.2400	19.6403	0.6300	0.7000	0.7700				49.4591 (76)
South				2.7800	46.7521	0.6300	0.7000	0.7700				39.7207 (78)
Solar gains	98.6690	179.9391	273.0172	375.5360	449.0663	456.8392	435.9652	380.4072	308.9277	206.5565	120.4584	82.9058 (83)
Total gains	699.2040	794.8334	862.0404	944.2014	989.0295	974.7857	934.1335	879.5356	823.2132	741.0352	687.4215	671.0293 (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	97.6853	98.0249	98.3602	99.9658	100.2721	101.7228	101.7228	101.9961	101.1591	100.2721	99.6545	99.0168	
alpha	7.5124	7.5350	7.5573	7.6644	7.6848	7.7815	7.7815	7.7997	7.7439	7.6848	7.6436	7.6011	
util living area	0.9992	0.9977	0.9923	0.9611	0.8499	0.6323	0.4583	0.5068	0.7822	0.9760	0.9976	0.9994	(86)
MIT	20.1872	20.3182	20.5052	20.7608	20.9357	20.9942	20.9996	20.9991	20.9738	20.7504	20.4298	20.1732	(87)
Th 2	20.0360	20.0390	20.0420	20.0559	20.0585	20.0707	20.0707	20.0730	20.0660	20.0585	20.0532	20.0477	(88)
util rest of house	0.9989	0.9965	0.9883	0.9416	0.7916	0.5445	0.3619	0.4055	0.6947	0.9599	0.9961	0.9992	(89)
MIT 2	19.0952	19.2650	19.5046	19.8280	20.0132	20.0684	20.0706	20.0728	20.0528	19.8236	19.4194	19.0866	(90)
Living area fraction									fLA = Living area / (4) =			0.1670	(91)
MIT	19.2776	19.4410	19.6718	19.9839	20.1673	20.2230	20.2258	20.2275	20.2066	19.9784	19.5882	19.2681	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2776	19.4410	19.6718	19.9839	20.1673	20.2230	20.2258	20.2275	20.2066	19.9784	19.5882	19.2681	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9984	0.9955	0.9862	0.9398	0.7990	0.5591	0.3780	0.4225	0.7088	0.9581	0.9951	0.9988	(94)
Useful gains	698.0940	791.2641	850.1496	887.3515	790.2292	545.0488	353.0968	371.6004	583.5013	709.9619	684.0602	670.2378	(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	1519.3628	1469.9555	1327.0057	1098.7199	836.7781	547.7722	353.2103	371.8609	598.1968	926.8210	1241.7943	1507.9887	(97)
Space heating kWh	611.0240	456.0806	354.7809	152.1853	34.6324	0.0000	0.0000	0.0000	0.0000	161.3432	401.5686	623.2867	(98a)
Space heating requirement - total per year (kWh/year)												2794.9016	
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	611.0240	456.0806	354.7809	152.1853	34.6324	0.0000	0.0000	0.0000	0.0000	161.3432	401.5686	623.2867	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2794.9016	
Space heating per m2										(98c) / (4) =		29.1257	(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)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	611.0240	456.0806	354.7809	152.1853	34.6324	0.0000	0.0000	0.0000	0.0000	161.3432	401.5686	623.2867	(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)	661.9979	494.1285	384.3780	164.8811	37.5215	0.0000	0.0000	0.0000	0.0000	174.8030	435.0689	675.2835	(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	239.3131	211.5200	224.7112	197.9075	191.9953	173.1941	171.2161	178.0065	179.9184	200.3624	212.6716	236.7748	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.0681	85.7363	85.0792	83.4778	81.0554	79.8000	79.8000	79.8000	79.8000	83.5785	85.4628	86.1259	(217)
Fuel for water heating, kWh/month													

Full SAP Calculation Printout



	278.0507	246.7098	264.1201	237.0780	236.8692	217.0352	214.5565	223.0658	225.4617	239.7296	248.8471	274.9171	(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	27.8432	22.3369	20.1119	14.7348	11.3816	9.2989	10.3827	13.4958	17.5297	22.9999	25.9783	28.6171	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-32.0778	-46.3805	-68.3397	-78.8088	-86.6460	-81.4471	-80.4258	-75.1037	-65.9938	-53.9042	-35.6677	-27.5979	(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	-14.7570	-31.3805	-63.0100	-95.5834	-127.3239	-128.3001	-126.8122	-106.9574	-77.8370	-45.2121	-19.8086	-11.6459	(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												3028.0625	(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												2906.4408	(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)												224.7107	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1581.0211	(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												4664.1928	(238)

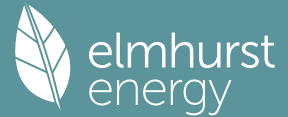
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3028.0625	0.2100	635.8931 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2906.4408	0.2100	610.3526 (264)
Space and water heating			1246.2457 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	224.7107	0.1443	32.4327 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-732.3930	0.1341	-98.1915
PV Unit electricity exported	-848.6281	0.1256	-106.5873
Total			-204.7788 (269)
Total CO2, kg/year			1085.8289 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.3200 (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	3028.0625	1.1300	3421.7106 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2906.4408	1.1300	3284.2781 (278)
Space and water heating			6705.9887 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	224.7107	1.5338	344.6688 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-732.3930	1.4955	-1095.2709
PV Unit electricity exported	-848.6281	0.4610	-391.2363
Total			-1486.5073 (283)
Total Primary energy kWh/year			5694.2510 (286)
Target Primary Energy Rate (TPER)			59.3400 (287)

Full SAP Calculation Printout



Property Reference	FLAT C8-3B5P				Issued on Date	12/09/2024
Assessment Reference	FLAT C8-3B5P_BeLean	Prop Type Ref	BLOCK C			
Property	Hornsey Police Station, 88/90 , Tottenham Ln. , London , N8 7EJ					
SAP Rating	82 B	DER	14.09	TER	11.32	
Environmental	88 B	% DER < TER				-24.47
CO ₂ Emissions (t/year)	1.16	DFEE	34.18	TFEE	35.33	
Compliance Check	See BREL	% DFEE < TFEE				3.27
% DPER < TPER	-39.51	DPER	82.78	TPER	59.34	
Assessor Details	Mr. Mirza Baig				Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M					

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)
Ground floor	95.9600 (1b)	2.5000 (2b)	239.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.9600		239.9000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	239.9000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2000 (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	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												46.2000 (23c)
Effective ac	0.5240	0.5190	0.5140	0.4890	0.4840	0.4590	0.4590	0.4540	0.4690	0.4840	0.4940	0.5040 (25)

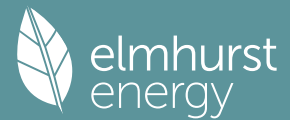
3. Heat losses and heat loss parameter

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
Window North (Uw = 1.20)			13.2100	1.1450	15.1260		(27)
Window S (Uw = 1.20)			0.7300	1.1450	0.8359		(27)
External Wall	95.1800	13.9400	81.2400	0.1800	14.6232	190.0000	15435.6000 (29a)
External Roof 1	49.5900		49.5900	0.0600	2.9754	9.0000	446.3100 (30)
Pitched Roof	46.3700		46.3700	0.0600	2.7822	9.0000	417.3300 (30)
Total net area of external elements Aum(A, m ²)			191.1400				(31)
Fabric heat loss, W/K = Sum (A x k)				(26)...(30) + (32) =	36.3426		(33)
Party Wall 1			18.9200	0.0000	0.0000	180.0000	3405.6000 (32)
Party Floor 1			95.9600			40.0000	3838.4000 (32d)
Party Ceiling 1			50.4400			30.0000	1513.2000 (32b)
Internal Wall 1			134.8400			75.0000	10113.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	35169.4400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							366.5010 (35)
List of Thermal Bridges							

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.6988 (42)
Hot water usage for mixer showers	69.4706	68.4266	66.9052	63.9945	61.8464	59.4509	58.0892	59.5991	61.2541	63.8261	66.7994	69.2044 (42a)
Hot water usage for baths	29.9978	29.5523	28.9250	27.7682	26.9020	25.9416	25.4228	26.0458	26.7241	27.7518	28.9324	29.8964 (42b)
Hot water usage for other uses	42.2689	40.7318	39.1948	37.6577	36.1207	34.5836	34.5836	36.1207	37.6577	39.1948	40.7318	42.2689 (42c)
Average daily hot water use (litres/day)												130.2885 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.7373	138.7107	135.0250	129.4204	124.8691	119.9761	118.0957	121.7655	125.6359	130.7727	136.4637	141.3697 (44)
Energy content (annual)	224.4772	197.5222	207.5284	177.1701	168.0978	147.5246	142.8265	150.7712	154.9217	177.4574	194.4175	221.3508 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 2164.0653
	33.6716	29.6283	31.1293	26.5755	25.2147	22.1287	21.4240	22.6157	23.2382	26.6186	29.1626	33.2026 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3800 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7452 (55)
Total storage loss	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (56)
If cylinder contains dedicated solar storage	23.1012	20.8656	23.1012	22.3560	23.1012	22.3560	23.1012	23.1012	22.3560	23.1012	22.3560	23.1012 (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	270.8408	239.3990	253.8920	222.0381	214.4614	192.3926	189.1901	197.1348	199.7897	223.8210	239.2855	267.7144 (62)
VVHRS	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	270.8408	239.3990	253.8920	222.0381	214.4614	192.3926	189.1901	197.1348	199.7897	223.8210	239.2855	267.7144 (64)
12Total per year (kWh/year)												2709.9593 (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 (64a)
Heat gains from water heating, kWh/month	111.7296	99.1776	106.0941	94.8034	92.9834	84.9463	84.5807	87.2223	87.4059	96.0955	100.5382	110.6900 (65)

6. Solar gains						
[Jan]	Area	Solar flux	α	FF	Access	Gains

Full SAP Calculation Printout



				m2	Table 6a W/m2	Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W
North				2.9200	10.6334	0.5200		0.7000		0.7700		7.8323 (74)
East				8.2400	19.6403	0.5200		0.7000		0.7700		40.8234 (76)
South				2.0500	46.7521	0.5200		0.7000		0.7700		24.1763 (78)
South				0.7300	46.7521	0.2500		0.7000		0.7700		4.1390 (78)
Solar gains	76.9710	141.2003	216.0220	299.4263	359.6747	366.5038	349.5169	303.9576	245.2463	162.5948	94.1274	64.5676 (83)
Total gains	677.2572	755.8459	804.7965	867.8430	899.3892	884.2016	847.4365	802.8373	759.2831	696.8248	660.8418	652.4424 (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	106.6198	107.0824	107.5490	109.9445	110.4365	112.9639	112.9639	113.4833	111.9392	110.4365	109.4569	108.4946
alpha	8.1080	8.1388	8.1699	8.3296	8.3624	8.5309	8.5309	8.5656	8.4626	8.3624	8.2971	8.2330
util living area	0.9992	0.9978	0.9930	0.9625	0.8493	0.6216	0.4488	0.4927	0.7671	0.9743	0.9975	0.9994 (86)
MIT	20.2847	20.4007	20.5654	20.7982	20.9505	20.9967	20.9998	20.9996	20.9834	20.7971	20.5110	20.2770 (87)
Th 2	20.5226	20.5246	20.5267	20.5370	20.5391	20.5494	20.5494	20.5515	20.5453	20.5391	20.5350	20.5308 (88)
util rest of house	0.9991	0.9973	0.9912	0.9536	0.8211	0.5795	0.4029	0.4449	0.7247	0.9665	0.9968	0.9993 (89)
MIT 2	19.8439	19.9614	20.1270	20.3633	20.5026	20.5476	20.5493	20.5513	20.5349	20.3659	20.0805	19.8433 (90)
Living area fraction	FLA = Living area / (4) = 0.1670 (91)											
MIT	19.9175	20.0348	20.2002	20.4359	20.5774	20.6226	20.6246	20.6262	20.6099	20.4379	20.1524	19.9157 (92)
Temperature adjustment	-0.1500											
adjusted MIT	19.7675	19.8848	20.0502	20.2859	20.4274	20.4726	20.4746	20.4762	20.4599	20.2879	20.0024	19.7657 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9987	0.9964	0.9890	0.9479	0.8138	0.5722	0.3953	0.4369	0.7164	0.9613	0.9957	0.9990 (94)
Useful gains	676.3683	753.1159	795.9582	822.6465	731.9409	505.9554	335.0046	350.7357	543.9406	669.8534	658.0174	651.7985 (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	1417.2464	1367.0843	1230.8433	1011.7159	772.0298	507.8730	335.0786	350.9005	555.0451	856.9984	1151.5717	1401.6005 (97)
Space heating kWh	551.2134	412.5867	323.5545	136.1300	29.8261	0.0000	0.0000	0.0000	0.0000	139.2359	355.3591	557.8527 (98a)
Space heating requirement - total per year (kWh/year)	2505.7585											
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	551.2134	412.5867	323.5545	136.1300	29.8261	0.0000	0.0000	0.0000	0.0000	139.2359	355.3591	557.8527 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2505.7585											
Space heating per m2	(98c) / (4) = 26.1125 (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	551.2134	412.5867	323.5545	136.1300	29.8261	0.0000	0.0000	0.0000	0.0000	139.2359	355.3591	557.8527 (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)	615.8808	460.9908	361.5134	152.1006	33.3253	0.0000	0.0000	0.0000	0.0000	155.5708	397.0493	623.2991 (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	270.8408	239.3990	253.8920	222.0381	214.4614	192.3926	189.1901	197.1348	199.7897	223.8210	239.2855	267.7144 (64)
Water heating requirement	270.8408	239.3990	253.8920	222.0381	214.4614	192.3926	189.1901	197.1348	199.7897	223.8210	239.2855	267.7144 (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	302.6155	267.4850	283.6782	248.0872	239.6217	214.9638	211.3856	220.2623	223.2287	250.0793	267.3581	299.1222 (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	127.7701	115.4053	127.7701	123.6485	127.7701	123.6485	127.7701	127.7701	123.6485	127.7701	123.6485	127.7701 (231)
Lighting	31.1357	24.9782	22.4901	16.4772	12.7275	10.3985	11.6104	15.0917	19.6026	25.7197	29.0503	32.0011 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-35.3060	-52.1644	-78.8667	-93.7310	-105.9538	-101.3246	-100.6210	-92.7915	-79.3477	-62.3361	-39.8414	-30.2854 (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	2799.7301 (211)											
Space heating fuel - main system 1	2799.7301 (211)											

Full SAP Calculation Printout



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	3027.8875	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Table 4g: in-use factor = 2.5000, SFP = 5.0000)		
mechanical ventilation fans (SFP = 5.0000)	1463.3900	(230a)
central heating pump	41.0000	(230c)
Total electricity for the above, kWh/year	1504.3900	(231)
Electricity for lighting (calculated in Appendix L)	251.2831	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-872.5696	(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	6710.7212	(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	2799.7301	0.2100	587.9433 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3027.8875	0.2100	635.8564 (264)
Space and water heating			1223.7997 (265)
Pumps, fans and electric keep-hot	1504.3900	0.1387	208.6774 (267)
Energy for lighting	251.2831	0.1443	36.2679 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-872.5696	0.1334	-116.3885
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-116.3885 (269)
Total CO2, kg/year			1352.3566 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			14.0900 (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	2799.7301	1.1300	3163.6950 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3027.8875	1.1300	3421.5129 (278)
Space and water heating			6585.2079 (279)
Pumps, fans and electric keep-hot	1504.3900	1.5128	2275.8412 (281)
Energy for lighting	251.2831	1.5338	385.4265 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-872.5696	1.4929	-1302.6605
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1302.6605 (283)
Total Primary energy kWh/year			7943.8150 (286)
Dwelling Primary energy Rate (DPER)			82.7800 (287)

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

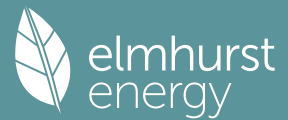
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	95.9600 (1b)	x 2.5000 (2b)	= 239.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	95.9600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 239.9000 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1251 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3751 (18)

Full SAP Calculation Printout



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) = 0.3751 (21)

Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4782	0.4688	0.4594	0.4126	0.4032	0.3563	0.3563	0.3469	0.3751	0.4032	0.4219	0.4407 (22b)
Effective ac	0.6143	0.6099	0.6055	0.5851	0.5813	0.5635	0.5635	0.5602	0.5703	0.5813	0.5890	0.5971 (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	
TER Opening Type (Uw = 1.20)			13.9400	1.1450	15.9618			(27)
External Wall	95.1800	13.9400	81.2400	0.1800	14.6232			(29a)
External Roof 1	49.5900		49.5900	0.1100	5.4549			(30)
Pitched Roof	46.3700		46.3700	0.1100	5.1007			(30)
Total net area of external elements Aum(A, m ²)			191.1400					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.1406			(33)
Party Wall 1			18.9200	0.0000	0.0000			(32)

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

371.7574 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	4.1500	0.0500	0.2075	
E3 Sill	4.1500	0.0500	0.2075	
E4 Jamb	14.5000	0.0500	0.7250	
E7 Party floor between dwellings (in blocks of flats)	38.0700	0.0700	2.6649	
E16 Corner (normal)	32.5000	0.0900	2.9250	
E25 Staggered party wall between dwellings	2.5000	0.0600	0.1500	
E18 Party wall between dwellings	15.0000	0.0600	0.9000	
P4 Party wall - Roof (insulation at ceiling level)	7.5700	0.1200	0.9084	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.5700	0.0000	0.0000	
R1 Head of roof window	3.0500	0.0800	0.2440	
R2 Sill of roof window	3.0500	0.0600	0.1830	
R3 Jamb of roof window	11.0900	0.0800	0.8872	
R7 Flat ceiling (inverted)	20.4000	0.0400	0.8160	
R9 Roof to wall (flat ceiling)	21.4500	0.0400	0.8580	
E8 Balcony within a dwelling, wall insulation continuous	3.9500	0.0000	0.0000	
E14 Flat roof	28.0000	0.0800	2.2400	
E17 Corner (inverted - internal area greater than external area)	25.0000	-0.0900	-2.2500	

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

11.6665 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 52.8071 (37)

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

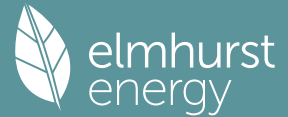
(38)m	Jan 48.6349	Feb 48.2835	Mar 47.9389	Apr 46.3208	May 46.0180	Jun 44.6086	Jul 44.6086	Aug 44.3476	Sep 45.1515	Oct 46.0180	Nov 46.6305	Dec 47.2708 (38)
Heat transfer coeff	101.4421	101.0906	100.7461	99.1279	98.8251	97.4157	97.4157	97.1547	97.9586	98.8251	99.4376	100.0779 (39)
Average = Sum(39)m / 12 =												99.1264

HLP	Jan 1.0571	Feb 1.0535	Mar 1.0499	Apr 1.0330	May 1.0299	Jun 1.0152	Jul 1.0152	Aug 1.0125	Sep 1.0208	Oct 1.0299	Nov 1.0362	Dec 1.0429 (40)
HLP (average)												1.0330
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.6988 (42)
Hot water usage for mixer showers	69.4706	68.4266	66.9052	63.9945	61.8464	59.4509	58.0892	59.5991	61.2541	63.8261	66.7994	69.2044 (42a)
Hot water usage for baths	29.9978	29.5523	28.9250	27.7682	26.9020	25.9416	25.4228	26.0458	26.7241	27.7518	28.9324	29.8964 (42b)
Hot water usage for other uses	42.2689	40.7318	39.1948	37.6577	36.1207	34.5836	34.5836	36.1207	37.6577	39.1948	40.7318	42.2689 (42c)
Average daily hot water use (litres/day)												130.2885 (43)
Daily hot water use	Jan 141.7373	Feb 138.7107	Mar 135.0250	Apr 129.4204	May 124.8691	Jun 119.9761	Jul 118.0957	Aug 121.7655	Sep 125.6359	Oct 130.7727	Nov 136.4637	Dec 141.3697 (44)
Energy conte	224.4772	197.5222	207.5284	177.1701	168.0978	147.5246	142.8265	150.7712	154.9217	177.4574	194.4175	221.3508 (45)
Energy content (annual)										Total = Sum(45)m =		2164.0653
Distribution loss (46)m = 0.15 x (45)m	33.6716	29.6283	31.1293	26.5755	25.2147	22.1287	21.4240	22.6157	23.2382	26.6186	29.1626	33.2026 (46)
Water storage loss:												
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	271.0721	239.6079	254.1233	222.2619	214.6927	192.6164	189.4214	197.3661	200.0135	224.0523	239.5094	267.9457 (62)
WWHRS	-31.7590	-28.0880	-29.4121	-24.3544	-22.6974	-19.4223	-18.2053	-19.3595	-20.0951	-23.6899	-26.8378	-31.1709 (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	239.3131	211.5200	224.7112	197.9075	191.9953	173.1941	171.2161	178.0065	179.9184	200.3624	212.6716	236.7748 (64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2417.5910 (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												

Full SAP Calculation Printout



111.9146 99.3447 106.2791 94.9825 93.1684 85.1254 84.7657 87.4073 87.5849 96.2805 100.7173 110.8751 (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	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	134.9423	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	134.0032	148.3607	134.0032	138.4700	134.0032	138.4700	134.0032	134.0032	138.4700	134.0032	138.4700	134.0032	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	249.6262	252.2166	245.6890	231.7926	214.2508	197.7641	186.7499	184.1596	190.6871	204.5836	222.1253	238.6121	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	36.4942	(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)	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	-107.9539	(71)
Water heating gains (Table 5)	150.4229	147.8344	142.8483	131.9202	125.2264	118.2297	113.9324	117.4830	121.6457	129.4093	139.8851	149.0256	(72)
Total internal gains	600.5350	614.8944	589.0232	568.6654	539.9631	517.9465	498.1682	499.1284	514.2855	534.4787	566.9631	588.1236	(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
North				2.9200	10.6334		0.6300		0.7000		0.7700		9.4891 (74)
East				8.2400	19.6403		0.6300		0.7000		0.7700		49.4591 (76)
South				2.7800	46.7521		0.6300		0.7000		0.7700		39.7207 (78)
Solar gains	98.6690	179.9391	273.0172	375.5360	449.0663	456.8392	435.9652	380.4072	308.9277	206.5565	120.4584	82.9058	(83)
Total gains	699.2040	794.8334	862.0404	944.2014	989.0295	974.7857	934.1335	879.5356	823.2132	741.0352	687.4215	671.0293	(84)

7. Mean internal temperature (heating season)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nil,m (see Table 9a)	0.9992	0.9977	0.9923	0.9611	0.8499	0.6323	0.4583	0.5068	0.7822	0.9760	0.9976	0.9994	(85)
tau	97.6853	98.0249	98.3602	99.9658	100.2721	101.7228	101.7228	101.9961	101.1591	100.2721	99.6545	99.0168	
alpha	7.5124	7.5350	7.5573	7.6644	7.6848	7.7815	7.7815	7.7997	7.7439	7.6848	7.6436	7.6011	
util living area	0.9992	0.9977	0.9923	0.9611	0.8499	0.6323	0.4583	0.5068	0.7822	0.9760	0.9976	0.9994	(86)
MIT	20.1872	20.3182	20.5052	20.7608	20.9357	20.9942	20.9996	20.9991	20.9738	20.7504	20.4298	20.1732	(87)
Th 2	20.0360	20.0390	20.0420	20.0559	20.0585	20.0707	20.0707	20.0730	20.0660	20.0585	20.0532	20.0477	(88)
util rest of house	0.9989	0.9965	0.9883	0.9416	0.7916	0.5445	0.3619	0.4055	0.6947	0.9599	0.9961	0.9992	(89)
MIT 2	19.0952	19.2650	19.5046	19.8280	20.0132	20.0684	20.0706	20.0728	20.0528	19.8236	19.4194	19.0866	(90)
Living area fraction	19.2776	19.4410	19.6718	19.9839	20.1673	20.2230	20.2258	20.2275	20.2066	19.9784	19.5882	19.2681	(91)
MIT	19.2776	19.4410	19.6718	19.9839	20.1673	20.2230	20.2258	20.2275	20.2066	19.9784	19.5882	19.2681	(92)
Temperature adjustment	19.2776	19.4410	19.6718	19.9839	20.1673	20.2230	20.2258	20.2275	20.2066	19.9784	19.5882	19.2681	(93)
adjusted MIT	19.2776	19.4410	19.6718	19.9839	20.1673	20.2230	20.2258	20.2275	20.2066	19.9784	19.5882	19.2681	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9984	0.9955	0.9862	0.9398	0.7990	0.5591	0.3780	0.4225	0.7088	0.9581	0.9951	0.9988	(94)
Useful gains	698.0940	791.2641	850.1496	887.3515	790.2292	545.0488	353.0968	371.6004	583.5013	709.9619	684.0602	670.2378	(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	1519.3628	1469.9555	1327.0057	1098.7199	836.7781	547.7722	353.2103	371.8609	598.1968	926.8210	1241.7943	1507.9887	(97)
Space heating kWh	611.0240	456.0806	354.7809	152.1853	34.6324	0.0000	0.0000	0.0000	0.0000	161.3432	401.5686	623.2867	(98a)
Space heating requirement - total per year (kWh/year)												2794.9016	
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	611.0240	456.0806	354.7809	152.1853	34.6324	0.0000	0.0000	0.0000	0.0000	161.3432	401.5686	623.2867	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2794.9016	
Space heating per m ²												29.1257	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
Space heating requirement	611.0240	456.0806	354.7809	152.1853	34.6324	0.0000	0.0000	0.0000	0.0000	161.3432	401.5686	623.2867	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	92.3000	92.3000	92.3000	92.3000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	661.9979	494.1285	384.3780	164.8811	37.5215	0.0000	0.0000	0.0000	0.0000	174.8030	435.0689	675.2835	(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)

Full SAP Calculation Printout



Water heating													
Water heating requirement	239.3131	211.5200	224.7112	197.9075	191.9953	173.1941	171.2161	178.0065	179.9184	200.3624	212.6716	236.7748	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.0681	85.7363	85.0792	83.4778	81.0554	79.8000	79.8000	79.8000	79.8000	83.5785	85.4628	86.1259	(217)
Fuel for water heating, kWh/month	278.0507	246.7098	264.1201	237.0780	236.8692	217.0352	214.5565	223.0658	225.4617	239.7296	248.8471	274.9171	(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	7.0685	(231)
Lighting	27.8432	22.3369	20.1119	14.7348	11.3816	9.2989	10.3827	13.4958	17.5297	22.9999	25.9783	28.6171	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-32.0778	-46.3805	-68.3397	-78.8088	-86.6460	-81.4471	-80.4258	-75.1037	-65.9938	-53.9042	-35.6677	-27.5979	(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	-14.7570	-31.3805	-63.0100	-95.5834	-127.3239	-128.3001	-126.8122	-106.9574	-77.8370	-45.2121	-19.8086	-11.6459	(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												3028.0625	(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												2906.4408	(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)												224.7107	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1581.0211	(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												4664.1928	(238)

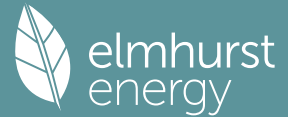
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3028.0625	0.2100	635.8931	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2906.4408	0.2100	610.3526	(264)
Space and water heating			1246.2457	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	224.7107	0.1443	32.4327	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-732.3930	0.1341	-98.1915	
PV Unit electricity exported	-848.6281	0.1256	-106.5873	
Total			-204.7788	(269)
Total CO2, kg/year			1085.8289	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.3200	(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	3028.0625	1.1300	3421.7106	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2906.4408	1.1300	3284.2781	(278)
Space and water heating			6705.9887	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	224.7107	1.5338	344.6688	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-732.3930	1.4955	-1095.2709	
PV Unit electricity exported	-848.6281	0.4610	-391.2363	
Total			-1486.5073	(283)
Total Primary energy kWh/year			5694.2510	(286)
Target Primary Energy Rate (TPER)			59.3400	(287)

Full SAP Calculation Printout



Property Reference	MH3- 4B8P			Issued on Date	12/09/2024
Assessment Reference	MH3- 4B8P	Prop Type Ref	BLOCK B		
Property	Hornsey Police Station, 98 , Tottenham Ln , London , N8 7EJ				
SAP Rating	92 A	DER	1.96	TER	11.35
Environmental	98 A	% DER < TER			82.73
CO ₂ Emissions (t/year)	0.18	DFEE	39.73	TFEE	40.76
Compliance Check	See BREL	% DFEE < TFEE			2.54
% DPER < TPER	66.48	DPER	19.88	TPER	59.31
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, ARCHANAUM				

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)	
Ground floor	45.7900 (1b)	x	2.5000 (2b)	=	114.4750 (1b)	- (3b)
First floor	41.1500 (1c)	x	2.5000 (2c)	=	102.8750 (1c)	- (3c)
Second floor	25.7800 (1d)	x	2.5000 (2d)	=	64.4500 (1d)	- (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	112.7200					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	281.8000	(5)

2. Ventilation rate

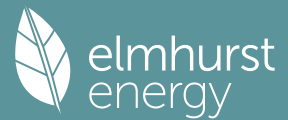
		m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)	
Number of open flues	0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =	0.0000 (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		3.5000 (17)	
Infiltration rate		0.1750 (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) =	0.1750 (21)	

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.2231	0.2188	0.2144	0.1925	0.1881	0.1662	0.1662	0.1619	0.1750	0.1881	0.1969	0.2056	(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) =												73.6000	(23c)
Effective ac	0.3551	0.3507	0.3464	0.3245	0.3201	0.2982	0.2982	0.2939	0.3070	0.3201	0.3289	0.3376	(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	
Window North (Uw = 1.20)			7.9700	1.1450	9.1260			(27)
Window South (Uw = 1.20)			19.2700	1.1450	22.0649			(27)
Door			1.9000	0.9800	1.8620			(26)
GF			45.7900	0.0700	3.2053	110.0000	5036.9000	(28a)
External Wall 1	92.4100	29.1400	63.2700	0.1800	11.3886	190.0000	12021.3000	(29a)
Flat Roof	33.3600		33.3600	0.0700	2.3352	9.0000	300.2400	(30)
Total net area of external elements Aum (A, m ²)			171.5600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		49.9819			(33)
Party Wall 1			111.2900	0.0000	0.0000	180.0000	20032.2000	(32)
Internal Wall 1			141.7000			75.0000	10627.5000	(32c)
Internal Floor 1			41.1500			18.0000	740.7000	(32d)
Internal Floor 2			25.7800			18.0000	464.0400	(32d)

Full SAP Calculation Printout



Heat capacity $C_m = \text{Sum}(A \times k)$
Thermal mass parameter (TMP) = C_m / TFA in $\text{kJ/m}^2\text{K}$
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	13.8200	0.0410	0.5666
E3 Sill	7.6200	0.0210	0.1600
E4 Jamb	38.5600	0.0160	0.6170
E5 Ground floor (normal)	24.8500	0.1640	4.0754
E6 Intermediate floor within a dwelling	24.8500	0.0000	0.0000
E6 Corner (normal)	22.5000	0.0540	1.2150
E17 Corner (inverted - internal area greater than external area)	20.0000	-0.0900	-1.8000
E18 Party wall between dwellings	5.0000	0.0600	0.3000
P1 Party wall - Ground floor	16.5700	0.0800	1.3256
P2 Party wall - Intermediate floor within a dwelling	16.5700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	16.5700	0.1200	1.9884
E21 Exposed floor (inverted)	11.4300	0.3200	3.6576
E14 Flat roof	35.5300	0.0400	1.4212
E25 Staggered party wall between dwellings	20.0000	0.1200	2.4000

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges
Total fabric heat loss

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	33.0245	32.6176	32.2108	30.1766	29.7697	27.7355	27.7355	27.3286	28.5492	29.7697	30.5834	31.3971
Average = $\text{Sum}(39)\text{m} / 12 =$	98.9332	98.5264	98.1195	96.0853	95.6784	93.6442	93.6442	93.2374	94.4579	95.6784	96.4921	97.3058
HLP	0.8777	0.8741	0.8705	0.8524	0.8488	0.8308	0.8308	0.8272	0.8380	0.8488	0.8560	0.8633
HLP (average)												0.8515
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.8302 (42)
Hot water usage for mixer showers												
Hot water usage for baths	71.6730	70.5959	69.0264	66.0233	63.8071	61.3357	59.9309	61.4886	63.1961	65.8497	68.9172	71.3984 (42a)
Hot water usage for other uses	30.9450	30.4854	29.8382	28.6449	27.7514	26.7606	26.2255	26.8681	27.5679	28.6280	29.8459	30.8404 (42b)
Average daily hot water use (litres/day)	43.6141	42.0282	40.4422	38.8562	37.2702	35.6843	35.6843	37.2702	38.8562	40.4422	42.0282	43.6141 (42c)
Daily hot water use	146.2321	143.1095	139.3068	133.5245	128.8288	123.7806	121.8406	125.6269	129.6201	134.9199	140.7913	145.8529 (44)
Energy content (annual)	231.5959	203.7860	214.1093	182.7883	173.4283	152.2027	147.3557	155.5524	159.8346	183.0850	200.5830	228.3704 (45)
Distribution loss (46)m = $0.15 \times (45)\text{m}$	34.7394	30.5679	32.1164	27.4182	26.0142	22.8304	22.1034	23.3329	23.9752	27.4627	30.0874	34.2556 (46)
Water storage 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												
Primary 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 (57)
Combi 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)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
WWHRS	280.4705	247.9308	262.9839	230.0863	222.3029	199.5007	196.2303	204.4270	207.1326	231.9596	247.8810	277.2450 (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	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)
12Total per year (kWh/year)	280.4705	247.9308	262.9839	230.0863	222.3029	199.5007	196.2303	204.4270	207.1326	231.9596	247.8810	277.2450 (64)
Electric shower(s)												
Heat gains from water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	116.1053	103.0747	110.2910	98.6155	96.7646	88.4458	88.0955	90.8209	90.9834	99.9754	104.5322	115.0328 (65)

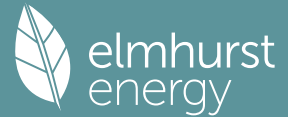
5. Internal gains (see Table 5 and 5a)

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	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	138.9114	153.7948	138.9114	143.5418	138.9114	143.5418	138.9114	138.9114	143.5418	138.9114	143.5418	138.9114 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	275.4074	278.2653	271.0635	255.7319	236.3785	218.1890	206.0373	203.1794	210.3811	225.7128	245.0662	263.2557 (68)
Pumps, fans	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510 (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)	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082 (71)
Total internal gains	156.0556	153.3849	148.2406	136.9660	130.0599	122.8414	118.4079	122.0710	126.3658	134.3756	145.1837	154.6140 (72)
	635.8274	650.8981	623.6687	601.6928	570.8029	550.0252	528.8096	529.6149	545.7418	564.4528	599.2447	622.2342 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

Full SAP Calculation Printout



	m2		Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W	
South	7.9700		46.7521		0.5200		0.7000		0.7700		93.9926 (78)	
North	19.2700		10.6334		0.2500		0.7000		0.7700		24.8499 (74)	

Solar gains	118.8425	201.4251	276.7829	351.2394	405.5507	409.1740	391.6693	349.3419	301.8587	222.5641	142.0689	101.9344 (83)
Total gains	754.6700	852.3232	900.4516	952.9321	976.3536	959.1992	920.4789	878.9568	847.6006	787.0169	741.3136	724.1686 (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	138.2045	138.7752	139.3507	142.3009	142.9060	146.0103	146.0103	146.6475	144.7526	142.9060	141.7009	140.5159
alpha	10.2136	10.2517	10.2900	10.4867	10.5271	10.7340	10.7340	10.7765	10.6502	10.5271	10.4467	10.3677
util living area	0.9998	0.9992	0.9967	0.9751	0.8651	0.6233	0.4476	0.4878	0.7576	0.9810	0.9991	0.9999 (86)
Living	20.4459	20.5464	20.6755	20.8555	20.9720	20.9991	21.0000	20.9999	20.9940	20.8619	20.6283	20.4369
Non living	19.6821	19.7850	19.9159	20.1019	20.1971	20.2265	20.2267	20.2298	20.2186	20.1127	19.8805	19.6840
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	20.7166	20.5464	20.6755	20.8555	20.9720	20.9991	21.0000	20.9999	20.9940	20.8619	20.6283	20.5157 (87)
Th 2	20.1865	20.1896	20.1927	20.2081	20.2112	20.2267	20.2267	20.2299	20.2205	20.2112	20.2050	20.1988 (88)
util rest of house	0.9997	0.9987	0.9946	0.9601	0.8107	0.5489	0.3690	0.4062	0.6784	0.9664	0.9984	0.9998 (89)
MIT 2	19.9285	19.7850	19.9159	20.1019	20.1971	20.2265	20.2267	20.2298	20.2186	20.1127	19.8805	19.7560 (90)
Living area fraction									fLA = Living area / (4) =			0.3081 (91)
MIT	20.1713	20.0196	20.1500	20.3341	20.4358	20.4646	20.4650	20.4671	20.4575	20.3436	20.1109	19.9901 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1713	20.0196	20.1500	20.3341	20.4358	20.4646	20.4650	20.4671	20.4575	20.3436	20.1109	19.9901 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9997	0.9986	0.9944	0.9629	0.8273	0.5719	0.3932	0.4314	0.7031	0.9695	0.9983	0.9998 (94)
Useful gains	754.4495	851.1298	895.4331	917.6212	807.7115	548.5902	361.9234	379.1825	595.9752	762.9860	740.0744	724.0115 (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	1570.1964	1489.6781	1339.3280	1098.6448	835.8323	549.1812	361.9332	379.2076	600.5158	932.2495	1255.4528	1536.4647 (97)
Space heating kWh	606.9157	429.1045	330.2579	130.3370	20.9219	0.0000	0.0000	0.0000	0.0000	125.9320	371.0724	604.4652 (98a)
Space heating requirement - total per year (kWh/year)												2619.0066
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	606.9157	429.1045	330.2579	130.3370	20.9219	0.0000	0.0000	0.0000	0.0000	125.9320	371.0724	604.4652 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2619.0066
Space heating per m2										(98c) / (4) =		23.2346 (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 %)												370.4331 (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	606.9157	429.1045	330.2579	130.3370	20.9219	0.0000	0.0000	0.0000	0.0000	125.9320	371.0724	604.4652 (98)
Space heating efficiency (main heating system 1)	370.4331	370.4331	370.4331	370.4331	370.4331	0.0000	0.0000	0.0000	0.0000	370.4331	370.4331	370.4331 (210)
Space heating fuel (main heating system)	163.8395	115.8386	89.1545	35.1850	5.6480	0.0000	0.0000	0.0000	0.0000	33.9959	100.1726	163.1780 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	280.4705	247.9308	262.9839	230.0863	222.3029	199.5007	196.2303	204.4270	207.1326	231.9596	247.8810	277.2450 (64)
Efficiency of water heater (217)m	178.2296	178.2296	178.2296	178.2296	178.2296	178.2296	178.2296	178.2296	178.2296	178.2296	178.2296	178.2296 (216)
Fuel for water heating, kWh/month	157.3648	139.1075	147.5535	129.0955	124.7284	111.9347	110.0997	114.6987	116.2167	130.1465	139.0796	155.5550 (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	22.4833	20.3075	22.4833	21.7580	22.4833	21.7580	22.4833	22.4833	21.7580	22.4833	21.7580	22.4833 (231)
Lighting	32.3247	25.9321	23.3490	17.1064	13.2135	10.7956	12.0538	15.6680	20.3512	26.7018	30.1597	33.2231 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-64.7206	-92.9319	-135.0321	-149.5125	-158.7548	-147.7942	-145.9042	-137.8205	-122.0346	-103.6346	-71.0850	-55.7082 (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)												

Full SAP Calculation Printout



(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												707.0121	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												178.2296	
Water heating fuel used												1575.5806	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.7700)													
mechanical ventilation fans (SFP = 0.7700)												264.7229	(230a)
Total electricity for the above, kWh/year												264.7229	(231)
Electricity for lighting (calculated in Appendix L)												260.8788	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1384.9334	(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												1423.2611	(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	707.0121	0.1570	111.0052	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1575.5806	0.1410	222.1425	(264)
Space and water heating			333.1476	(265)
Pumps, fans and electric keep-hot	264.7229	0.1387	36.7203	(267)
Energy for lighting	260.8788	0.1443	37.6529	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1384.9334	0.1347	-186.5778	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-186.5778	(269)
Total CO2, kg/year			220.9431	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			1.9600	(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	707.0121	1.5813	1117.9639	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1575.5806	1.5213	2396.9901	(278)
Space and water heating			3514.9540	(279)
Pumps, fans and electric keep-hot	264.7229	1.5128	400.4728	(281)
Energy for lighting	260.8788	1.5338	400.1447	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1384.9334	1.4979	-2074.5137	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-2074.5137	(283)
Total Primary energy kWh/year			2241.0578	(286)
Dwelling Primary energy Rate (DPER)			19.8800	(287)

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

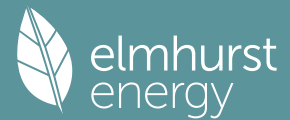
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	45.7900 (1b)	x 2.5000 (2b)	= 114.4750 (1b) - (3b)	
First floor	41.1500 (1c)	x 2.5000 (2c)	= 102.8750 (1c) - (3c)	
Second floor	25.7800 (1d)	x 2.5000 (2d)	= 64.4500 (1d) - (3d)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	112.7200		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	281.8000 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
		Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1419 (8)

Full SAP Calculation Printout



Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3919 (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) =	0.3919 (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												
	0.4997	0.4899	0.4801	0.4311	0.4213	0.3723	0.3723	0.3625	0.3919	0.4213	0.4409	0.4605 (22b)
Effective ac	0.6249	0.6200	0.6153	0.5929	0.5888	0.5693	0.5693	0.5657	0.5768	0.5888	0.5972	0.6060 (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
TER Opaque door			1.9000	1.0000	1.9000		(26)
TER Opening Type (Uw = 1.20)			26.2800	1.1450	30.0916		(27)
GF			45.7900	0.1300	5.9527		(28a)
External Wall 1	92.4100	28.1800	64.2300	0.1800	11.5614		(29a)
Flat Roof	33.3600		33.3600	0.1100	3.6696		(30)
Total net area of external elements Aum(A, m2)			171.5600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.1753		(33)
Party Wall 1			111.2900	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 436.6828 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	13.8200	0.0500	0.6910
E2 Other lintels (including other steel lintels)	7.6200	0.0500	0.3810
E3 Sill	38.5600	0.0500	1.9280
E4 Jamb	24.8500	0.1600	3.9760
E5 Ground floor (normal)	24.8500	0.0000	0.0000
E6 Intermediate floor within a dwelling	22.5000	0.0900	2.0250
E16 Corner (normal)	20.0000	-0.0900	-1.8000
E17 Corner (inverted - internal area greater than external area)	5.0000	0.0600	0.3000
E18 Party wall between dwellings	16.5700	0.0800	1.3256
P1 Party wall - Ground floor	16.5700	0.0000	0.0000
P2 Party wall - Intermediate floor within a dwelling	16.5700	0.1200	1.9884
P4 Party wall - Roof (insulation at ceiling level)	11.4300	0.3200	3.6576
E21 Exposed floor (inverted)	35.5300	0.0800	2.8424
E14 Flat roof	20.0000	0.0600	1.2000
E25 Staggered party wall between dwellings			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			18.5150 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	71.6903 (37)

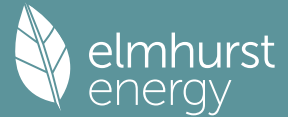
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	58.1087	57.6578	57.2158	55.1399	54.7515	52.9435	52.9435	52.6086	53.6399	54.7515	55.5372	56.3587 (38)
Heat transfer coeff	129.7990	129.3481	128.9061	126.8302	126.4418	124.6338	124.6338	124.2989	125.3302	126.4418	127.2275	128.0490 (39)
Average = Sum(39)m / 12 =												126.8283
HLP	1.1515	1.1475	1.1436	1.1252	1.1217	1.1057	1.1057	1.1027	1.1119	1.1217	1.1287	1.1360 (40)
HLP (average)												1.1252
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.8302 (42)
Hot water usage for mixer showers													
71.6730	70.5959	69.0264	66.0233	63.8071	61.3357	59.9309	61.4886	63.1961	65.8497	68.9172	71.3984	(42a)	
Hot water usage for baths													
30.9450	30.4854	29.8382	28.6449	27.7514	26.7606	26.2255	26.8681	27.5679	28.6280	29.8459	30.8404	(42b)	
Hot water usage for other uses													
43.6141	42.0282	40.4422	38.8562	37.2702	35.6843	35.6843	37.2702	38.8562	40.4422	42.0282	43.6141	(42c)	
Average daily hot water use (litres/day)												134.4202 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
146.2321	143.1095	139.3068	133.5245	128.8288	123.7806	121.8406	125.6269	129.6201	134.9199	140.7913	145.8529	(44)	
Energy content (annual)													
231.5959	203.7860	214.1093	182.7883	173.4283	152.2027	147.3557	155.5524	159.8346	183.0850	200.5830	228.3704	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2232.6916	
34.7394	30.5679	32.1164	27.4182	26.0142	22.8304	22.1034	23.3329	23.9752	27.4627	30.0874	34.2556	(46)	
Water storage 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													
283.3425	250.5248	265.8559	232.8657	225.1749	202.2800	199.1023	207.2990	209.9119	234.8316	250.6603	280.1170	(62)	
WWHRS													
-32.7659	-28.9784	-30.3446	-25.1265	-23.4170	-20.0381	-18.7825	-19.9733	-20.7322	-24.4409	-27.6886	-32.1591	(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													
250.5766	221.5464	235.5114	207.7392	201.7579	182.2419	180.3198	187.3257	189.1798	210.3906	222.9717	247.9578	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2537.5187 (64)	
Electric shower(s)												2538 (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)	

Full SAP Calculation Printout



Heat gains from water heating, kWh/month	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)										
118.4029 105.1499 112.5886 100.8390 99.0622 90.6693 90.3930 93.1184 93.2069 102.2730 106.7557 117.3304 (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	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	138.9114	153.7948	138.9114	143.5418	138.9114	143.5418	138.9114	138.9114	143.5418	138.9114	143.5418	138.9114	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	275.4074	278.2653	271.0635	255.7319	236.3785	218.1890	206.0373	203.1794	210.3811	225.7128	245.0662	263.2557	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	(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)	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	(71)
Water heating gains (Table 5)	159.1437	156.4731	151.3288	140.0542	133.1481	125.9295	121.4960	125.1592	129.4540	137.4638	148.2718	157.7022	(72)
Total internal gains	641.9156	656.9862	629.7568	607.7809	576.8911	553.1134	531.8978	532.7031	548.8300	570.5410	605.3329	628.3224	(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
North					18.5900	10.6334	0.6300	0.7000	0.7700			60.4120 (74)
South					7.6900	46.7521	0.6300	0.7000	0.7700			109.8750 (78)
Solar gains	170.2870	295.3973	425.3989	574.1818	694.4517	714.2301	678.1092	583.1183	475.3179	331.5183	204.7653	145.3045 (83)
Total gains	812.2026	952.3836	1055.1557	1181.9627	1271.3427	1267.3434	1210.0070	1115.8214	1024.1479	902.0593	810.0982	773.6269 (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	105.3400	105.7072	106.0696	107.8057	108.1369	109.7056	109.7056	110.0011	109.0960	108.1369	107.4691	106.7796
alpha	8.0227	8.0471	8.0713	8.1870	8.2091	8.3137	8.3137	8.3334	8.2731	8.2091	8.1646	8.1186
util living area	0.9998	0.9990	0.9957	0.9702	0.8536	0.6244	0.4529	0.5115	0.8034	0.9853	0.9991	0.9998 (86)
MIT	20.1895	20.3234	20.5101	20.7674	20.9456	20.9962	20.9997	20.9994	20.9748	20.7443	20.4251	20.1748 (87)
Th 2	19.9590	19.9622	19.9654	19.9803	19.9831	19.9962	19.9962	19.9986	19.9911	19.9831	19.9775	19.9715 (88)
util rest of house	0.9996	0.9984	0.9929	0.9516	0.7883	0.5294	0.3498	0.4008	0.7068	0.9725	0.9984	0.9997 (89)
MIT 2	19.0225	19.1966	19.4370	19.7644	19.9484	19.9949	19.9962	19.9985	19.9800	19.7451	19.3393	19.0138 (90)
Living area fraction									fLA =	Living area / (4) =		
MIT	19.3821	19.5438	19.7676	20.0734	20.2556	20.3034	20.3054	20.3069	20.2865	20.0530	19.6739	19.3715 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3821	19.5438	19.7676	20.0734	20.2556	20.3034	20.3054	20.3069	20.2865	20.0530	19.6739	19.3715 (93)

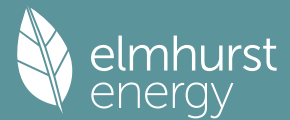
8. Space heating requirement

Utilisation	0.9995	0.9980	0.9921	0.9537	0.8073	0.5589	0.3816	0.4350	0.7372	0.9737	0.9981	0.9997	(94)
Useful gains	811.7935	950.5072	1046.8556	1127.2288	1026.4146	708.2764	461.7191	485.3534	754.9740	878.3249	808.5493	773.3629	(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	1957.6364	1894.1490	1710.2773	1417.1298	1081.7853	710.8384	461.8141	485.6210	775.3578	1195.2531	1599.7408	1942.6997	(97)
Space heating kWh	852.5071	634.1273	493.5857	208.7287	41.1959	0.0000	0.0000	0.0000	0.0000	235.7945	569.6579	869.9866	(98a)
Space heating requirement - total per year (kWh/year)												3905.5837	
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	852.5071	634.1273	493.5857	208.7287	41.1959	0.0000	0.0000	0.0000	0.0000	235.7945	569.6579	869.9866	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3905.5837	
Space heating per m ²										(98c) / (4) =		34.6485	(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	852.5071	634.1273	493.5857	208.7287	41.1959	0.0000	0.0000	0.0000	0.0000	235.7945	569.6579	869.9866	(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)	923.6264	687.0285	534.7624	226.1416	44.6326	0.0000	0.0000	0.0000	0.0000	255.4654	617.1808	942.5640	(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)													

Full SAP Calculation Printout



	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	250.5766	221.5464	235.5114	207.7392	201.7579	182.2419	180.3198	187.3257	189.1798	210.3906	222.9717	247.9578	(64)
Efficiency of water heater	86.5818	86.2805	85.6787	84.0704	81.1954	79.8000	79.8000	79.8000	79.8000	84.3160	86.0693	86.6329	(216)
(217)m	86.5818	86.2805	85.6787	84.0704	81.1954	79.8000	79.8000	79.8000	79.8000	84.3160	86.0693	86.6329	(217)
Fuel for water heating, kWh/month	289.4102	256.7745	274.8774	247.1013	248.4845	228.3734	225.9646	234.7439	237.0674	249.5262	259.0605	286.2167	(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	7.0685	(231)
Lighting	28.8630	23.1550	20.8485	15.2745	11.7985	9.6395	10.7630	13.9901	18.1718	23.8423	26.9299	29.6652	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-43.4010	-61.4824	-88.7855	-100.2801	-108.4719	-101.3096	-99.9919	-94.1904	-84.0706	-70.4359	-47.7927	-37.4827	(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	-23.6446	-49.8351	-99.2461	-149.3684	-197.8332	-198.9507	-196.6764	-166.4362	-121.8280	-71.4524	-31.6235	-18.6961	(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												4231.4016	(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												3037.6007	(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)												232.9413	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2263.2855	(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												5324.6582	(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	4231.4016	0.2100	888.5943 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3037.6007	0.2100	637.8961 (264)
Space and water heating			1526.4905 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	232.9413	0.1443	33.6206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.6948	0.1345	-126.1219
PV Unit electricity exported	-1325.5907	0.1258	-166.7955
Total			-292.9174 (269)
Total CO2, kg/year			1279.1229 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.3500 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	4231.4016	1.1300	4781.4838 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3037.6007	1.1300	3432.4888 (278)
Space and water heating			8213.9726 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	232.9413	1.5338	357.2932 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.6948	1.4971	-1403.8159
PV Unit electricity exported	-1325.5907	0.4619	-612.2491
Total			-2016.0650 (283)
Total Primary energy kWh/year			6685.3017 (286)
Target Primary Energy Rate (TPER)			59.3100 (287)

Full SAP Calculation Printout



Property Reference	MH3- 4B8P			Issued on Date	12/09/2024
Assessment Reference	MH3- 4B8P_Baseline	Prop Type Ref	BLOCK B		
Property	Hornsey Police Station, 98 , Tottenham Ln, , London , N8 7EJ				
SAP Rating	85 B	DER	19.89	TER	11.35
Environmental	82 B	% DER < TER			-75.24
CO ₂ Emissions (t/year)	1.84	DFEE	65.02	TFEE	40.76
Compliance Check	See BREL	% DFEE < TFEE			-59.51
% DPER < TPER	-74.67	DPER	103.60	TPER	59.31
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, A R C H A N A U M				

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)
Ground floor	45.7900 (1b)	x 2.5000 (2b)	= 114.4750 (1b) - (3b)
First floor	41.1500 (1c)	x 2.5000 (2c)	= 102.8750 (1c) - (3c)
Second floor	25.7800 (1d)	x 2.5000 (2d)	= 64.4500 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	112.7200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 281.8000 (5)

2. Ventilation rate

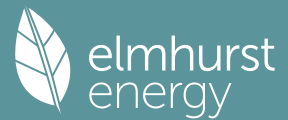
	m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	40.0000 / (5) =	0.1419 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	8.0000	(17)
Infiltration rate	0.5419	(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) =	0.5419 (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	0.6910	0.6774	0.6639	0.5961	0.5826	0.5148	0.5148	0.5013	0.5419	0.5826	0.6097	0.6368 (22b)
Effective ac	0.7387	0.7295	0.7204	0.6777	0.6697	0.6325	0.6325	0.6257	0.6469	0.6697	0.6859	0.7027 (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
Window North (Uw = 1.60)			7.9700	1.5038	11.9850		(27)
Window South (Uw = 1.60)			19.2700	1.5038	28.9774		(27)
Door			1.9000	1.6000	3.0400		(26)
CF			45.7900	0.1800	8.2422	110.0000	5036.9000 (28a)
External Wall 1	92.4100	29.1400	63.2700	0.2600	16.4502	190.0000	12021.3000 (29a)
Flat Roof	33.3600		33.3600	0.1600	5.3376	9.0000	300.2400 (30)
Total net area of external elements Aum(A, m ²)			171.5600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	74.0324		(33)
Party Wall 1			111.2900	0.0000	0.0000	180.0000	20032.2000 (32)
Internal Wall 1			141.7000			75.0000	10627.5000 (32c)
Internal Floor 1			41.1500			18.0000	740.7000 (32d)
Internal Floor 2			25.7800			18.0000	464.0400 (32d)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	49222.8800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							436.6828 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				13.8200	0.5000	6.9100	

Full SAP Calculation Printout



E3 Sill	7.6200	0.0400	0.3048
E4 Jamb	38.5600	0.0500	1.9280
E5 Ground floor (normal)	24.8500	0.1600	3.9760
E6 Intermediate floor within a dwelling	24.8500	0.0700	1.7395
E16 Corner (normal)	22.5000	0.0900	2.0250
E17 Corner (inverted - internal area greater than external area)	20.0000	-0.0900	-1.8000
E18 Party wall between dwellings	5.0000	0.0600	0.3000
P1 Party wall - Ground floor	16.5700	0.0800	1.3256
P2 Party wall - Intermediate floor within a dwelling	16.5700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	16.5700	0.1200	1.9884
E21 Exposed floor (inverted)	11.4300	0.3200	3.6576
E14 Flat roof	35.5300	0.0400	1.4212
E25 Staggered party wall between dwellings	20.0000	0.1200	2.4000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			26.1761 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	100.2085 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	68.6971	67.8351	66.9901	63.0212	62.2786	58.8219	58.8219	58.1817	60.1534	62.2786	63.7808	65.3513	(38)
Average = Sum(39)m / 12 =	168.9056	168.0436	167.1986	163.2297	162.4871	159.0304	159.0304	158.3902	160.3619	162.4871	163.9893	165.5598	(39)
												163.2261	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.4985	1.4908	1.4833	1.4481	1.4415	1.4108	1.4108	1.4052	1.4227	1.4415	1.4548	1.4698	(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													2.8302 (42)
Hot water usage for mixer showers	71.6730	70.5959	69.0264	66.0233	63.8071	61.3357	59.9309	61.4886	63.1961	65.8497	68.9172	71.3984	(42a)
Hot water usage for baths	30.9450	30.4854	29.8382	28.6449	27.7514	26.7606	26.2255	26.8681	27.5679	28.6280	29.8459	30.8404	(42b)
Hot water usage for other uses	43.6141	42.0282	40.4422	38.8562	37.2702	35.6843	35.6843	37.2702	38.8562	40.4422	42.0282	43.6141	(42c)
Average daily hot water use (litres/day)													134.4202 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	146.2321	143.1095	139.3068	133.5245	128.8288	123.7806	121.8406	125.6269	129.6201	134.9199	140.7913	145.8529	(44)
Energy content (annual)	231.5959	203.7860	214.1093	182.7883	173.4283	152.2027	147.3557	155.5524	159.8346	183.0850	200.5830	228.3704	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2232.6916	
Water storage loss:													
Store volume													210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.7000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.9180 (55)
Total storage loss	28.4580	25.7040	28.4580	27.5400	28.4580	27.5400	28.4580	28.4580	27.5400	28.4580	27.5400	28.4580	(56)
If cylinder contains dedicated solar storage													
Primary loss	28.4580	25.7040	28.4580	27.5400	28.4580	27.5400	28.4580	28.4580	27.5400	28.4580	27.5400	28.4580	(57)
Combi 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)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
WWHRS	283.3163	250.5012	265.8297	232.8403	225.1487	202.2547	199.0761	207.2728	209.8866	234.8054	250.6350	280.0908	(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	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)
Total per year (kWh/year)	283.3163	250.5012	265.8297	232.8403	225.1487	202.2547	199.0761	207.2728	209.8866	234.8054	250.6350	280.0908	(64)
Electric shower(s)													2841.6576 (64)
Heat gains from water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
	118.3820	105.1310	112.5677	100.8187	99.0412	90.6490	90.3721	93.0975	93.1866	102.2521	106.7354	117.3095	(65)

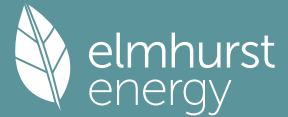
5. Internal gains (see Table 5 and 5a)

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	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	138.9114	153.7948	138.9114	143.5418	138.9114	143.5418	138.9114	138.9114	143.5418	138.9114	143.5418	138.9114	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	275.4074	278.2653	271.0635	255.7319	236.3785	218.1890	206.0373	203.1794	210.3811	225.7128	245.0662	263.2557	(68)
Pumps, fans	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	(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)
Water heating gains (Table 5)	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	(71)
Total internal gains	159.1156	156.4449	151.3006	140.0260	133.1199	125.9014	121.4679	125.1310	129.4258	137.4356	148.2437	157.6740	(72)
	641.8874	656.9581	629.7287	607.7528	576.8629	553.0852	531.8696	532.6749	548.8018	570.5128	605.3047	628.2942	(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
South	7.9700	46.7521	0.5200	0.7000	0.7700	93.9926 (78)
North	19.2700	10.6334	0.2500	0.7000	0.7700	24.8499 (74)

Full SAP Calculation Printout



Solar gains	118.8425	201.4251	276.7829	351.2394	405.5507	409.1740	391.6693	349.3419	301.8587	222.5641	142.0689	101.9344 (83)
Total gains	760.7300	858.3832	906.5116	958.9921	982.4136	962.2592	923.5389	882.0168	850.6606	793.0769	747.3736	730.2286 (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	80.9507	81.3659	81.7771	83.7655	84.1483	85.9774	85.9774	86.3249	85.2636	84.1483	83.3775	82.5866	
alpha	6.3967	6.4244	6.4518	6.5844	6.6099	6.7318	6.7318	6.7550	6.6842	6.6099	6.5585	6.5058	
util living area	0.9998	0.9996	0.9989	0.9956	0.9789	0.8937	0.7256	0.7749	0.9540	0.9964	0.9996	0.9999 (86)	
MIT	19.8153	19.9367	20.1251	20.4100	20.6820	20.9084	20.9828	20.9738	20.8290	20.4794	20.1145	19.8166 (87)	
Th 2	20.2508	20.2546	20.2583	20.2760	20.2792	20.2946	20.2946	20.2974	20.2887	20.2792	20.2726	20.2656 (88)	
util rest of house	0.9998	0.9994	0.9985	0.9937	0.9686	0.8428	0.6248	0.6798	0.9265	0.9946	0.9994	0.9998 (89)	
MIT 2	19.1389	19.2633	19.4547	19.7533	20.0232	20.2396	20.2885	20.2871	20.1702	19.8256	19.4560	19.1523 (90)	
Living area fraction									fLA = Living area / (4) =				0.3081 (91)
MIT	19.3473	19.4708	19.6613	19.9556	20.2262	20.4457	20.5024	20.4987	20.3732	20.0270	19.6589	19.3570 (92)	
Temperature adjustment												-0.1500	
adjusted MIT	19.1973	19.3208	19.5113	19.8056	20.0762	20.2957	20.3524	20.3487	20.2232	19.8770	19.5089	19.2070 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9997	0.9992	0.9979	0.9921	0.9648	0.8429	0.6336	0.6874	0.9233	0.9932	0.9991	0.9998 (94)
Useful gains	760.4778	857.6780	904.6449	951.3889	947.8352	811.0642	585.1873	606.2573	785.4297	787.6483	746.7099	730.0497 (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	2516.2354	2423.3242	2175.4638	1780.1177	1361.0243	905.7857	596.7460	625.4323	981.9266	1507.3988	2034.9245	2484.5506 (97)
Space heating kWh	1306.2837	1052.1142	945.4893	596.6847	307.4127	0.0000	0.0000	0.0000	0.0000	535.4944	927.5145	1305.3487 (98a)
Space heating requirement - total per year (kWh/year)												6976.3421
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	1306.2837	1052.1142	945.4893	596.6847	307.4127	0.0000	0.0000	0.0000	0.0000	535.4944	927.5145	1305.3487 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6976.3421
Space heating per m2										(98c) / (4) =		61.8909 (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	1306.2837	1052.1142	945.4893	596.6847	307.4127	0.0000	0.0000	0.0000	0.0000	535.4944	927.5145	1305.3487 (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)	1459.5348	1175.5466	1056.4126	666.6868	343.4779	0.0000	0.0000	0.0000	0.0000	598.3177	1036.3290	1458.4902 (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	283.3163	250.5012	265.8297	232.8403	225.1487	202.2547	199.0761	207.2728	209.8866	234.8054	250.6350	280.0908 (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	316.5546	279.8896	297.0164	260.1568	251.5628	225.9829	222.4314	231.5897	234.5102	262.3524	280.0391	312.9506 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	56.5019	45.3279	40.8128	29.9012	23.0965	18.8701	21.0694	27.3868	35.5728	46.6734	52.7175	58.0722 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-45.7113	-64.9068	-93.8444	-105.8094	-113.9495	-106.1589	-104.9455	-99.3980	-89.1089	-74.6550	-50.4660	-39.4625 (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												7794.7957 (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												3175.0364 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

Full SAP Calculation Printout



central heating pump	41.0000 (230c)
Total electricity for the above, kWh/year	41.0000 (231)
Electricity for lighting (calculated in Appendix L)	456.0026 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-988.4162 (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	10478.4185 (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	7794.7957	0.2100	1636.9071 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3175.0364	0.2100	666.7576 (264)
Space and water heating			2303.6647 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	456.0026	0.1443	65.8153 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-988.4162	0.1345	-132.9640
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-132.9640 (269)
Total CO2, kg/year			2242.2032 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			19.8900 (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	7794.7957	1.1300	8808.1191 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3175.0364	1.1300	3587.7911 (278)
Space and water heating			12395.9103 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	456.0026	1.5338	699.4320 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-988.4162	1.4972	-1479.8267
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1479.8267 (283)
Total Primary energy kWh/year			11677.5404 (286)
Dwelling Primary energy Rate (DPER)			103.6000 (287)

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

1. Overall dwelling characteristics

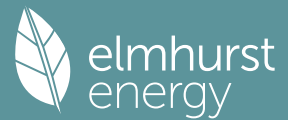
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	45.7900 (1b)	x 2.5000 (2b)	= 114.4750 (1b) - (3b)
First floor	41.1500 (1c)	x 2.5000 (2c)	= 102.8750 (1c) - (3c)
Second floor	25.7800 (1d)	x 2.5000 (2d)	= 64.4500 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	112.7200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	281.8000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1419 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3919 (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) = 0.3919 (21)

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

Full SAP Calculation Printout



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												
	0.4997	0.4899	0.4801	0.4311	0.4213	0.3723	0.3723	0.3625	0.3919	0.4213	0.4409	0.4605 (22b)
Effective ac	0.6249	0.6200	0.6153	0.5929	0.5888	0.5693	0.5693	0.5657	0.5768	0.5888	0.5972	0.6060 (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
TER Opaque door			1.9000	1.0000	1.9000		(26)
TER Opening Type (Uw = 1.20)			26.2800	1.1450	30.0916		(27)
GF			45.7900	0.1300	5.9527		(28a)
External Wall 1	92.4100	28.1800	64.2300	0.1800	11.5614		(29a)
Flat Roof	33.3600		33.3600	0.1100	3.6696		(30)
Total net area of external elements Aum (A, m2)			171.5600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.1753		(33)
Party Wall 1			111.2900	0.0000	0.0000		(32)

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

436.6828 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	13.8200	0.0500	0.6910
E3 Sill	7.6200	0.0500	0.3810
E4 Jamb	38.5600	0.0500	1.9280
E5 Ground floor (normal)	24.8500	0.1600	3.9760
E6 Intermediate floor within a dwelling	24.8500	0.0000	0.0000
E16 Corner (normal)	22.5000	0.0900	2.0250
E17 Corner (inverted - internal area greater than external area)	20.0000	-0.0900	-1.8000
E18 Party wall between dwellings	5.0000	0.0600	0.3000
P1 Party wall - Ground floor	16.5700	0.0800	1.3256
P2 Party wall - Intermediate floor within a dwelling	16.5700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	16.5700	0.1200	1.9884
E21 Exposed floor (inverted)	11.4300	0.3200	3.6576
E14 Flat roof	35.5300	0.0800	2.8424
E25 Staggered party wall between dwellings	20.0000	0.0600	1.2000

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

18.5150 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 71.6903 (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
	58.1087	57.6578	57.2158	55.1399	54.7515	52.9435	52.9435	52.6086	53.6399	54.7515	55.5372	56.3587 (38)
Heat transfer coeff	129.7990	129.3481	128.9061	126.8302	126.4418	124.6338	124.6338	124.2989	125.3302	126.4418	127.2275	128.0490 (39)
Average = Sum(39)m / 12 =												126.8283

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1515	1.1475	1.1436	1.1252	1.1217	1.1057	1.1057	1.1027	1.1119	1.1217	1.1287	1.1360 (40)
HLP (average)												1.1252
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

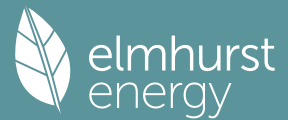
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.8302 (42)
Hot water usage for mixer showers												
71.6730	70.5959	69.0264	66.0233	63.8071	61.3357	59.9309	61.4886	63.1961	65.8497	68.9172	71.3984 (42a)	
Hot water usage for baths												
30.9450	30.4854	29.8382	28.6449	27.7514	26.7606	26.2255	26.8681	27.5679	28.6280	29.8459	30.8404 (42b)	
Hot water usage for other uses												
43.6141	42.0282	40.4422	38.8562	37.2702	35.6843	35.6843	37.2702	38.8562	40.4422	42.0282	43.6141 (42c)	
Average daily hot water use (litres/day)												134.4202 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	146.2321	143.1095	139.3068	133.5245	128.8288	123.7806	121.8406	125.6269	129.6201	134.9199	140.7913	145.8529 (44)
Energy content (annual)	231.5959	203.7860	214.1093	182.7883	173.4283	152.2027	147.3557	155.5524	159.8346	183.0850	200.5830	228.3704 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2232.6916
34.7394	30.5679	32.1164	27.4182	26.0142	22.8304	22.1034	23.3329	23.9752	27.4627	30.0874	34.2556 (46)	
Water storage 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 (61)	
Total heat required for water heating calculated for each month												
283.3425	250.5248	265.8559	232.8657	225.1749	202.2800	199.1023	207.2990	209.9119	234.8316	250.6603	280.1170 (62)	
WWHRS	-32.7659	-28.9784	-30.3446	-25.1265	-23.4170	-20.0381	-18.7825	-19.9733	-20.7322	-24.4409	-27.6886	-32.1591 (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												
250.5766	221.5464	235.5114	207.7392	201.7579	182.2419	180.3198	187.3257	189.1798	210.3906	222.9717	247.9578 (64)	
Total per year (kWh/year)							Total per year (kWh/year) = Sum(64)m =					2537.5187 (64)
12Total per year (kWh/year)												2538 (64)
Electric shower(s)												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
118.4029	105.1499	112.5886	100.8390	99.0622	90.6693	90.3930	93.1184	93.2069	102.2730	106.7557	117.3304 (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
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Full SAP Calculation Printout



(66)m	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	138.9114	153.7948	138.9114	143.5418	138.9114	143.5418	138.9114	138.9114	143.5418	138.9114	143.5418	138.9114 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	275.4074	278.2653	271.0635	255.7319	236.3785	218.1890	206.0373	203.1794	210.3811	225.7128	245.0662	263.2557 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510 (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)	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082 (71)
Water heating gains (Table 5)	159.1437	156.4731	151.3288	140.0542	133.1481	125.9295	121.4960	125.1592	129.4540	137.4638	148.2718	157.7022 (72)
Total internal gains	641.9156	656.9862	629.7568	607.7809	576.8911	553.1134	531.8978	532.7031	548.8300	570.5410	605.3329	628.3224 (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	
North				18.5900	10.6334	0.6300	0.7000		0.7700		60.4120 (74)	
South				7.6900	46.7521	0.6300	0.7000		0.7700		109.8750 (78)	
Solar gains	170.2870	295.3973	425.3989	574.1818	694.4517	714.2301	678.1092	583.1183	475.3179	331.5183	204.7653	145.3045 (83)
Total gains	812.2026	952.3836	1055.1557	1181.9627	1271.3427	1267.3434	1210.0070	1115.8214	1024.1479	902.0593	810.0982	773.6269 (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	105.3400	105.7072	106.0696	107.8057	108.1369	109.7056	109.7056	110.0011	109.0960	108.1369	107.4691	106.7796
alpha	8.0227	8.0471	8.0713	8.1870	8.2091	8.3137	8.3137	8.3334	8.2731	8.2091	8.1646	8.1186
util living area	0.9998	0.9990	0.9957	0.9702	0.8536	0.6244	0.4529	0.5115	0.8034	0.9853	0.9991	0.9998 (86)
MIT	20.1895	20.3234	20.5101	20.7674	20.9456	20.9962	20.9997	20.9994	20.9748	20.7443	20.4251	20.1748 (87)
Th 2	19.9590	19.9622	19.9654	19.9803	19.9831	19.9962	19.9962	19.9986	19.9911	19.9831	19.9775	19.9715 (88)
util rest of house	0.9996	0.9984	0.9929	0.9516	0.7883	0.5294	0.3498	0.4008	0.7068	0.9725	0.9984	0.9997 (89)
MIT 2	19.0225	19.1966	19.4370	19.7644	19.9484	19.9949	19.9962	19.9985	19.9800	19.7451	19.3393	19.0138 (90)
Living area fraction									fLA = Living area / (4) =			0.3081 (91)
MIT	19.3821	19.5438	19.7676	20.0734	20.2556	20.3034	20.3054	20.3069	20.2865	20.0530	19.6739	19.3715 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3821	19.5438	19.7676	20.0734	20.2556	20.3034	20.3054	20.3069	20.2865	20.0530	19.6739	19.3715 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9995	0.9980	0.9921	0.9537	0.8073	0.5589	0.3816	0.4350	0.7372	0.9737	0.9981	0.9997 (94)
Ext temp.	811.7935	950.5072	1046.8556	1127.2288	1026.4146	708.2764	461.7191	485.3534	754.9740	878.3249	808.5493	773.3629 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	1957.6364	1894.1490	1710.2773	1417.1298	1081.7853	710.8384	461.8141	485.6210	775.3578	1195.2531	1599.7408	1942.6997 (97)
Space heating requirement - total per year (kWh/year)	852.5071	634.1273	493.5857	208.7287	41.1959	0.0000	0.0000	0.0000	0.0000	235.7945	569.6579	869.9866 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating contribution - total per year (kWh/year)	852.5071	634.1273	493.5857	208.7287	41.1959	0.0000	0.0000	0.0000	0.0000	235.7945	569.6579	869.9866 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3905.5837
Space heating per m2										(98c) / (4) =		34.6485 (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)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	852.5071	634.1273	493.5857	208.7287	41.1959	0.0000	0.0000	0.0000	0.0000	235.7945	569.6579	869.9866 (98)
Space heating fuel (main heating system)	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 efficiency (main heating system 2)	923.6264	687.0285	534.7624	226.1416	44.6326	0.0000	0.0000	0.0000	0.0000	255.4654	617.1808	942.5640 (211)
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 (212)
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 (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	250.5766	221.5464	235.5114	207.7392	201.7579	182.2419	180.3198	187.3257	189.1798	210.3906	222.9717	247.9578 (64)
Efficiency of water heater (217)m	86.5818	86.2805	85.6787	84.0704	81.1954	79.8000	79.8000	79.8000	79.8000	84.3160	86.0693	79.8000 (216)
Fuel for water heating, kWh/month	289.4102	256.7745	274.8774	247.1013	248.4845	228.3734	225.9646	234.7439	237.0674	249.5262	259.0605	286.2167 (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)

Full SAP Calculation Printout



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	28.8630	23.1550	20.8485	15.2745	11.7985	9.6395	10.7630	13.9901	18.1718	23.8423	26.9299	29.6652	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-43.4010	-61.4824	-88.7855	-100.2801	-108.4719	-101.3096	-99.9919	-94.1904	-84.0706	-70.4359	-47.7927	-37.4827	(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	-23.6446	-49.8351	-99.2461	-149.3684	-197.8332	-198.9507	-196.6764	-166.4362	-121.8280	-71.4524	-31.6235	-18.6961	(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												4231.4016	(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												3037.6007	(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)												232.9413	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2263.2855	(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												5324.6582	(238)

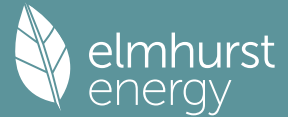
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	4231.4016	0.2100	888.5943	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3037.6007	0.2100	637.8961	(264)
Space and water heating			1526.4905	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	232.9413	0.1443	33.6206	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-937.6948	0.1345	-126.1219	
PV Unit electricity exported	-1325.5907	0.1258	-166.7955	
Total			-292.9174	(269)
Total CO2, kg/year			1279.1229	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.3500	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	4231.4016	1.1300	4781.4838	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3037.6007	1.1300	3432.4888	(278)
Space and water heating			8213.9726	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	232.9413	1.5338	357.2932	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-937.6948	1.4971	-1403.8159	
PV Unit electricity exported	-1325.5907	0.4619	-612.2491	
Total			-2016.0650	(283)
Total Primary energy kWh/year			6685.3017	(286)
Target Primary Energy Rate (TPER)			59.3100	(287)

Full SAP Calculation Printout



Property Reference	MH3- 4B8P			Issued on Date	12/09/2024
Assessment Reference	MH3- 4B8P_BeLean	Prop Type Ref	BLOCK B		
Property	Hornsey Police Station, 98 , Tottenham Ln , London , N8 7EJ				
SAP Rating	82 B	DER	14.15	TER	11.35
Environmental	87 B	% DER < TER			-24.67
CO ₂ Emissions (t/year)	1.35	DFEE	39.29	TFEE	40.76
Compliance Check	See BREL	% DFEE < TFEE			3.61
% DPER < TPER	-37.96	DPER	81.83	TPER	59.31
Assessor Details	Mr. Mirza Baig			Assessor ID	CK52-0001
Client	Archanaeum Ltd, ARCHANAUM				

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)
Ground floor	45.7900 (1b)	x 2.5000 (2b)	= 114.4750 (1b) - (3b)
First floor	41.1500 (1c)	x 2.5000 (2c)	= 102.8750 (1c) - (3c)
Second floor	25.7800 (1d)	x 2.5000 (2d)	= 64.4500 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	112.7200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 281.8000 (5)

2. Ventilation rate

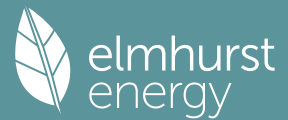
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1750 (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	0.2231	0.2188	0.2144	0.1925	0.1881	0.1662	0.1662	0.1619	0.1750	0.1881	0.1969	0.2056 (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) =												46.2000 (23c)
Effective ac	0.4921	0.4878	0.4834	0.4615	0.4571	0.4353	0.4353	0.4309	0.4440	0.4571	0.4659	0.4746 (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
Window North (Uw = 1.20)			7.9700	1.1450	9.1260		(27)
Window South (Uw = 1.20)			19.2700	1.1450	22.0649		(27)
Door			1.9000	0.9800	1.8620		(26)
GF			45.7900	0.0600	2.7474	110.0000	5036.9000 (28a)
External Wall 1	92.4100	29.1400	63.2700	0.1800	11.3886	190.0000	12021.3000 (29a)
Flat Roof	33.3600		33.3600	0.0600	2.0016	9.0000	300.2400 (30)
Total net area of external elements Aum (A, m ²)			171.5600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		49.1904		(33)
Party Wall 1			111.2900	0.0000	0.0000	180.0000	20032.2000 (32)
Internal Wall 1			141.7000			75.0000	10627.5000 (32c)
Internal Floor 1			41.1500			18.0000	740.7000 (32d)
Internal Floor 2			25.7800			18.0000	464.0400 (32d)

Full SAP Calculation Printout



Heat capacity $C_m = \text{Sum}(A \times k)$
Thermal mass parameter (TMP) = C_m / TFA in $\text{kJ/m}^2\text{K}$
List of Thermal Bridges

(28)...(30) + (32) + (32a)...(32e) = 49222.8800 (34)
436.6828 (35)

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	13.8200	0.0410	0.5666
E3 Sill	7.6200	0.0210	0.1600
E4 Jamb	38.5600	0.0160	0.6170
E5 Ground floor (normal)	24.8500	0.1640	4.0754
E6 Intermediate floor within a dwelling	24.8500	0.0000	0.0000
E6 Corner (normal)	22.5000	0.0540	1.2150
E17 Corner (inverted - internal area greater than external area)	20.0000	-0.0900	-1.8000
E18 Party wall between dwellings	5.0000	0.0600	0.3000
P1 Party wall - Ground floor	16.5700	0.0800	1.3256
P2 Party wall - Intermediate floor within a dwelling	16.5700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	16.5700	0.1200	1.9884
E21 Exposed floor (inverted)	11.4300	0.3200	3.6576
E14 Flat roof	35.5300	0.0400	1.4212
E25 Staggered party wall between dwellings	20.0000	0.1200	2.4000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 15.9268 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 65.1172 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$
(38)m Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Heat transfer coeff 45.7647 45.3578 44.9510 42.9167 42.5099 40.4756 40.4756 40.0688 41.2893 42.5099 43.3236 44.1373 (38)
Average = $\text{Sum}(39)\text{m} / 12 =$ 110.8819 110.4751 110.0682 108.0340 107.6271 105.5929 105.5929 105.1860 106.4066 107.6271 108.4408 109.2545 (39)
107.9323

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9837	0.9801	0.9765	0.9584	0.9548	0.9368	0.9368	0.9332	0.9440	0.9548	0.9620	0.9693 (40)
HLP (average)												0.9575
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.8302 (42)
Hot water usage for mixer showers													
71.6730	70.5959	69.0264	66.0233	63.8071	61.3357	59.9309	61.4886	63.1961	65.8497	68.9172	71.3984	(42a)	
Hot water usage for baths													
30.9450	30.4854	29.8382	28.6449	27.7514	26.7606	26.2255	26.8681	27.5679	28.6280	29.8459	30.8404	(42b)	
Hot water usage for other uses													
43.6141	42.0282	40.4422	38.8562	37.2702	35.6843	35.6843	37.2702	38.8562	40.4422	42.0282	43.6141	(42c)	
Average daily hot water use (litres/day)												134.4202 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	146.2321	143.1095	139.3068	133.5245	128.8288	123.7806	121.8406	125.6269	129.6201	134.9199	140.7913	145.8529	(44)
Energy content	231.5959	203.7860	214.1093	182.7883	173.4283	152.2027	147.3557	155.5524	159.8346	183.0850	200.5830	228.3704	(45)
Energy content (annual)													Total = Sum(45)m = 2232.6916
Distribution loss (46)m = 0.15 x (45)m													
34.7394	30.5679	32.1164	27.4182	26.0142	22.8304	22.1034	23.3329	23.9752	27.4627	30.0874	34.2556	(46)	
Water storage loss:													
Store volume													210.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.7000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.9180 (55)
Total storage loss													
28.4580	25.7040	28.4580	27.5400	28.4580	27.5400	28.4580	28.4580	27.5400	28.4580	27.5400	28.4580	(56)	
If cylinder contains dedicated solar storage													
28.4580	25.7040	28.4580	27.5400	28.4580	27.5400	28.4580	28.4580	27.5400	28.4580	27.5400	28.4580	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	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													
283.3163	250.5012	265.8297	232.8403	225.1487	202.2547	199.0761	207.2728	209.8866	234.8054	250.6350	280.0908	(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													
283.3163	250.5012	265.8297	232.8403	225.1487	202.2547	199.0761	207.2728	209.8866	234.8054	250.6350	280.0908	(64)	
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 2841.6576 (64)
Electric shower(s)													2842 (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													0.0000 (64a)
118.3820	105.1310	112.5677	100.8187	99.0412	90.6490	90.3721	93.0975	93.1866	102.2521	106.7354	117.3095	(65)	

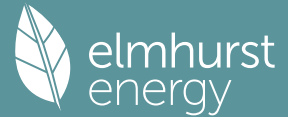
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	138.9114	153.7948	138.9114	143.5418	138.9114	143.5418	138.9114	138.9114	143.5418	138.9114	143.5418	138.9114 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	275.4074	278.2653	271.0635	255.7319	236.3785	218.1890	206.0373	203.1794	210.3811	225.7128	245.0662	263.2557 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510 (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)	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082 (71)
Water heating gains (Table 5)	159.1156	156.4449	151.3006	140.0260	133.1199	125.9014	121.4679	125.1310	129.4258	137.4356	148.2437	157.6740 (72)
Total internal gains	641.8874	656.9581	629.7287	607.7528	576.8629	553.0852	531.8696	532.6749	548.8018	570.5128	605.3047	628.2942 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

Full SAP Calculation Printout



	m2				Table 6a W/m2	Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W
South	7.9700				46.7521	0.5200		0.7000		0.7700		93.9926 (78)
North	19.2700				10.6334	0.2500		0.7000		0.7700		24.8499 (74)
Solar gains	118.8425	201.4251	276.7829	351.2394	405.5507	409.1740	391.6693	349.3419	301.8587	222.5641	142.0689	101.9344 (83)
Total gains	760.7300	858.3832	906.5116	958.9921	982.4136	962.2592	923.5389	882.0168	850.6606	793.0769	747.3736	730.2286 (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	123.3116	123.7657	124.2232	126.5622	127.0407	129.4881	129.4881	129.9890	128.4979	127.0407	126.0874	125.1483
alpha	9.2208	9.2510	9.2815	9.4375	9.4694	9.6325	9.6325	9.6659	9.5665	9.4694	9.4058	9.3432
util living area	0.9998	0.9994	0.9977	0.9851	0.9127	0.6952	0.5027	0.5478	0.8265	0.9885	0.9993	0.9999 (86)
MIT	20.4673	20.5451	20.6500	20.8007	20.9192	20.9645	20.9675	20.9674	20.9531	20.8132	20.6183	20.4604 (87)
Th 2	20.5082	20.5100	20.5118	20.5208	20.5226	20.5316	20.5316	20.5334	20.5280	20.5226	20.5190	20.5154 (88)
util rest of house	0.9998	0.9992	0.9970	0.9802	0.8884	0.6472	0.4494	0.4927	0.7823	0.9839	0.9991	0.9999 (89)
MIT 2	20.0004	20.0798	20.1860	20.3431	20.4544	20.4976	20.4992	20.5011	20.4869	20.3577	20.1611	20.0000 (90)
Living area fraction	20.1443	20.2232	20.3290	20.4841	20.5977	20.6415	20.6435	20.6448	20.6306	20.4981	20.3020	0.3081 (91)
MIT	20.1443	20.2232	20.3290	20.4841	20.5977	20.6415	20.6435	20.6448	20.6306	20.4981	20.3020	20.1419 (92)
Temperature adjustment	19.9943	20.0732	20.1790	20.3341	20.4477	20.4915	20.4935	20.4948	20.4806	20.3481	20.1520	-0.1500
adjusted MIT	19.9943	20.0732	20.1790	20.3341	20.4477	20.4915	20.4935	20.4948	20.4806	20.3481	20.1520	19.9919 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9997	0.9990	0.9964	0.9779	0.8841	0.6430	0.4451	0.4881	0.7776	0.9818	0.9988	0.9998 (94)
Useful gains	760.5220	857.5250	903.2426	937.8162	868.5663	618.7729	411.0308	430.4952	661.4704	778.6250	746.5037	730.0919 (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	1740.2111	1676.2573	1505.6213	1235.2735	941.4847	622.0975	411.1247	430.7112	678.9339	1049.1574	1415.3659	1725.3352 (97)
Space heating kWh	728.8887	550.1881	448.1698	214.1693	54.2513	0.0000	0.0000	0.0000	0.0000	201.2761	481.5808	740.4610 (98a)
Space heating requirement - total per year (kWh/year)												3418.9850
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	728.8887	550.1881	448.1698	214.1693	54.2513	0.0000	0.0000	0.0000	0.0000	201.2761	481.5808	740.4610 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3418.9850
Space heating per m2										(98c) / (4) =		30.3317 (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	728.8887	550.1881	448.1698	214.1693	54.2513	0.0000	0.0000	0.0000	0.0000	201.2761	481.5808	740.4610 (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)	814.4008	614.7353	500.7483	239.2953	60.6159	0.0000	0.0000	0.0000	0.0000	224.8895	538.0791	827.3307 (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	283.3163	250.5012	265.8297	232.8403	225.1487	202.2547	199.0761	207.2728	209.8866	234.8054	250.6350	280.0908 (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	316.5546	279.8896	297.0164	260.1568	251.5628	225.9829	222.4314	231.5897	234.5102	262.3524	280.0391	312.9506 (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	149.4778	135.0122	149.4778	144.6559	149.4778	144.6559	149.4778	149.4778	144.6559	149.4778	144.6559	149.4778 (221)
Lighting	29.5698	23.7220	21.3590	15.6485	12.0874	9.8755	11.0265	14.3327	18.6167	24.4261	27.5893	30.3916 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-48.3241	-70.2060	-104.4485	-122.1831	-136.5623	-130.1840	-129.3952	-120.1358	-103.8806	-83.1420	-54.1588	-41.5957 (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												3820.0950 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)

Full SAP Calculation Printout



Efficiency of water heater	89.5000	
Water heating fuel used	3175.0364	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Table 4g: in-use factor = 2.5000, SFP = 5.0000)		
mechanical ventilation fans (SFP = 5.0000)	1718.9800	(230a)
central heating pump	41.0000	(230c)
Total electricity for the above, kWh/year	1759.9800	(231)
Electricity for lighting (calculated in Appendix L)	238.6451	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1144.2160	(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	7849.5405	(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	3820.0950	0.2100	802.2200	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3175.0364	0.2100	666.7576	(264)
Space and water heating			1468.9776	(265)
Pumps, fans and electric keep-hot	1759.9800	0.1387	244.1309	(267)
Energy for lighting	238.6451	0.1443	34.4439	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1144.2160	0.1337	-152.9678	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-152.9678	(269)
Total CO2, kg/year			1594.5846	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			14.1500	(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	3820.0950	1.1300	4316.7074	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3175.0364	1.1300	3587.7911	(278)
Space and water heating			7904.4985	(279)
Pumps, fans and electric keep-hot	1759.9800	1.5128	2662.4977	(281)
Energy for lighting	238.6451	1.5338	366.0418	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1144.2160	1.4940	-1709.4985	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-1709.4985	(283)
Total Primary energy kWh/year			9223.5395	(286)
Dwelling Primary energy Rate (DPER)			81.8300	(287)

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

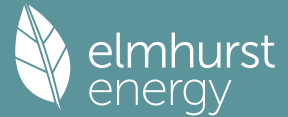
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	45.7900 (1b)	x 2.5000 (2b)	= 114.4750 (1b)	- (3b)
First floor	41.1500 (1c)	x 2.5000 (2c)	= 102.8750 (1c)	- (3c)
Second floor	25.7800 (1d)	x 2.5000 (2d)	= 64.4500 (1d)	- (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	112.7200			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 281.8000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1419 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3919 (18)

Full SAP Calculation Printout



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) = 0.3919 (21)

Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4997	0.4899	0.4801	0.4311	0.4213	0.3723	0.3723	0.3625	0.3919	0.4213	0.4409	0.4605 (22b)
Effective ac	0.6249	0.6200	0.6153	0.5929	0.5888	0.5693	0.5693	0.5657	0.5768	0.5888	0.5972	0.6060 (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
TER Opaque door			1.9000	1.0000	1.9000		(26)
TER Opening Type (Uw = 1.20)			26.2800	1.1450	30.0916		(27)
GF			45.7900	0.1300	5.9527		(28a)
External Wall 1	92.4100	28.1800	64.2300	0.1800	11.5614		(29a)
Flat Roof	33.3600		33.3600	0.1100	3.6696		(30)
Total net area of external elements Aum(A, m2)			171.5600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.1753		(33)
Party Wall 1			111.2900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							436.6828 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	13.8200	0.0500	0.6910
E3 Sill	7.6200	0.0500	0.3810
E4 Jamb	38.5600	0.0500	1.9280
E5 Ground floor (normal)	24.8500	0.1600	3.9760
E6 Intermediate floor within a dwelling	24.8500	0.0000	0.0000
E16 Corner (normal)	22.5000	0.0900	2.0250
E17 Corner (inverted - internal area greater than external area)	20.0000	-0.0900	-1.8000
E18 Party wall between dwellings	5.0000	0.0600	0.3000
P1 Party wall - Ground floor	16.5700	0.0800	1.3256
P2 Party wall - Intermediate floor within a dwelling	16.5700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	16.5700	0.1200	1.9884
E21 Exposed floor (inverted)	11.4300	0.3200	3.6576
E14 Flat roof	35.5300	0.0800	2.8424
E25 Staggered party wall between dwellings	20.0000	0.0600	1.2000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			18.5150 (36)
Point Thermal Bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 71.6903 (37)

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

(38)m	Jan 58.1087	Feb 57.6578	Mar 57.2158	Apr 55.1399	May 54.7515	Jun 52.9435	Jul 52.9435	Aug 52.6086	Sep 53.6399	Oct 54.7515	Nov 55.5372	Dec 56.3587 (38)
Heat transfer coeff	129.7990	129.3481	128.9061	126.8302	126.4418	124.6338	124.6338	124.2989	125.3302	126.4418	127.2275	128.0490 (39)
Average = Sum(39)m / 12 =												126.8283

HLP	Jan 1.1515	Feb 1.1475	Mar 1.1436	Apr 1.1252	May 1.1217	Jun 1.1057	Jul 1.1057	Aug 1.1027	Sep 1.1119	Oct 1.1217	Nov 1.1287	Dec 1.1360 (40)
HLP (average)												1.1252
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.8302 (42)
Hot water usage for mixer showers	71.6730	70.5959	69.0264	66.0233	63.8071	61.3357	59.9309	61.4886	63.1961	65.8497	68.9172	71.3984 (42a)
Hot water usage for baths	30.9450	30.4854	29.8382	28.6449	27.7514	26.7606	26.2255	26.8681	27.5679	28.6280	29.8459	30.8404 (42b)
Hot water usage for other uses	43.6141	42.0282	40.4422	38.8562	37.2702	35.6843	35.6843	37.2702	38.8562	40.4422	42.0282	43.6141 (42c)
Average daily hot water use (litres/day)												134.4202 (43)
Daily hot water use	Jan 146.2321	Feb 143.1095	Mar 139.3068	Apr 133.5245	May 128.8288	Jun 123.7806	Jul 121.8406	Aug 125.6269	Sep 129.6201	Oct 134.9199	Nov 140.7913	Dec 145.8529 (44)
Energy conte	231.5959	203.7860	214.1093	182.7883	173.4283	152.2027	147.3557	155.5524	159.8346	183.0850	200.5830	228.3704 (45)
Energy content (annual)										Total = Sum(45)m =		2232.6916
Distribution loss (46)m = 0.15 x (45)m	34.7394	30.5679	32.1164	27.4182	26.0142	22.8304	22.1034	23.3329	23.9752	27.4627	30.0874	34.2556 (46)
Water storage 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	283.3425	250.5248	265.8559	232.8657	225.1749	202.2800	199.1023	207.2990	209.9119	234.8316	250.6603	280.1170 (62)
WWHRS	-32.7659	-28.9784	-30.3446	-25.1265	-23.4170	-20.0381	-18.7825	-19.9733	-20.7322	-24.4409	-27.6886	-32.1591 (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 (64a)
Output from w/h	250.5766	221.5464	235.5114	207.7392	201.7579	182.2419	180.3198	187.3257	189.1798	210.3906	222.9717	247.9578 (64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2537.5187 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	118.4029	105.1499	112.5886	100.8390	99.0622	90.6693	90.3930	93.1184	93.2069	102.2730	106.7557	117.3304 (65)

Full SAP Calculation Printout



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	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102	141.5102 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	138.9114	153.7948	138.9114	143.5418	138.9114	143.5418	138.9114	138.9114	143.5418	138.9114	143.5418	138.9114 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	275.4074	278.2653	271.0635	255.7319	236.3785	218.1890	206.0373	203.1794	210.3811	225.7128	245.0662	263.2557 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510	37.1510 (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)	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082	-113.2082 (71)
Water heating gains (Table 5)	159.1437	156.4731	151.3288	140.0542	133.1481	125.9295	121.4960	125.1592	129.4540	137.4638	148.2718	157.7022 (72)
Total internal gains	641.9156	656.9862	629.7568	607.7809	576.8911	553.1134	531.8978	532.7031	548.8300	570.5410	605.3329	628.3224 (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																		
															North		18.5900		10.6334		0.6300		0.7000		0.7700		60.4120 (74)													
															South		7.6900		46.7521		0.6300		0.7000		0.7700		109.8750 (78)													
															Solar gains		170.2870		295.3973		425.3989		574.1818		694.4517		714.2301		678.1092		583.1183		475.3179		331.5183		204.7653		145.3045 (83)	
															Total gains		812.2026		952.3836		1055.1557		1181.9627		1271.3427		1267.3434		1210.0070		1115.8214		1024.1479		902.0593		810.0982		773.6269 (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, n _{l,m} (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	105.3400	105.7072	106.0696	107.8057	108.1369	109.7056	109.7056	110.0011	109.0960	108.1369	107.4691	106.7796
alpha	8.0227	8.0471	8.0713	8.1870	8.2091	8.3137	8.3137	8.3334	8.2731	8.2091	8.1646	8.1186
util living area	0.9998	0.9990	0.9957	0.9702	0.8536	0.6244	0.4529	0.5115	0.8034	0.9853	0.9991	0.9998 (86)
MIT	20.1895	20.3234	20.5101	20.7674	20.9456	20.9962	20.9997	20.9994	20.9748	20.7443	20.4251	20.1748 (87)
Th 2	19.9590	19.9622	19.9654	19.9803	19.9831	19.9962	19.9962	19.9986	19.9911	19.9831	19.9775	19.9715 (88)
util rest of house	0.9996	0.9984	0.9929	0.9516	0.7883	0.5294	0.3498	0.4008	0.7068	0.9725	0.9984	0.9997 (89)
MIT 2	19.0225	19.1966	19.4370	19.7644	19.9484	19.9949	19.9962	19.9985	19.9800	19.7451	19.3393	19.0138 (90)
Living area fraction	19.3821	19.5438	19.7676	20.0734	20.2556	20.3034	20.3054	20.3069	20.2865	20.0530	19.6739	19.3715 (92)
MIT	19.3821	19.5438	19.7676	20.0734	20.2556	20.3034	20.3054	20.3069	20.2865	20.0530	19.6739	19.3715 (93)
Temperature adjustment												0.0000
adjusted MIT	19.3821	19.5438	19.7676	20.0734	20.2556	20.3034	20.3054	20.3069	20.2865	20.0530	19.6739	19.3715 (93)

8. Space heating requirement

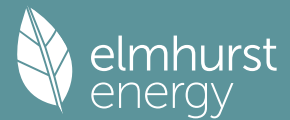
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9995	0.9980	0.9921	0.9537	0.8073	0.5589	0.3816	0.4350	0.7372	0.9737	0.9981	0.9997 (94)
Useful gains	811.7935	950.5072	1046.8556	1127.2288	1026.4146	708.2764	461.7191	485.3534	754.9740	878.3249	808.5493	773.3629 (95)
Ext temp.	4.3000	4.9000	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	1957.6364	1894.1490	1710.2773	1417.1298	1081.7853	710.8384	461.8141	485.6210	775.3578	1195.2531	1599.7408	1942.6997 (97)
Space heating kWh	852.5071	634.1273	493.5857	208.7287	41.1959	0.0000	0.0000	0.0000	0.0000	235.7945	569.6579	869.9866 (98a)
Space heating requirement - total per year (kWh/year)												3905.5837
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	852.5071	634.1273	493.5857	208.7287	41.1959	0.0000	0.0000	0.0000	0.0000	235.7945	569.6579	869.9866 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3905.5837
Space heating per m ²										(98c) / (4) =		34.6485 (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	852.5071	634.1273	493.5857	208.7287	41.1959	0.0000	0.0000	0.0000	0.0000	235.7945	569.6579	869.9866 (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)	923.6264	687.0285	534.7624	226.1416	44.6326	0.0000	0.0000	0.0000	0.0000	255.4654	617.1808	942.5640 (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

Full SAP Calculation Printout



Efficiency of water heater (217)m	250.5766	221.5464	235.5114	207.7392	201.7579	182.2419	180.3198	187.3257	189.1798	210.3906	222.9717	247.9578 (64)
Fuel for water heating, kWh/month	86.5818	86.2805	85.6787	84.0704	81.1954	79.8000	79.8000	79.8000	79.8000	84.3160	86.0693	79.8000 (216)
Space cooling fuel requirement (221)m	289.4102	256.7745	274.8774	247.1013	248.4845	228.3734	225.9646	234.7439	237.0674	249.5262	259.0605	86.6329 (217)
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	286.2167 (219)
Lighting	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	0.0000 (221)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	28.8630	23.1550	20.8485	15.2745	11.7985	9.6395	10.7630	13.9901	18.1718	23.8423	26.9299	7.0685 (231)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	-43.4010	-61.4824	-88.7855	-100.2801	-108.4719	-101.3096	-99.9919	-94.1904	-84.0706	-70.4359	-47.7927	29.6652 (232)
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 (233a)
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 (234a)
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 (235a)
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 (235c)
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 (233b)
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 (234b)
Annual totals kWh/year	-23.6446	-49.8351	-99.2461	-149.3684	-197.8332	-198.9507	-196.6764	-166.4362	-121.8280	-71.4524	-31.6235	-18.6961 (235b)
Space heating fuel - main system 1												4231.4016 (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												3037.6007 (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)												232.9413 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2263.2855 (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												5324.6582 (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	4231.4016	0.2100	888.5943 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3037.6007	0.2100	637.8961 (264)
Space and water heating			1526.4905 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	232.9413	0.1443	33.6206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.6948	0.1345	-126.1219
PV Unit electricity exported	-1325.5907	0.1258	-166.7955
Total			-292.9174 (269)
Total CO2, kg/year			1279.1229 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.3500 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	4231.4016	1.1300	4781.4838 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3037.6007	1.1300	3432.4888 (278)
Space and water heating			8213.9726 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	232.9413	1.5338	357.2932 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-937.6948	1.4971	-1403.8159
PV Unit electricity exported	-1325.5907	0.4619	-612.2491
Total			-2016.0650 (283)
Total Primary energy kWh/year			6685.3017 (286)
Target Primary Energy Rate (TPER)			59.3100 (287)

Project name

**Hornsey Police Station-Communal Area
BeGreen**

As designed

Date: Fri Jul 26 21:11:21 2024

Administrative information

Building Details

Address: Address 1, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.26

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.26

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 40.55The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	1.39
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	1.33
Target primary energy rate (TPER), kWh _{PE} /m ² annum	13.52
Building primary energy rate (BPER), kWh _{PE} /m ² annum	12.89
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.18	0.18	BL000015:Surf[4]
Floors	0.18	0.06	0.06	BL000015:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.06	0.06	BL000015:Surf[1]
Windows** and roof windows	1.6	1.2	1.2	BL000015:Surf[3]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	0.98	0.98	BL000015:Surf[2]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Elec heaters- BeLean

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

"No HWS in project, or hot water is provided by HVAC system"

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
Block A- BIKE		120	-	-
Block A-REFUSE		120	-	-
Block A- STAIRS		120	-	-
CORRIDOR- BLOCK C		120	-	-
STAIRS		120	-	-
PLANT		120	-	-
BLOCK B FLAT BIKES		120	-	-
STAIRS		120	-	-
STAIRS		120	-	-
CORRIDOR- BLOCK C		120	-	-
STAIRS		120	-	-
STAIRS		120	-	-
Block B ENTRANCE LOBBY		120	-	-
STAIRS		120	-	-

The spaces in the building should have appropriate passive control measures to limit the effects of solar gains in summer

There are no zones in the building where the solar gain check is applicable.

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	209.2	209.2
External area [m ²]	370.8	370.8
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	76.37	121.71
Average U-value [W/m ² K]	0.21	0.33
Alpha value* [%]	25	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

Retail/Financial and Professional Services
 Restaurants and Cafes/Drinking Establishments/Takeaways
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups
 Storage or Distribution
 Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools
 Residential Institutions: Universities and Colleges
 Secure Residential Institutions

78 Residential Spaces

22 Non-residential Institutions: Community/Day Centre

Non-residential Institutions: Libraries, Museums, and Galleries
 Non-residential Institutions: Education
 Non-residential Institutions: Primary Health Care Building
 Non-residential Institutions: Crown and County Courts
 General Assembly and Leisure, Night Clubs, and Theatres
 Others: Passenger Terminals
 Others: Emergency Services
 Others: Miscellaneous 24hr Activities
 Others: Car Parks 24 hrs
 Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	8.52	8.89
Cooling	0	0
Auxiliary	0	0
Lighting	4.32	6.21
Hot water	0	0
Equipment*	22.16	22.16
TOTAL**	12.84	15.1

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	4.56	6.38
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>4.56</i>	<i>6.38</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	30.66	45.16
Primary energy [kWh _{PE} /m ²]	12.89	13.52
Total emissions [kg/m ²]	1.33	1.39

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	39.5	0	11	0	0	1	0	1	0
Notional	58.3	0	11.5	0	0	1.41	0	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Project name

Hornsey Police Station-Communal Area
BeLean

As designed

Date: Fri Jul 26 21:21:27 2024

Administrative information

Building Details

Address: Address 1, City, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.26

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.26

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 40.55The CO₂ emission and primary energy rates of the building must not exceed the targets

The building does not comply with England Building Regulations Part L 2021

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	3.09
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	2.95
Target primary energy rate (TPER), kWh _{PE} /m ² annum	17.06
Building primary energy rate (BPER), kWh _{PE} /m ² annum	20.72
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER > TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.18	0.18	BL000015:Surf[4]
Floors	0.18	0.06	0.06	BL000015:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.06	0.06	BL000015:Surf[1]
Windows** and roof windows	1.6	1.2	1.2	BL000015:Surf[3]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	0.98	0.98	BL000015:Surf[2]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check.

*** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Gas Boiler BeLean

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.93	-	0.2	-	-
Standard value	0.93*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					

"No HWS in project, or hot water is provided by HVAC system"

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
Block A- BIKE		120	-	-
Block A-REFUSE		120	-	-
Block A- STAIRS		120	-	-
CORRIDOR- BLOCK C		120	-	-
STAIRS		120	-	-
PLANT		120	-	-
BLOCK B FLAT BIKES		120	-	-
STAIRS		120	-	-
STAIRS		120	-	-
CORRIDOR- BLOCK C		120	-	-
STAIRS		120	-	-
STAIRS		120	-	-
Block B ENTRANCE LOBBY		120	-	-
STAIRS		120	-	-

The spaces in the building should have appropriate passive control measures to limit the effects of solar gains in summer

There are no zones in the building where the solar gain check is applicable.

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	209.2	209.2
External area [m ²]	370.8	370.8
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	76.37	121.71
Average U-value [W/m ² K]	0.21	0.33
Alpha value* [%]	25	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

Retail/Financial and Professional Services
 Restaurants and Cafes/Drinking Establishments/Takeaways
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups
 Storage or Distribution
 Hotels
 Residential Institutions: Hospitals and Care Homes
 Residential Institutions: Residential Schools
 Residential Institutions: Universities and Colleges
 Secure Residential Institutions

78 Residential Spaces

22 Non-residential Institutions: Community/Day Centre

Non-residential Institutions: Libraries, Museums, and Galleries
 Non-residential Institutions: Education
 Non-residential Institutions: Primary Health Care Building
 Non-residential Institutions: Crown and County Courts
 General Assembly and Leisure, Night Clubs, and Theatres
 Others: Passenger Terminals
 Others: Emergency Services
 Others: Miscellaneous 24hr Activities
 Others: Car Parks 24 hrs
 Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	9.75	13.86
Cooling	0	0
Auxiliary	2.26	1.13
Lighting	4.32	6.21
Hot water	0	0
Equipment*	22.16	22.16
TOTAL**	16.33	21.19

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	6.38
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>6.38</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	30.66	45.16
Primary energy [kWh _{PE} /m ²]	20.72	17.06
Total emissions [kg/m ²]	2.95	3.09

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	39.5	0	12.6	0	2.9	0.87	0	0.93	0
Notional	58.3	0	17.9	0	1.5	0.91	0	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

APPENDIX C

GLA Carbon Emissions Reporting Spreadsheet

BACKGROUND AND PURPOSE

From **January 2023** planning applicants for new and refurbishments schemes are required to use this spreadsheet to report the anticipated carbon performance of a development. It should be used for both domestic and non-domestic uses. This spreadsheet ensures a consistent and transparent process for presenting Part L 2021 CO₂ emission performance. The GLA will not accept the use of alternative methodologies or tools. This is to ensure consistency and to minimise the need for clarifications during the planning application determination period.

Planning applicants should use Part L 2021 BRUKL and SAP outputs to fill in this spreadsheet which serves as a the final step in reporting the carbon emission performance of the proposed energy strategy. **It is solely for the purpose of reporting compliance with the London Plan to the GLA and does not replace Part L calculations submitted for Building Regulations approval.**

The spreadsheet has been developed to fit as wide a range of policy compliant approaches for schemes as possible. Any planning applicants with a policy compliant approach that the spreadsheet does not serve should contact the GLA at: ZeroCarbonPlanning@london.gov.uk. Applicants must not amend or alter the spreadsheet to suit non-policy compliant strategies. Any unauthorised amendment to the spreadsheet will invalidate the CO₂ emission calculations.

Applicants should note that we will update the spreadsheet from time to time to ensure it remains fit for purpose. Applicants are expected to use the latest version at the time of the planning submission.

Any feedback on this spreadsheet should be sent to: ZeroCarbonPlanning@london.gov.uk.

METHODOLOGY

Applicants are required to complete all light blue input cells in the applicable tabs prior to submission ('Development Information', 'Part L Outputs', 'EUI & space heating demand' and 'GLA Summary Tables').

Input Data

For all applications, the input data required includes:

'Development information' tab

- Table 1. Application Completeness Check
- Table 2. Development Details
- Table 3. Bespoke District Heating Carbon Factors (if applicable)
- Table 4. Distribution loss factor (if applicable)
- Table 5. SCoP Calculation Methodology (if applicable)

'Part L Output' tab

- Type of units modelled
- Area of units modelled (m²)
- Number of units modelled
- Total area represented by model (m²)
- TER, DER and BER figures (kgCO₂/m² p.a.)
- Notional building Energy saving/generation technologies (-) for residential (kgCO₂ p.a.)
- Notional building Displaced electricity (-) for non-residential (kWh/m² p.a.)
- TFEE and DFEE figures for residential (kWh/m² p.a.)

'GLA Summary tables' tab

- Unregulated figures (tCO₂ p.a.)
- Actual and notional building cooling demand (MJ/m²)

Note: The total carbon emissions figures in the 'GLA Summary tables' tab are now calculated based on the area input for 'Total area represented by model (m²)'. This input requirement has been added to ensure that the carbon emission figures align with the development area schedule (included within the DAS) rather than the number of representative models.

'EUI & Space Heating Demand' tab

- Confirmation of building type
- Gross Internal Area (GIA) in m²
- Energy Use Intensity (EUI) per fuel type (kWh p.a.)
- Space heating demand (kWh p.a.)
- Confirmation that both regulated and unregulated energy use has been included
- Confirmation of predicted energy use methodology, including modelling software
- Notes on the assessment, including justification if expected performance differs from Table 4

Note: Applicants can use the 'be seen' methodology or an alternative predictive energy modelling methodology to fill in the required EUI & space heating demand information.

Where 'be seen' reporting is used the reported EUI and space heating demand should align with energy consumption data reported in the planning stage submission for the 'be seen' policy, submitted via the online webform.

Required Part L Outputs for the GLA spreadsheet

Domestic Part L Outputs:

For the domestic conversion applicants are required to use the outputs from the SAP TER and DER worksheets. To assist in the process the required SAP worksheet rows have been referenced in each input cell. Note: The SAP worksheet rows are based on a communal heating system in line with GLA policy and guidance. Applicants proposing individual systems must first seek confirmation from the GLA as to whether the approach will be acceptable.

Non-domestic Part L Outputs:

Regarding the non-domestic uses, the applicant can determine whether each individual unit will be modelled independently and apportioned to the entire scheme or whether a single model will be generated for the entire development. The applicant should, however, include the results from all BRUKL outputs generated for the proposed development under the "NON-RESIDENTIAL CO₂ ANALYSIS" sections. Applicants are generally encouraged to model each individual typology independently.

Validation Check

Applicants must ensure that the calculated TER/DER/BER in this spreadsheet matches the actual values from the Part L 2021 BRUKL and SAP worksheets. The Part L 2021 BRUKL and SAP sheet must accompany the energy assessment so that results can be validated.

TABLE 1. APPLICATION COMPLETENESS CHECK	
Development information tab (Tables 1-4) completed and included in appendix of energy strategy?	yes
Part L outputs tab completed	yes
EUI & space heating demand completed	yes
Confirmation that the planning stage webform will be completed at planning application submission and that the Be Seen process and reporting responsibilities are fully understood, including the requirement for as-built and in-use stage reporting to be undertaken (or where the legal owner changes from one reporting stage to another that the responsible party will be notified).	no

TABLE 2. DEVELOPMENT DETAILS		Further notes	Response	Supporting comments (or signpost sections in the energy assessment)
Application details	Date of Application	Please provide the date the application was submitted to the Local Planning Authority.		
	Local Planning Authority	Please indicate the Local Planning Authority determining the application.	Haringley	
	Confirmed carbon offset price (£/tonne of carbon dioxide)	Please confirm the agreed carbon offset price for the Local Planning Authority. If no value is entered then the GLA's recommend price of £95 per tonne of carbon dioxide will be used.	95.00	
	Evidence of communication on the carbon offset price included in the energy assessment (Y/N).		N	
	Residential units number (Part L1)		29	
	Non-residential floor area in m ² (Part L2)		0.00	
Heat risk	CIBSE TM59 undertaken for residential development (Y/N)		N	
	CIBSE TM52 undertaken for non-residential development (Y/N)			
	All sample units meet CIBSE criteria with DSY1 weather file (Y/N)			
	DSY2 and DSY3 included in overheating assessments (Y/N)			
	Residential g-value			
	% Glazing Ratio over façade			
	External shading proposed (Y/N)		N	
Energy efficiency measures	Target Fabric Energy Efficiency met (Y/N)			
	Mechanical Ventilation with Heat Recovery included (Y/N)			
	Waste Water Heat Recovery (Y/N)			
	Low energy lighting (Y/N)		Y	
District heating connection	Development in a Heat Network Priority Area (HNPA) (Y/N)		N	
	District Heating Network connection (Y/N)		N	
	Name of District Heating Network			
	Carbon factor (kgCO ₂ / kWh)			
	Borough energy officer and Heat Network Operator contacted and evidence of correspondence included in the energy strategy (Y/N)	Applicable to all applications.	N	
Site heating distribution configuration	Development future proofed for DHN connection (Y/N)	Note that individual heating systems would not be appropriate for developments in HNPA's.		
	Drawings of communal system provided (Y/N)	Applicants should provide a drawings of the energy centre, on-site communal network with all building uses connected and future proofing arrangements detailed, including single point of connection.	N	
	Distribution type			
	Flow temperature (°C)			
	Return temperature (°C)			
Heating system performance	Distribution losses modelled (%)	See table 4 below for details.		
	Heat Pump (Y/N)		Y	
	Heat Pump source		ELECTRIC	
	Centralised Heat Pump capacity (kWth)			
	Heat Pump Seasonal Heating Efficiency (SCoP)			
	Heat Pump SCoP calculation includes heat source and heat distribution temperature and seasonal performance factor (Y/N)	See table 5 below for details.		
	Fraction of heat supplied by heat pump (only for hybrid systems with boilers) (%)			
	Low-emission on-site CHP enabling an area-wide heat network (Y/N)	Only low-emission CHP is suitable and only where it is facilitating an area-wide heat network. Therefore, new gas engine CHP is not suitable for any other purpose for new developments.		
	CHP (kWe)			
	Estimated end user cost (pence/kWh)			
	Energy assessment includes consideration of occupant running costs (Y/N)	Applicants should consider the estimated costs to occupants of the energy assessment and outline how they are committed to protecting the consumer from high prices.		
Solar technologies	Solar PV included (Y/N)		Y	
	Roof layout demonstrating solar PV technologies have been maximised included in energy strategy (Y/N)		Y	
	kWh generated			
	kWp			
	Total PV panel area (m ²) installed			
	Solar Thermal included (Y/N)		N	
	Solar Thermal panel area (m ²) installed			
Flexibility and peak energy demand	Site-wide peak demand, capacity and flexibility potential included in energy assessment (Y/N)	Table 9 in the energy assessment guidance to be completed.		
	Interventions for achieving flexibility included in energy assessment (Y/N)	Table 10 in the energy assessment guidance to be completed.		
	Estimated peak demand (MW)			
	Electrical energy storage (kWh) capacity			
	Heat energy storage (kWh) capacity			
Other technologies	System type (e.g. wind turbine)			
	Capacity (kW)			
Cooling	Cooling proposed - Residential (Y/N)	It is not expected that 'active cooling' will be proposed for any residential developments. It will be expected that applicants can fully demonstrate that all passive design measures have been thoroughly investigated before considering 'active cooling'.	N	
	Cooling proposed - Non-residential (Y/N)			
	Residential Cooling consumption (kWh p.a.)	See note in cell C60.		
	Commercial Cooling consumption (MJ p.a.)			

TABLE 3. BESPOKE DH CARBON FACTOR CALCULATION METHODOLOGY	
Please provide below details of the calculation methodology followed to establish the bespoke carbon factor, if applicable.	

TABLE 4. DISTRIBUTION LOSSES			COMMENTS	
Primary network (buried pipe)	Total pipe length (m)			
	Average heat loss rate (W/m)			
Secondary network (buried pipe)	Total pipe length (m)			
	Average heat loss rate (W/m)			
Total losses (MWh/year)				
Total heat supplied (MWh/year)				
Distribution Loss Factor (DLF)				
Calculation included in energy statement (yes/no)				

TABLE 5. SEASONAL COEFFICIENT OF PERFORMANCE (SCOP) CALCULATION METHODOLOGY				
Details of the Seasonal Coefficient of Performance (SCOP), the Seasonal Performance Factor (SFP) and Seasonal Energy Efficiency ratio (SEER), which should be used in the energy modelling. This should be based on a dynamic calculation of the system boundaries over the course of a year i.e. incorporating variations in source temperatures and the design sink temperatures (for space heat and hot water). Details of the assumptions should be included in the energy assessment, including manufacturer datasheets showing performance under test conditions for the specific source and sink temperatures of the proposed development and assumptions for hours spent under changing source temperatures.				

The applicant should complete all the light blue cells including information on the modelled units, the area per unit, the number of units, the TER/DER/BER and the TFEF/DFEE.																				
RESIDENTIAL CO ₂ ANALYSIS (PART L1)																				
				Baseline		'Be Lean'	'Be Clean'	'Be Green'	Fabric Energy Efficiency (FEE)		Baseline		'Be Lean'			'Be Clean'			'Be Green'	
Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area	Number of units	Total area represented by model	TER	Energy saving/generation technologies (-)	DER	DER	DER	Target Fabric Energy Efficiency	Dwelling Fabric Energy Efficiency	Part L 2021 CO ₂ emissions	Energy saving/generation technologies	Part L 2021 CO ₂ emissions	Part L 2021 CO ₂ emissions with Notional PV savings included	'Be Lean' savings	Part L 2021 CO ₂ emissions	Part L 2021 CO ₂ emissions with Notional PV savings included	'Be Clean' savings	Part L 2021 CO ₂ emissions	'Be Green' savings
	(m ²)		(m ²)	(kgCO ₂ / m ²)	(kgCO ₂ p.a.)	(kgCO ₂ / m ²)	(kgCO ₂ / m ²)	(kgCO ₂ / m ²)	(kWh/m ²)	(kWh/m ²)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)
	(Row 4)			(Row 273)	(Row 269)	(Row 273 or 384)	(Row 273 or 384)	(Row 273 or 384)												
AH1-3B SEMI DET	129.21	6	775.26	21.31	-148.33	13.32	13.32	3.71	48.88	47.88	16,521	-890	10,326	9,436	7,084	10,326	9,436	0	2,876	6,560
Flat A1- 2B4P	73.81	2	147.62	24.34	-82.16	18.43	18.43	4.40	51.49	46.65	3,593	-164	2,721	2,556	1,037	2,721	2,556	0	650	1,907
Flat A2-1B2P	52.77	1	52.77	23.85	-37.11	17.87	17.87	4.76	41.56	36.51	1,259	-37	943	906	353	943	906	0	251	655
Flat A4-3B5P	99.61	1	99.61	23.83	-106.93	17.82	17.82	4.08	50.53	49.21	2,374	-107	1,775	1,668	706	1,775	1,668	0	406	1,262
Flat B2-2B4P	73.35	4	293.4	16.68	-67.43	13.13	13.13	2.26	28.31	25.58	4,894	-270	3,852	3,583	1,311	3,852	3,583	0	663	2,920
FLAT B3-2B3P	69.02	5	345.1	18.30	-64.07	14.06	14.06	2.72	28.78	27.18	6,315	-320	4,852	4,532	1,784	4,852	4,532	0	939	3,593
Flat C2-1B2P	50.74	5	253.7	24.48	-58.09	17.89	17.89	4.52	41.76	40.30	6,211	-290	4,539	4,248	1,962	4,539	4,248	0	1,147	3,102
Flat C8-3B5P	95.96	1	95.96	18.60	-103.66	14.09	14.09	3.68	35.33	34.76	1,785	-104	1,352	1,248	536	1,352	1,248	0	353	895
MH11- 4B8P	112.72	4	450.88	19.89	-132.96	14.15	14.15	1.96	40.76	39.73	8,968	-532	6,380	5,848	3,120	6,380	5,848	0	884	4,964
Sum		29	2,514	20.6	-105.9	14.6	14.6	3.2	41.1	39.5	51,919	-2,714	36,740	34,026	17,893	36,740	34,026	0	8,169	25,857
NON-RESIDENTIAL CO ₂ ANALYSIS (PART L2)																				
				Baseline		'Be Lean'	'Be Clean'	'Be Green'			Baseline		'Be Lean'			'Be Clean'			'Be Green'	
Building Use	Model Area	Number of units	Total area represented by model	BRUKL TER	BRUKL Displaced electricity (-)	BRUKL BER	BRUKL BER	BRUKL BER			Part L 2021 CO ₂ emissions	Energy saving/generation technologies	Part L 2021 CO ₂ emissions	Part L 2021 CO ₂ emissions with Notional PV savings included	'Be Lean' savings	Part L 2021 CO ₂ emissions	Part L 2021 CO ₂ emissions with Notional PV savings included	'Be Clean' savings	Part L 2021 CO ₂ emissions	'Be Green' savings
	(m ²)		(m ²)	(kgCO ₂ / m ²)	(kWh / m ²)	(kgCO ₂ / m ²)	(kgCO ₂ / m ²)	(kgCO ₂ / m ²)			(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)
Commual	209.2	1	209.2	3.09	-6.38	2.95	2.95	1.33			646	-171.83	617.14	445	201	617	445	0	278	167
Sum		1	209	3.1	-6.4	3.0	3.0	1.3			646	-172	617	445	201	617	445	0	278	167
SITE-WIDE ENERGY CONSUMPTION AND CO ₂ ANALYSIS																				
Total Sum			2,724	-	-	-	-	-			52,565	-2,886	37,357	34,471	18,094	37,357	34,471	0	8,447	26,024

Applicants can use the 'be seen' methodology or an alternative predictive energy modelling methodology to fill in this tab.

Where 'be seen' reporting is used the reported EUI and space heating demand should align with energy consumption data reported in the planning stage submission for the 'be seen' policy, submitted via the online webform.

Residential predicted energy use

Building type	GIA (m ²)	EUI & space heating demand (kWh/year)									Has the following energy use been included?		Results		Table 4 of the guidance comparison		Methodology used		
		Space heating demand	Annual Electricity Use	Annual Gas Use	Annual Oil Use	Annual Biomass Use	Annual District Htg Use	Annual District Clg Use	Elec Generation, Gross	Solar Thermal Generation	Regulated	Unregulated	EUI (kWh/m ² /year) (excluding renewable energy)	Space heating demand (kWh/m ² /year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m ² /year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance (kWh/m ² /year) (excluding renewable energy)	Software	Operational energy use assessment	notes (if expected performance differs from the Table 4 values in the guidance or other software used)
Residential use (total)	2514.3	16791.3768	68358.293								Yes		26.08570626	6.678350555	35	15			
Landlord Circulation (in Residential Blocks)	209.2	1,782.38	2,686.13						14385.373										
Total	2723.5	18573.7608	71044.421	0	0	0	0	0	14385.373	0									

Non-residential predicted energy use

[illegible]

Part L 2021 Performance

ResidentialNon-residential

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential buildings

	Carbon Dioxide Emissions for residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	51.9	1.5
After energy demand reduction (be lean)	34.0	1.5
After heat network connection (be clean)	34.0	1.5
After renewable energy (be green)	8.2	1.5

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for residential buildings

	Regulated residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	17.9	34%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	25.9	50%
Cumulative on site savings	43.8	84%
Annual savings from off-set payment	8.2	-
(Tonnes CO ₂)		
Cumulative savings for off-set payment	245	-
Cash in-lieu contribution (£)	23,281	

*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

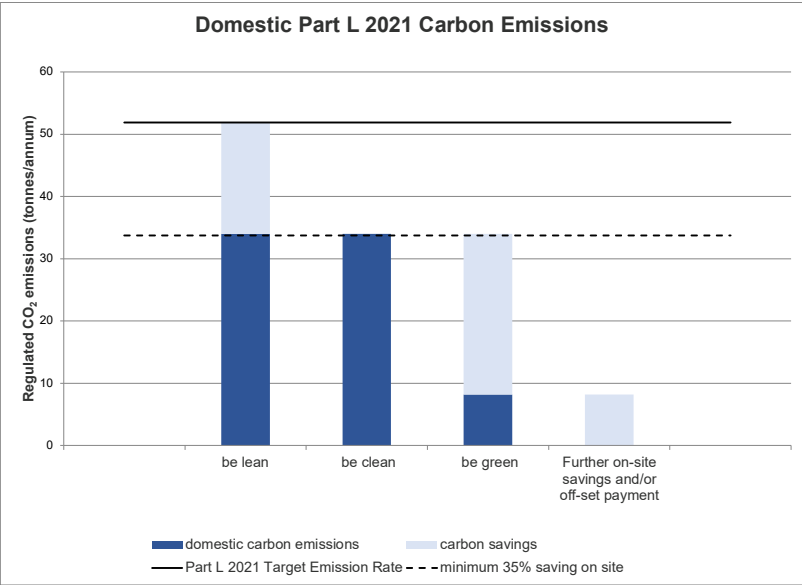


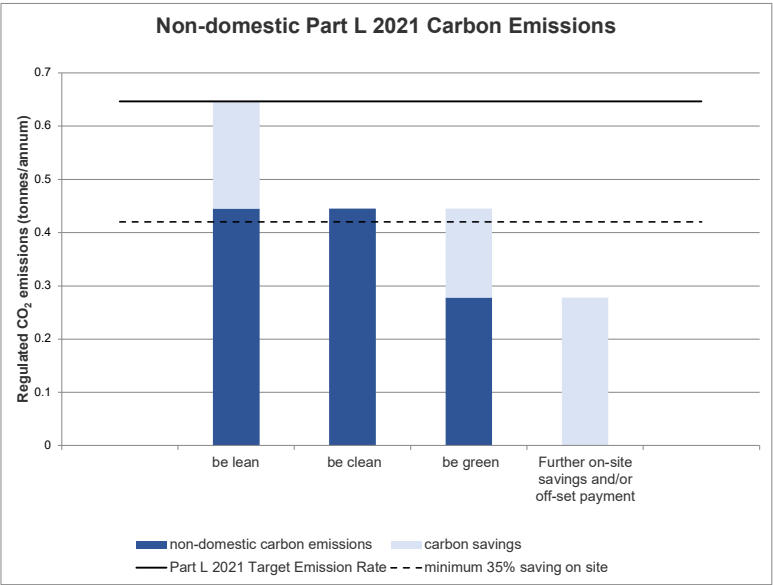
Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential buildings

	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	0.6	
After energy demand reduction (be lean)	0.4	
After heat network connection (be clean)	0.4	
After renewable energy (be green)	0.3	

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-residential buildings

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.2	31%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.2	26%
Total Cumulative Savings	0.4	57%
Annual savings from off-set payment	0.3	-
(Tonnes CO ₂)		
Cumulative savings for off-set payment	8	-
Cash in-lieu contribution (£)	793	

*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



SITE-WIDE

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	52.6		
Be lean	34.5	18.1	34%
Be clean	34.5	0.0	0%
Be green	8.4	26.0	50%
Total Savings	-	44.1	84%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	253.4	-

	Target Fabric Energy Efficiency (kWh/m ²)	Dwelling Fabric Energy Efficiency (kWh/m ²)	Improvement (%)
Development total	41.09	39.45	4%

	Area weighted non-residential cooling demand (MJ/m ²)	Total non-residential cooling demand (MJ/year)
Actual		
Notional		

EUI & space heating demand (predicted energy use)

Residential

Building type	EUI (kWh/m ² /year) (excluding renewable energy)	Space heating demand (kWh/m ² /year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m ² /year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance (kWh/m ² /year) (excluding renewable energy)	Methodology used (e.g. 'be seen' methodology or an alternative predictive energy modelling methodology)	Explanatory notes (if expected performance differs from the Table 4 values in the guidance)
Residential	26.08570626	6.678350555	35	15	& dwellings / & Landlord Circulation	

Non-residential

Building type	EUI (kWh/m ² /year) (excluding renewable energy)	Space heating demand (kWh/m ² /year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m ² /year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance (kWh/m ² /year) (excluding renewable energy)	Methodology used (e.g. 'be seen' methodology or an alternative predictive energy modelling methodology)	Explanatory notes (if expected performance differs from the Table 4 values in the guidance)

APPENDIX D

APPENDIX E

PUZ-WM50VHA(-BS)

Ecodan R32

Monobloc Air Source Heat Pump

R32

Key Features:

- A+++ high efficiency system
- Ultra quiet noise levels
- Maintains full heating capacity at low temperatures
- Zero carbon solution
- MELCloud enabled

Key Benefits:

- Ultra low running cost
- Flexible product placement
- Confident and quick product selection
- Help to tackle the climate crisis
- Remote control, monitoring, maintenance and technical support



MELCloud



Manufactured in the UK



037-0032-20-01



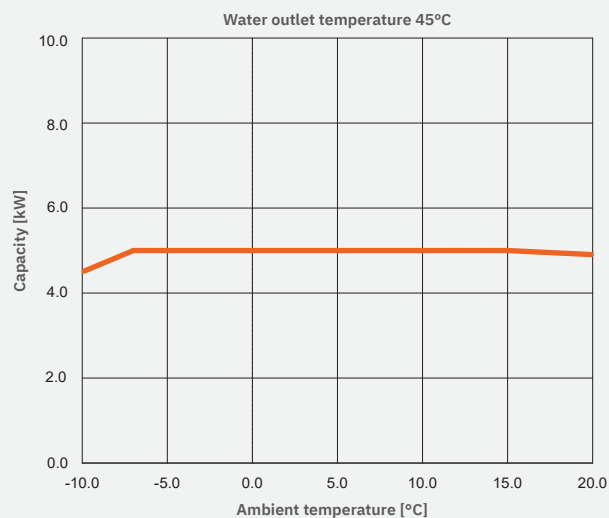
ecodan[®]
Renewable Heating Technology

OUTDOOR UNIT		PUZ-WM50VHA(-BS)
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++
	η_{s}	129%
	SCoP (MCS)	3.24
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A+++
	η_{s}	183%
	SCoP (MCS)	4.62
HEAT PUMP COMBINATION HEATER - Large Profile ^{*1}	ErP Rating	A+
	η_{wh}	135%
	Capacity (kW)	5.0
	Power Input (kW)	1.67
HEATING ^{*2} (A-7/W35)	COP	3.00
	Operating Ambient Temperature (°C DB)	-20 ~ +35
	SOUND DATA ^{*3}	
WATER DATA	Pressure Level at 1m (dBA)	52
	Power Level (dBA) ^{*4}	61
	Pipework Size (mm)	22
DIMENSIONS (mm)	Flow Rate (l/min)	14
	Water Pressure Drop (kPa)	12.0
	Width	950
WEIGHT (kg)	Depth	330+30 ^{*7}
	Height	943
		71
ELECTRICAL DATA	Electrical Supply	220-240v, 50Hz
	Phase	Single
	Nominal Running Current [MAX] (A) ^{*5}	4.64 [13]
	Fuse Rating - MCB Sizes (A) ^{*6}	16
REFRIGERANT CHARGE (kg) / CO ₂ EQUIVALENT (t)		
	R32 (GWP 675)	2.0 / 1.35

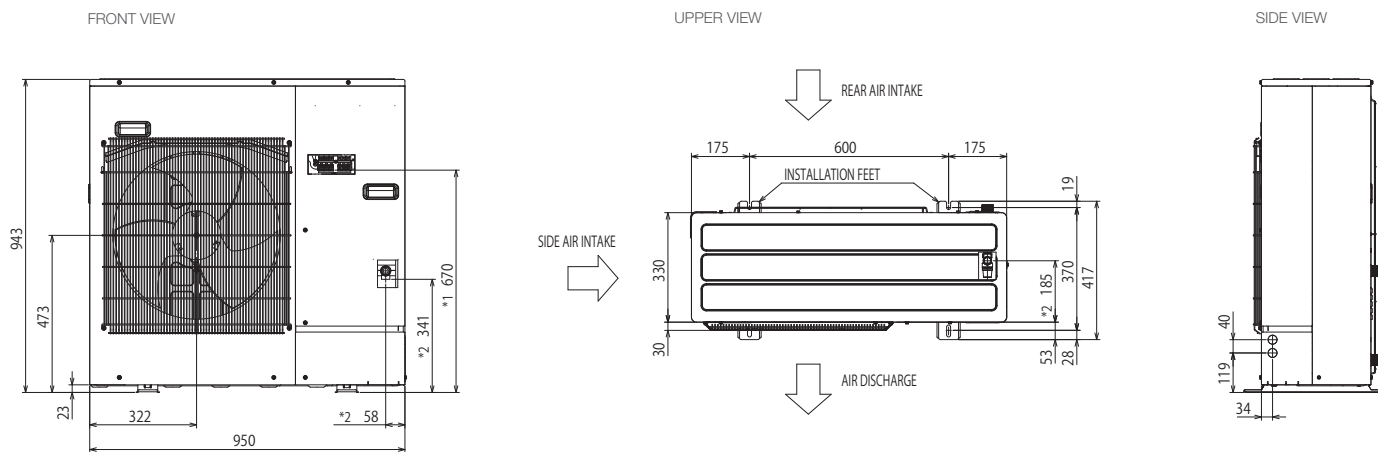
Notes:

- *1 Combination with E*PT20X Cylinder
 *2 Under normal heating conditions at outdoor temp: -7°CDB / -8°CWB, outlet water temp 35°C, inlet water temp 30°C.
 *3 Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 55°C, inlet water temp 47°C as tested to BS EN14511.
 *4 Sound power level tested to BS EN12102.
 *5 Under nominal heating conditions at outdoor temp: 7°C, outlet water temp: 35°C.
 *6 MCB Sizes BS EN60898-2 & BS EN60947-2.
 *7 Grille.
 η_{s} is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency

NOMINAL HEATING CAPACITY



PUZ-WM50VHA(-BS) DIMENSIONS

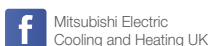


All dimensions (mm)

*1--INDICATION OF TERMINAL CONNECTION LOCATION.
 *2--INDICATION OF PRESSURE RELIEF VALVE DRAIN PORT.



Telephone: 01707 282880
 email: heating@meuk.mee.com
heating.mitsubishielectric.co.uk



UNITED KINGDOM Mitsubishi Electric Europe Living Environment Systems Division, Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, England. Telephone: 01707 282880 Fax: 01707 278881
 IRELAND Mitsubishi Electric Europe, Westgate Business Park, Ballymount, Dublin 24, Ireland. Telephone: (01) 419 8800 Fax: (01) 419 8890 International code: (003531)

Country of origin: United Kingdom - Japan - Thailand - Malaysia. ©Mitsubishi Electric Europe 2020. Mitsubishi and Mitsubishi Electric are trademarks of Mitsubishi Electric Europe B.V. The company reserves the right to make any variation in technical specification to the equipment described, or to withdraw or replace products without prior notification or public announcement. Mitsubishi Electric is constantly developing and improving its products. All descriptions, illustrations, drawings and specifications in this publication present only general particulars and shall not form part of any contract. All goods are supplied subject to the Company's General Conditions of Sale, a copy of which is available on request. Third-party product and brand names may be trademarks or registered trademarks of their respective owners.

Note: Refer to 'Installation Manual' and 'Instruction Book' for further 'Technical Information'. The fuse rating is for guidance only and please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R513A (GWP:631), R454B (GWP:466), R1234ze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No 626/2011 from IPCC 3rd edition, these are as follows. R410A (GWP:1975), R32 (GWP:550), R407C (GWP:1650) or R134a (GWP:1300).

Effective as of August 2020



PUZ-WM60VAA(-BS)

Ecodan R32

Monobloc Air Source Heat Pump

R32

Key Features:

- A+++ high efficiency system
- Ultra quiet noise levels
- Maintains full heating capacity at low temperatures
- Zero carbon solution
- MELCloud enabled

Key Benefits:

- Ultra low running cost
- Flexible product placement
- Confident and quick product selection
- Help to tackle the climate crisis
- Remote control, monitoring, maintenance and technical support



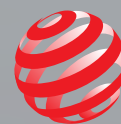
MELCloud



Manufactured in the UK



037-0033-20-01



ecodan[®]
Renewable Heating Technology

OUTDOOR UNIT		PUZ-WM60VAA(-BS)
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++
	η_s	142%
	SCOP (MCS)	3.57
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A+++
	η_s	190%
	SCOP (MCS)	4.81
HEAT PUMP COMBINATION HEATER - Large Profile ¹	ErP Rating	A+
	η_{wh}	145%
HEATING ² (A-7/W35)	Capacity (kW)	6.0
	Power Input (kW)	1.88
	COP	3.20
OPERATING AMBIENT TEMPERATURE (°C DB)		-20 ~ +35
SOUND DATA ³	Pressure Level at 1m (dBA)	45
	Power Level (dBA) ⁴	58
WATER DATA	Pipework Size (mm)	22
	Flow Rate (l/min)	17
	Water Pressure Drop (kPa)	8.0
DIMENSIONS (mm)	Width	1050
	Depth	480
	Height	1020
WEIGHT (kg)		98
ELECTRICAL DATA	Electrical Supply	220-240V, 50Hz
	Phase	Single
	Nominal Running Current [MAX] (A) ⁵	5.68 [13]
	Fuse Rating - MCB Sizes (A) ⁶	16
REFRIGERANT CHARGE (kg) / CO ₂ EQUIVALENT (t)	R32 (GWP 675)	2.2 / 1.49

Notes:

¹ Combination with E*PT20X Cylinder

² Under normal heating conditions at outdoor temp: -7°CDB / -8°CWB, outlet water temp 35°C, inlet water temp 30°C.

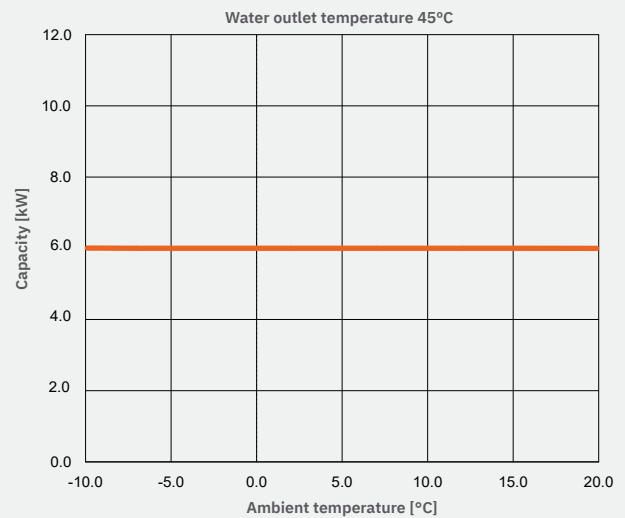
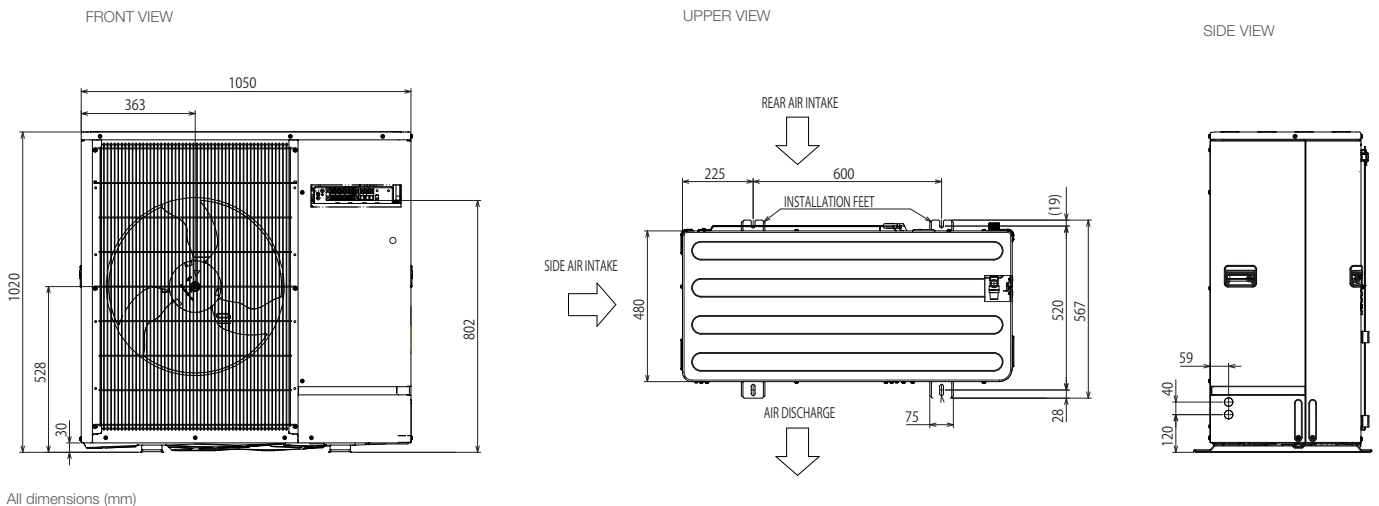
³ Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 55°C, inlet water temp 47°C as tested to BS EN14511.

⁴ Sound power level tested to BS EN12102.

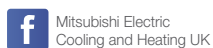
⁵ Under nominal heating conditions at outdoor temp: 7°C, outlet water temp: 35°C.

⁶ MCB Sizes BS EN60898-2 & BS EN60947-2.

η_s is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency

NOMINAL HEATING CAPACITY**PUZ-WM60VAA(-BS) DIMENSIONS**

Telephone: 01707 282880
email: heating@meuk.mee.com
heating.mitsubishielectric.co.uk



UNITED KINGDOM Mitsubishi Electric Europe Living Environment Systems Division, Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, England. Telephone: 01707 282880 Fax: 01707 278881
IRELAND Mitsubishi Electric Europe, Westgate Business Park, Ballymount, Dublin 24, Ireland. Telephone: (01) 419 8800 Fax: (01) 419 8890 International code: (003531)

Country of origin: United Kingdom - Japan - Thailand - Malaysia. ©Mitsubishi Electric Europe 2020. Mitsubishi and Mitsubishi Electric are trademarks of Mitsubishi Electric Europe B.V. The company reserves the right to make any variation in technical specification to the equipment described, or to withdraw or replace products without prior notification or public announcement. Mitsubishi Electric is constantly developing and improving its products. All descriptions, illustrations, drawings and specifications in this publication present only general particulars and shall not form part of any contract. All goods are supplied subject to the Company's General Conditions of Sale, a copy of which is available on request. Third-party product and brand names may be trademarks or registered trademarks of their respective owners.

Note: Refer to 'Installation Manual' and 'Instruction Book' for further 'Technical Information'. The fuse rating is for guidance only and please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R513A (GWP:631), R454B (GWP:466), R1234ze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No.626/2011 from IPCC 3rd edition, these are as follows. R410A (GWP:1975), R32 (GWP:550), R407C (GWP:1650) or R134a (GWP:1300).

Effective as of August 2020



PUZ-WM85VAA(-BS)

Ecodan R32

Monobloc Air Source Heat Pump

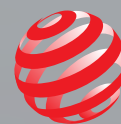
R32

Key Features:

- A+++ high efficiency system
- Ultra quiet noise levels
- Maintains full heating capacity at low temperatures
- Zero carbon solution
- MELCloud enabled

Key Benefits:

- Ultra low running cost
- Flexible product placement
- Confident and quick product selection
- Help to tackle the climate crisis
- Remote control, monitoring, maintenance and technical support



ecodan[®]
Renewable Heating Technology

OUTDOOR UNIT		PUZ-WM85VAA(-BS)
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++
	η_s	139%
	SCOP (MCS)	3.48
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A+++
	η_s	193%
	SCOP (MCS)	4.84
HEAT PUMP COMBINATION HEATER - Large Profile ^{*1}	ErP Rating	A+
	η_{wh}	145%
	Capacity (kW)	8.5
	Power Input (kW)	3.27
	COP	2.60
OPERATING AMBIENT TEMPERATURE (°C DB)		-20 ~ +35
SOUND DATA ^{*3}	Pressure Level at 1m (dBA)	45
	Power Level (dBA) ^{*4}	58
WATER DATA	Pipework Size (mm)	28
	Flow Rate (l/min)	24
	Water Pressure Drop (kPa)	15.0
DIMENSIONS (mm)	Width	1050
	Depth	480
	Height	1020
WEIGHT (kg)		98
ELECTRICAL DATA	Electrical Supply	220-240v, 50Hz
	Phase	Single
	Nominal Running Current [MAX] (A) ^{*5}	9.1 [22]
	Fuse Rating - MCB Sizes (A) ^{*6}	25
REFRIGERANT CHARGE (kg) / CO ₂ EQUIVALENT (t)	R32 (GWP 675)	2.2 / 1.49

Notes:

*1 Combination with E*PT20X Cylinder

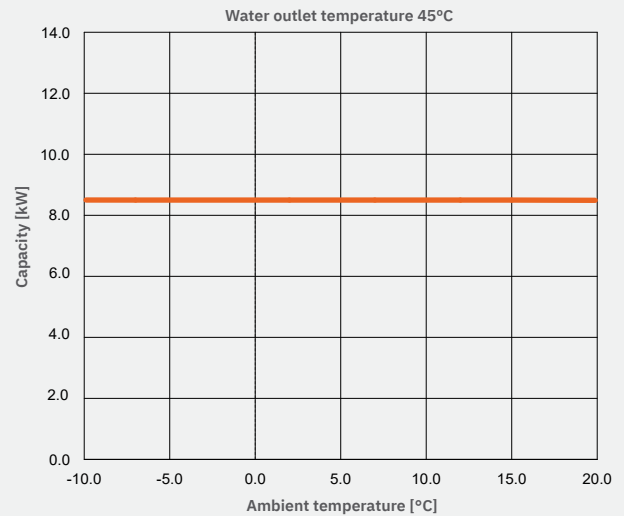
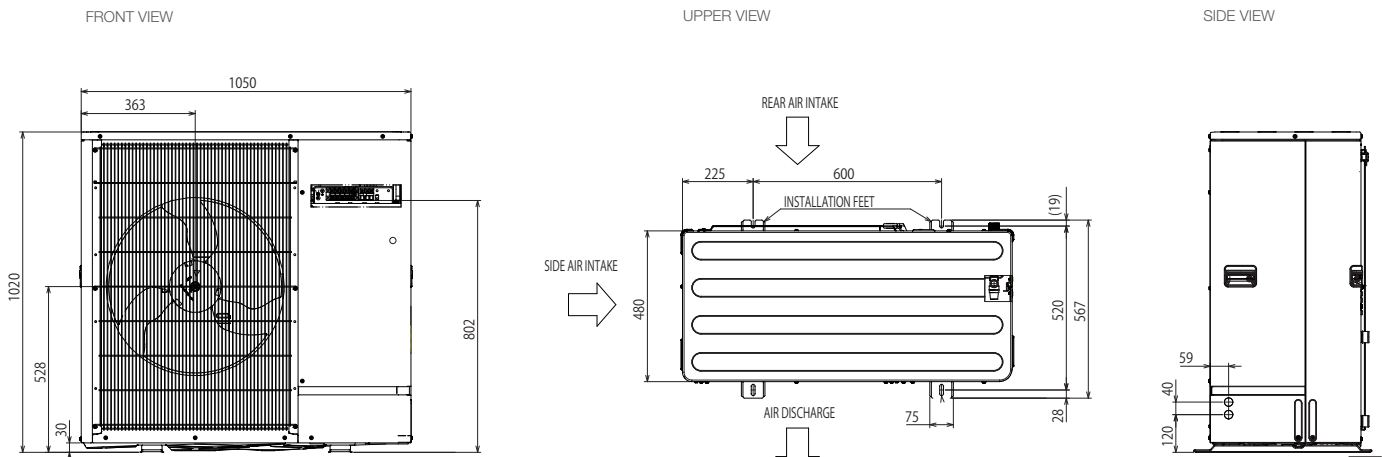
*2 Under normal heating conditions at outdoor temp: -7°CDB / -8°CWB, outlet water temp 35°C, inlet water temp 30°C.

*3 Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 55°C, inlet water temp 47°C as tested to BS EN14511.

*4 Sound power level tested to BS EN12102.

*5 Under nominal heating conditions at outdoor temp: 7°C, outlet water temp: 35°C.

*6 MCB Sizes BS EN60898-2 & BS EN60947-2.

 η_s is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency**NOMINAL HEATING CAPACITY****PUZ-WM85VAA(-BS) DIMENSIONS**

All dimensions (mm)



Telephone: **01707 282880**
 email: heating@meuk.mee.com
heating.mitsubishielectric.co.uk

Mitsubishi Electric Living
Environmental Systems UKMitsubishi Electric
Cooling and Heating UK[mitsubishielectricuk_les](https://www.instagram.com/mitsubishielectricuk_les)Mitsubishi Electric Living
Environmental Systems UKthehub.mitsubishielectric.co.uk

UNITED KINGDOM Mitsubishi Electric Europe Living Environment Systems Division, Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, England. Telephone: 01707 282880 Fax: 01707 278881
IRELAND Mitsubishi Electric Europe, Westgate Business Park, Ballymount, Dublin 24, Ireland. Telephone: (01) 419 8800 Fax: (01) 419 8890 International code: (003531)

Country of origin: United Kingdom - Japan - Thailand - Malaysia. ©Mitsubishi Electric Europe 2020. Mitsubishi and Mitsubishi Electric are trademarks of Mitsubishi Electric Europe B.V. The company reserves the right to make any variation in technical specification to the equipment described, or to withdraw or replace products without prior notification or public announcement. Mitsubishi Electric is constantly developing and improving its products. All descriptions, illustrations, drawings and specifications in this publication present only general particulars and shall not form part of any contract. All goods are supplied subject to the Company's General Conditions of Sale, a copy of which is available on request. Third-party product and brand names may be trademarks or registered trademarks of their respective owners.

Note: Refer to 'Installation Manual' and 'Instruction Book' for further 'Technical Information'. The fuse rating is for guidance only and please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R513A (GWP:631), R454B (GWP:466), R1234ze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No.626/2011 from IPCC 3rd edition, these are as follows. R410A (GWP:1975), R32 (GWP:550), R407C (GWP:1650) or R134a (GWP:1300).

Effective as of August 2020

greengateway.mitsubishielectric.co.uk



Logic Air.

MONOBLOC AIR SOURCE HEAT PUMP



Designed for
the UK climate



364 days a year UK
customer service



Quiet Mark
certified



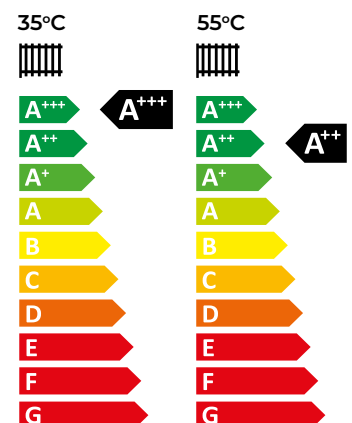
SCOP rating
up to 519%*



Hot water in
sunshine, rain,
ice and snow



HALO
AIR



idealheating.com

The Logic Air.

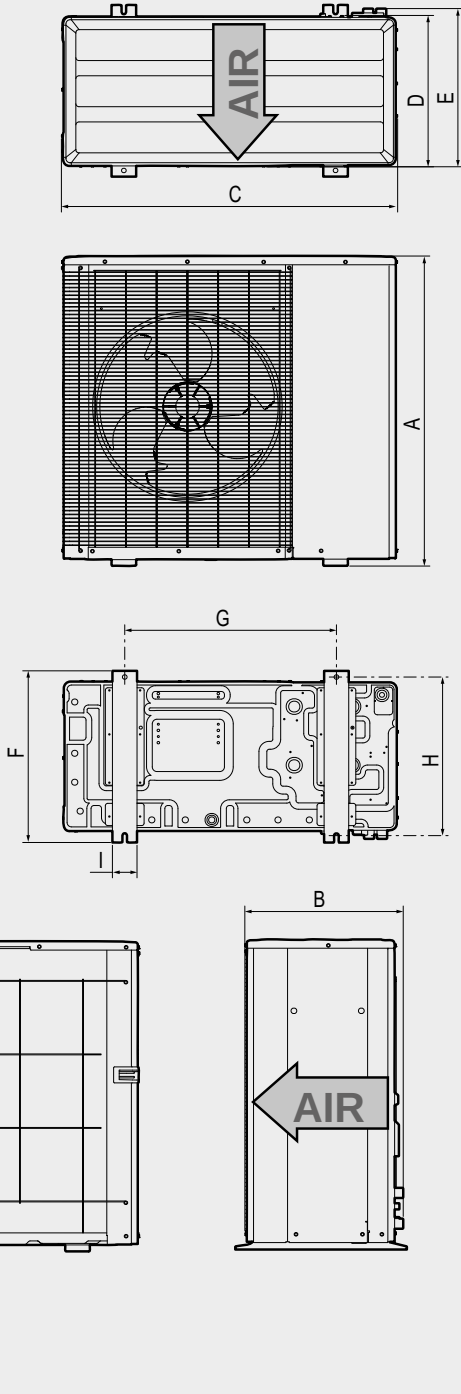
The Logic Air heat pump range is our new range of monobloc heat pumps, offering great efficiencies both in heating and hot water. The Logic Air is designed to deliver efficient, simple and reliable low carbon heating in homes throughout the UK.

Taking the learnings from the award winning Logic boiler, the Logic Air heat pump integrates seamlessly with UK homes, partnered with our best in class pre-plumbed hot water cylinder and our connected Halo Air room thermostat, the Logic Air is quick to install, easy to commission and simple to use.

Our new heat pumps are supported by our industry leading customer service and warranty team which is based in the UK and is open 364 days a year, providing customer service and technical support.

DIMENSIONS

	4kW & 5kW	8kW & 10kW
A	798	1008
B	518	518
C	1095	1095
D	499	499
E	518	518
F	558	558
G	688	688
H	516	516
I	80	80
J	184	184
K	140	140
L	95	95
M	84	84
N	48	48
O	90	90
P	103	105



KEY FEATURES

- Quiet operation
- Highly efficient: SCOP up to 5.19*
- Compatibility: radiator and underfloor heating systems
- Intuitive control: smart weather compensating controls
- Low carbon refrigerant: zero ozone depletion and low global warming potential
- Smart grid and solar PV compatible
- Monobloc technology enables easy installation and servicing
- Domestic hot water: hot, efficient and fast re-heat times with the Ideal heat pump cylinder range



HALO AIR

The Halo Air heat pump programmable room thermostat has a simple to use modern design with intelligent control.

- Simple, connected, and easy to use heat pump thermostat
- Remote control and remote diagnostics via mobile app
- Connected and non-connected options
- Time and temperature zone control

4 models:

- Halo Air RF Single Zone [234819](#)
- Halo Air RF Two Zone [234791](#)
- Halo Air Wi-Fi Single Zone [234790](#)
- Halo Air Wi-Fi Two Zone [234792](#)

Technical Specification.

			Logic Air 4kW	Logic Air 5kW	Logic Air 8kW	Logic Air 10kW
Ideal Product Code			AH750664	AH750665	AH750666	AH750667
MCS Certification No.			KIWA 00027/024 HP	KIWA 00027/023 HP	KIWA 00027/021 HP	KIWA 00027/022 HP
Heat Pump Space Heating [35°C]*	ErP Rating		A+++	A+++	A+++	A+++
	ηs		195	200	203	205
	SCOP (EN14825)		4.96	5.07	5.16	5.19
Heat Pump Space Heating [55°C]*	ErP Rating		A++	A++	A++	A++
	ηs		136	143	145	146
	SCOP (EN14825)		3.48	3.65	3.7	3.73
Heating [A 7°C / W 35°C]*	Capacity (kW)		4.0	5.0	8.2	10.3
	Power Input (kW)		0.75	0.97	1.58	2.1
	COP		5.34	5.0	5.19	4.9
Heating [A 7°C / W 55°C]*	Capacity (kW)		4.0	5.0	8.2	10.3
	Power Input (kW)		1.33	1.64	2.67	3.42
	COP		3.00	3.04	3.07	3.01
Sound Power Level (EN 12102 - 1)	35°C	db(A)	52	52	55	55
	55°C	db(A)	52	52	55	55
Pipework Connection Sizes	Heating F/R (mm)		28mm	28mm	28mm	28mm
Dimensions Outdoor Unit (mm)	Width		1095	1095	1095	1095
	Depth		521	521	518	518
	Height		798	798	1008	1008
Weight (kg)	Outdoor Unit		86	86	110	110
Electrical Data	Electrical Supply (50 Hz)		230v	230v	230v	230v
	Phase		Single Phase	Single Phase	Single Phase	Single Phase
Refrigerant Charge (kg)*	R32		0.88	0.88	1.47	1.47
Certification	EN 14511:2018, EN 14825:2016, EN 12102 - 1:2022					

*Performance data in accordance with EN 14825 : 2016, EN 12102-1 :2022, EN 14511 : 2018. The energy efficiency provided may not correspond to the actual energy once installed in a building, as the efficiency is influenced by other factors such as heat loss in the distribution system and the capacity of the products in relation to building size and characteristics.



INVESTMENT IN STATE-OF-THE ART TRAINING CENTRES

At Ideal we offer training at 16 locations throughout the UK alongside our unique mobile roadshow events. Our full time expert training managers offer a wide range of comprehensive courses, which can be customised to individual installation and service companies.

To support our UK wide training we have opened our first national training centre of excellence. With an investment of over £2m in state of the art heat pump training courses and equipment.

TRAINING LOCATIONS

OUR TRAINING CENTRES ARE ACCREDITED FOR BPEC AND CITY AND GUILDS.

Since 2012 we have invested over £10m, providing free or low-cost training to heating installers across the UK and Ireland.



SUPPORT



Design Enquiries

design.enquiries@idealheating.com



Training

enquiries@expertacademy.co.uk

01482 498660



Customer Service

01482 498660

Technical Help Line

01482 498663

idealheating.com

Ideal Heating, PO Box 103,
National Avenue,
Kingston upon Hull,
East Yorkshire, HU5 4JN
enquiries@idealheating.com

EHPT15-21X-UKHDW1S

FTC6 **Standard** Pre-Plumbed Cylinder
For Ecodan R32 Monobloc Units

R32

Key Features:

- Unvented plug & play pre-plumbed DHW cylinder
- Efficient & rapid heating
- Premium quality insulation
- Flexible 2-zone space heating control
- MELCloud enabled

Key Benefits:

- Minimal installation time
- Excellent hot water recovery times
- Reduced heat losses and running costs
- Improved comfort and reduced energy use
- Remote control, monitoring, maintenance and technical support

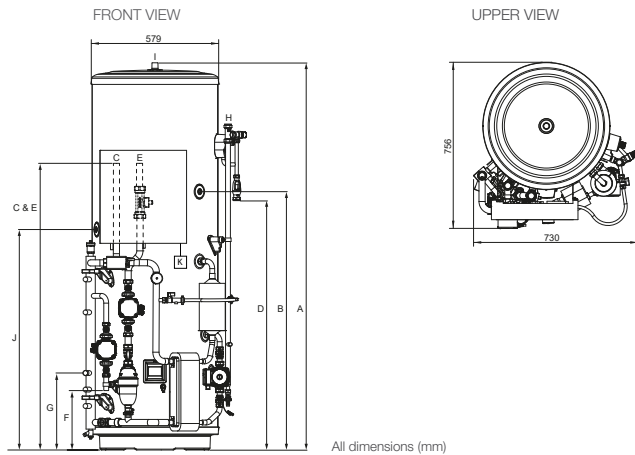
**MELCloud****ecodan**[®]
Renewable Heating Technology

CYLINDER			EHPT15X-UKHDW1S	EHPT17X-UKHDW1S	EHPT21X-UKHDW1S
NOMINAL HOT WATER VOLUME (LITRES)			150	170	210
ErP RATING			B	B	C
HEAT LOSS (kWh/24hrs)			1.15	1.23	1.53
HEAT LOSS (W)			48	51	64
WATER					
		Flow Rate (l/min) - WM 50 / 60 / 85	14 / 17 / 24	14 / 17 / 24	14 / 17 / 24
		Primary Circuit Pump		Grundfos UPM3L 25-75 130AZA	
		Heating Circuit Pump		Grundfos UPM3 AUTO 25-70 130	
		Sanitary Hot Water Pump		Grundfos UPSO 15-60 CIL2	
		Connection Size (mm) Heating / DHW	22 / 22	22 / 22	22 / 22
		Charge Pressure (MPa (Bar))	0.35 (3.5)	0.35 (3.5)	0.35 (3.5)
WATER SAFETY	Water Circuit	Control Thermistor (°C)	80	80	80
		DHW Expansion Vessel (Litres)	12	18	18
	DHW Cylinder	Control Thermistor (°C)	75	75	75
		Over Temperature Cut-Out (°C)	80 +/- 5	80 +/- 5	80 +/- 5
		Temp and Pressure Relief Valve (°C) / (MPa (Bar))	90 / 1.0 (10)	90 / 1.0 (10)	90 / 1.0 (10)
		Expansion Relief Valve (Cold) (MPa (Bar))	0.8 (8)	0.8 (8)	0.8 (8)
DIMENSIONS (mm)					
		Width	730	730	730
		Depth	756	756	756
		Height	1131	1257	1509
WEIGHT EMPTY / FULL (kg)			55/205	58/228	64/274
CYLINDER MATERIAL	Cylinder	Cylinder Material	Duplex stainless steel		
		Insulation	CFC / HCFC-free flame-retardant expanded Polyurethane		
		Insulation Thickness (mm)	60	60	60
		GWP of Insulation	3.1	3.1	3.1
		ODP of Insulation	0	0	0
ELECTRICAL DATA	Control Board - optionally powered by outdoor unit	Electrical Supply	220-240v ~, 50Hz	220-240v ~, 50Hz	220-240v ~, 50Hz
		Phase	Single	Single	Single
		Fuse Rating - MCB Sizes (A)*1	16	16	16
	Immersion Heater	Electrical Supply	220-240v ~, 50Hz	220-240v ~, 50Hz	220-240v ~, 50Hz
		Phase	Single	Single	Single
		Capacity (kW)	3	3	3
		Max Running Current (A)	13	13	13
		Fuse Rating - MCB Sizes (A)*1	16	16	16
MECHANICAL ZONES			DHW and 1 Heating Zone*2		
OPTIONAL SIMPLIFIED WIRELESS ROOM THERMOSTAT AND WIRELESS RECEIVER			PAR-WT50-E Controller and PAR-WR51-E Receiver		

*1 MCB Sizes BS EN60898-2 & BS EN60947-2 *2 Optional 2 zone accessory pack available.

Notes: Cylinder includes: Flow Temperature Controller (FTC6) with Main Controller and Temperature Sensors, Magnetic & Cyclonic Filter, Pumps & Valves for Primary Circuit and Zone 1 and DHW use, Flow Sensor, Plate Heat Exchanger, Scale Trap, 3kW Immersion Heater, Expansion Vessel, Diverter Valve and Low Loss Header.

EHPT15-21X-UKHWD1S DIMENSIONS

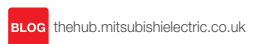
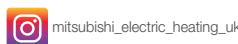


KEY			
A	OVERALL HEIGHT		
B	SECONDARY RETURN TAPPING (NOT FITTED TO EHPT15X-UKHWD1S/ EHPT17X-UKHWD1S)		
C	HEAT PUMP FLOW CONNECTION (22mm O/D COPPER)		
D	TUNDISH OUTLET CONNECTION (22mm COMPRESSION)		
E	HEAT PUMP RETURN CONNECTION (22mm O/D COPPER)		
F	HEATING ZONE 1 CIRCUIT FLOW CONNECTION (22mm O/D COPPER)		
G	HEATING ZONE 1 CIRCUIT RETURN CONNECTION (22mm O/D COPPER)		
H	COLD WATER INLET CONNECTION (22mm COMPRESSION)		
I	HOT WATER OUTLET CONNECTION (22mm COMPRESSION / 3/4" BSP M)		
J	THW5A SENSOR POCKET		
K	WI-FI ADAPTOR (INCLUDED, INSTALLER TO LOCATE AND MOUNT)		

Capacity	150	170	210
A	1131	1257	1509
B	Not Fitted	Not Fitted	1050
C	1122	1122	1122
D	505	630	880
E	1122	1122	1122
F	194	194	194
G	350	350	350
J	675	815	925
K	Installer to locate and mount		



Telephone: 01707 282880
email: heating@meuk.mee.com
ecodan.co.uk



UNITED KINGDOM Mitsubishi Electric Europe Living Environment Systems Division, Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, England. Telephone: 01707 282880 Fax: 01707 278881
IRELAND Mitsubishi Electric Europe, Westgate Business Park, Ballymount, Dublin 24, Ireland. Telephone: (01) 419 8800 Fax: (01) 419 8890 International code: (003531)

Country of origin: United Kingdom - Japan - Thailand - Malaysia. ©Mitsubishi Electric Europe 2022. Mitsubishi and Mitsubishi Electric are trademarks of Mitsubishi Electric Europe B.V. The company reserves the right to make any variation in technical specification to the equipment described, or to withdraw or replace products without prior notification or public announcement. Mitsubishi Electric is constantly developing and improving its products. All descriptions, illustrations, drawings and specifications in this publication present only general particulars and shall not form part of any contract. All goods are supplied subject to the Company's General Conditions of Sale, a copy of which is available on request. Third-party product and brand names may be trademarks or registered trademarks of their respective owners.

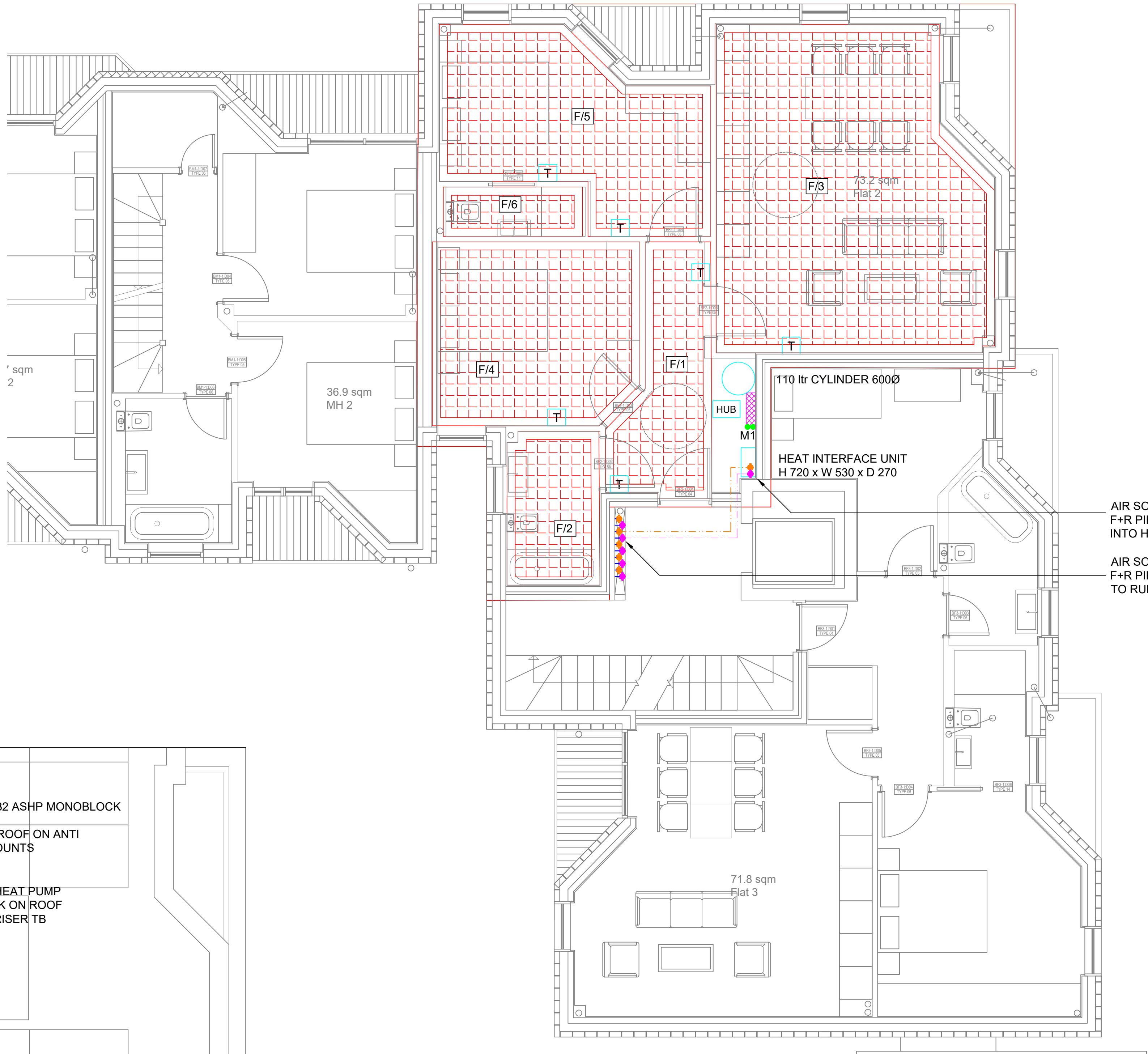
Note: Refer to 'Installation Manual' and 'Instruction Book' for further 'Technical Information'. The fuse rating is for guidance only and please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R513A (GWP:631), R454B (GWP:466), R1234ze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No.626/2011 from IPCC 3rd edition, these are as follows. R410A (GWP:1975), R32 (GWP:550), R407C (GWP:1650) or R134a (GWP:1300).

Effective as of August 2022



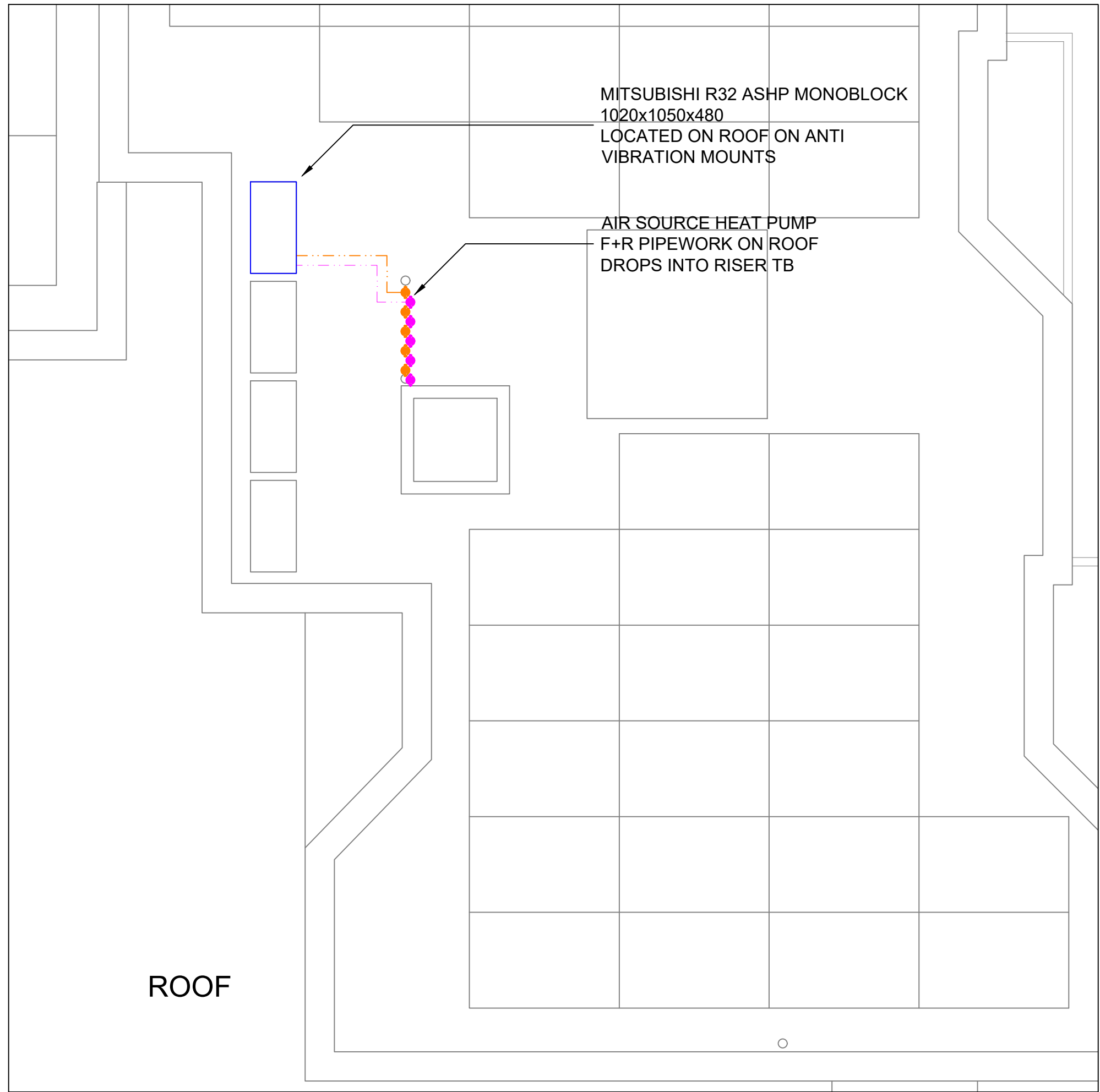
APPENDIX F

Heating Legend:	
	Heatmaster NEO E Electric Underfloor Heating Controller, With floor sensor
	Heatmaster NEO Heating Controller, supplied with button sensor
	Heatmaster NEO Hub
	Thermistor Sensor
	Button Sensor
	Electric Underfloor Heating
	Wet Underfloor Heating
	Underfloor Heating Manifold
	Surface Mounted Panel Radiators
	Heating Flow
	Heating Return
	ASHP Refrigeration Flow
	ASHP Refrigeration Return



AIR SOURCE HEAT PUMP
F+R PIPEWORK AT HL DROP
INTO HEAT INTERFACE UNIT

AIR SOURCE HEAT PUMP
F+R PIPEWORK FA IN RISER
TO RUN AT HL INTO FLAT



ROOF

WET AND ELECTRIC UNDERFLOOR HEATING SCHEDULE					
FLAT B2					
REF. No.	Area Served	Type	Area of Heating (m²)	Output W/m²	Total Output (W)
F/1	HALL	WET	6.7m²	30	201
F/2	BATHROOM	WET	4.7m²	30	141
F/3	KITCHEN/LOUNGE	WET	28m²	30	840
F/4	BEDROOM 1	WET	12.5m²	30	375
F/5	BEDROOM 2	WET	14m²	30	420
F/6	EN-SUITE	WET	2.3m²	30	69

MANIFOLD SCHEDULE			
FLAT B2			
REF. No.	AREA SERVED	AREA OF HEATING (m²)	TOTAL OUTPUT (W)
M/1	F/1, F/2, F/3, F/4, F/5, F/6	68.2	2046

GENERAL NOTES:

- This drawing is not an Architects drawing and must not be interpreted as such.
- Do not scale off this drawing.
- This drawing must not be used for construction or installation purposed unless stated.
- All dimensions must be verified on site before completing shop drawings or setting out the work.
- This drawing is to be read in conjunction with the relevant technical specifications.
- This drawing is to be read in conjunction with Architectural and Structural Engineers drawings.

HW - Hot Water	NRV - Non Return Valve
HL - High Level	S/C - Stop Cock
LL - Low Level	C/V - Control Valve
TA - To Above	DRV - Double Regulating Valve
TB - To Below	LSV - Lock Shield Valve
FA - From Above	IV - Isolation Valve
FB - From Below	STR - Strainer
SS - Stub Stack	HTG - Heating
AAV - Air Admittance Valve	CW - Cold Water
SVP - Soil Vent Pipe	TD - Tundish
DCV - Double Check Valve	F - Flow
SV - Solenoid Valve	R - Return
NRV - Non Return Valve	
PRV - Pressure Relief Valve	
Pipes Hidden H/L	-----
Pipes Hidden L/L	-----
Pipes Exposed H/L	-----
Pipes Solid L/L	-----

T2	Refrigeration pipes marked for clarity.	06/08/2024
T1	Architects layout updated.	23/05/2024
T0	TENDER ISSUE	19/12/2023
REV	MODIFICATIONS	DATE

CARNELL
WARREN

ASSOCIATES

DUKE HOUSE, DUKE STREET, WOKING, GU215BA
PROJECTS@CARNELLWARREN.CO.UK 01483 730995

PROJECT
HORNSEY POLICE
STATION

TITLE
BLOCK B
FLAT B2 TYPICAL
HEATING SERVICES

CLIENT
DIXON8 LIMITED

SCALE @ A1 1:50	DATE DEC '23	DRN JK
--------------------	-----------------	-----------

DRAWING NO. 1982/M/101F	REV. T2
----------------------------	------------

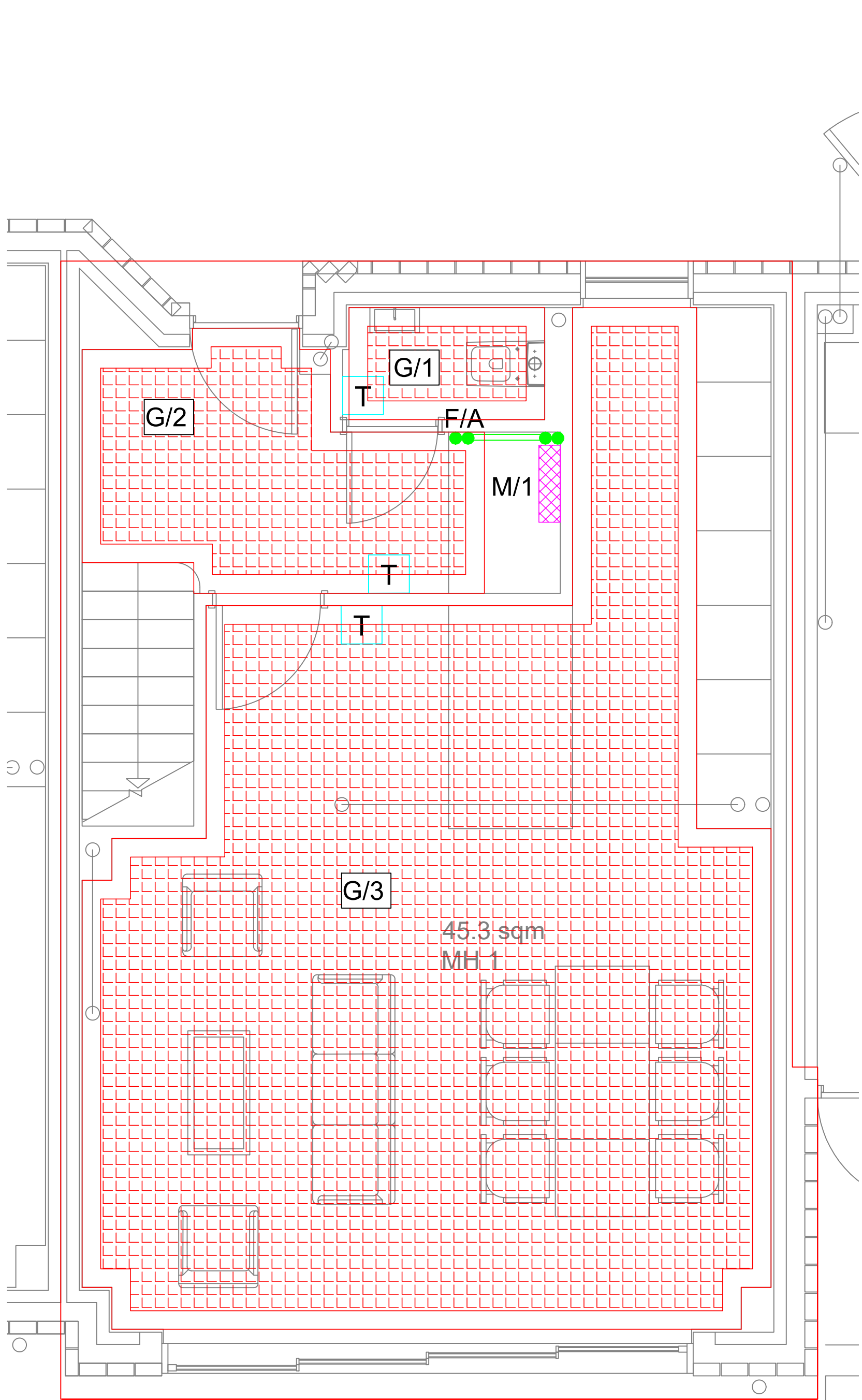
Heating Legend:	
	Heatmiser NEO E Electric Underfloor Heating Controller. With floor sensor
	Heatmiser NEO Heating Controller. Equipped with button sensor
	Heatmiser NEO Hub
	Thermistor Sensor
	Button Sensor
	Electric Underfloor Heating
	Wet Underfloor Heating
	Underfloor Heating Manifold
	Surface Mounted Panel Radiators
	Heating Flow
	Heating Return
	ASHP Refrigeration Flow
	ASHP Refrigeration Return

WET UNDERFLOOR HEATING SCHEDULE					
GROUND FLOOR					
REF. No.	Area Served	Type	Area of Heating (m²)	Output W/m²	Total Output (W)
G/1	W/C	WET	1.4m²	30	42
G/2	HALLWAY	WET	4.4m²	30	132
G/3	KITCHEN/LOUNGE	WET	34m²	30	1020

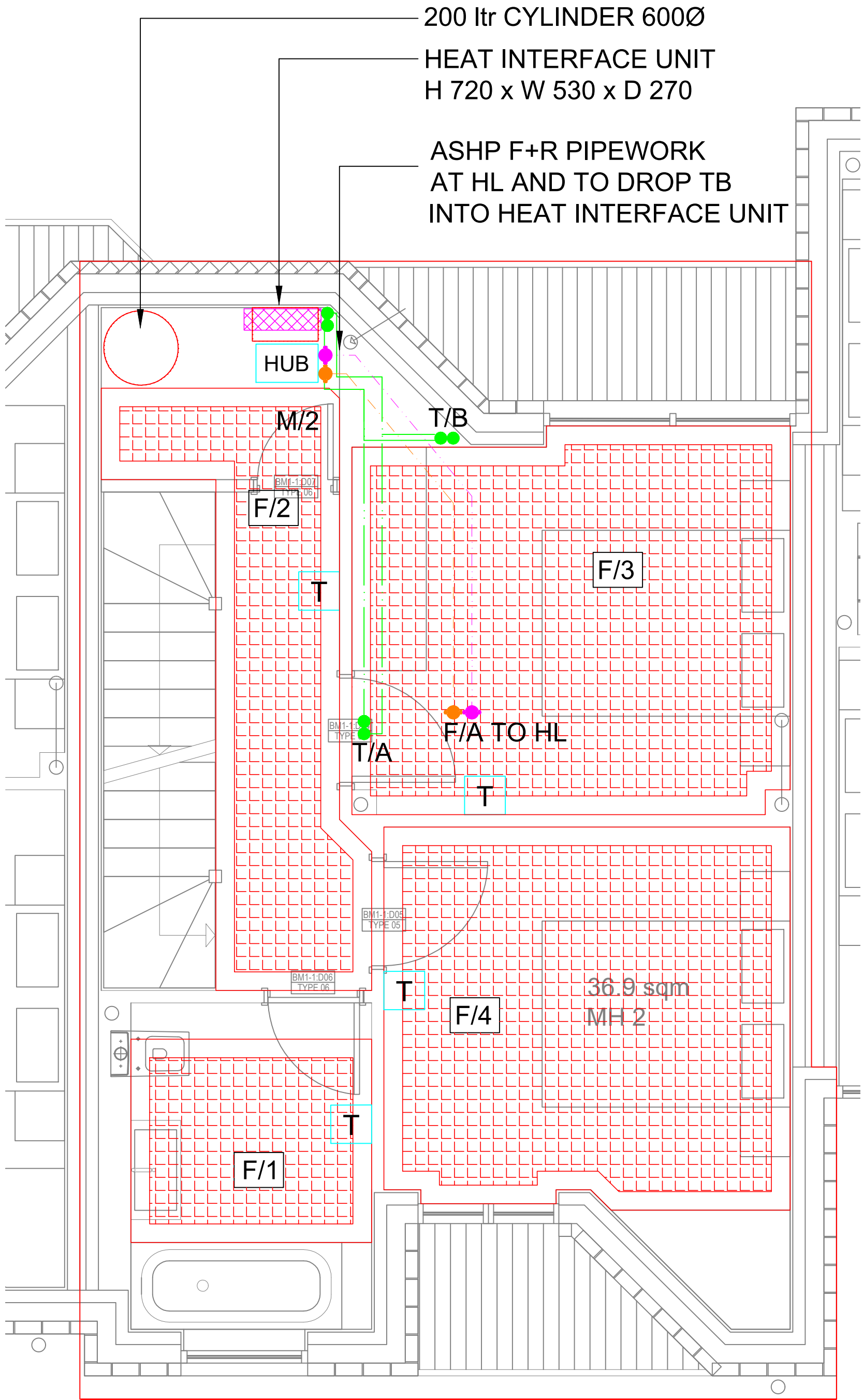
MANIFOLD SCHEDULE			
GROUND FLOOR			
REF. No.	AREA SERVED	AREA OF HEATING (m²)	TOTAL OUTPUT (W)
M/1	G/1, G/2, G/3	39.8	1194

WET UNDERFLOOR HEATING SCHEDULE					
FIRST FLOOR					
REF. No.	Area Served	Type	Area of Heating (m²)	Output W/m²	Total Output (W)
F/1	W/C	WET	4.5m²	30	135
F/2	HALLWAY	WET	7.8m²	30	234
F/3	BEDROOM 1	WET	10.8m²	30	324
F/4	BEDROOM 2	WET	9.9m²	30	297

MANIFOLD SCHEDULE			
FIRST FLOOR			
REF. No.	AREA SERVED	AREA OF HEATING (m²)	TOTAL OUTPUT (W)
M/2	F/1, F/2, F/3, F/4	33	990



GROUND FLOOR



FIRST FLOOR

GENERAL NOTES:

- This drawing is not an Architects drawing and must not be interpreted as such.
- Do not scale off this drawing.
- This drawing must not be used for construction or installation purposed unless stated.
- All dimensions must be verified on site before completing shop drawings or setting out the work.
- This drawing to be read in conjunction with the relevant technical specifications.
- This drawing is to be read in conjunction with Architectural and Structural Engineers drawings.

HW - Hot Water	NRV - Non Return Valve
HL - High Level	S/C - Stop Cock
LL - Low Level	C/V - Control Valve
TA - To Above	DRV - Double Regulating Valve
TB - To Below	LSV - Lock Shield Valve
FA - From Above	IV - Isolation Valve
FB - From Below	STR - Strainer
SS - Stub Stack	HTG - Heating
AAV - Air Admittance Valve	CW - Cold Water
SVP - Soil Vent Pipe	TD - Tundish
DCV - Double Check Valve	F - Flow
SV - Solenoid Valve	R - Return
NRV - Non Return Valve	
PRV - Pressure Relief Valve	
Pipes Hidden H/L	-----
Pipes Hidden L/L	-----
Pipes Exposed H/L	-----
Pipes Solid L/L	-----

T2	Refrigeration pipes marked for clarity.	06/08/2024
T1	Architect layout updated.	23/05/2024
T0	TENDER ISSUE	19/12/2023
REV	MODIFICATIONS	DATE

CARNELL
WARREN

ASSOCIATES

DUKE HOUSE, DUKE STREET, WOKING, GU215BA
PROJECTS@CARNELLWARREN.CO.UK 01483 730995

PROJECT
HORNSEY POLICE
STATION

TITLE
MEWS TYPICAL HOUSE
GROUND AND FIRST
FLOOR
HEATING SERVICES

CLIENT
DIXON8 LIMITED

SCALE @ A1
NTS

DATE
DEC '23

DRN
JK

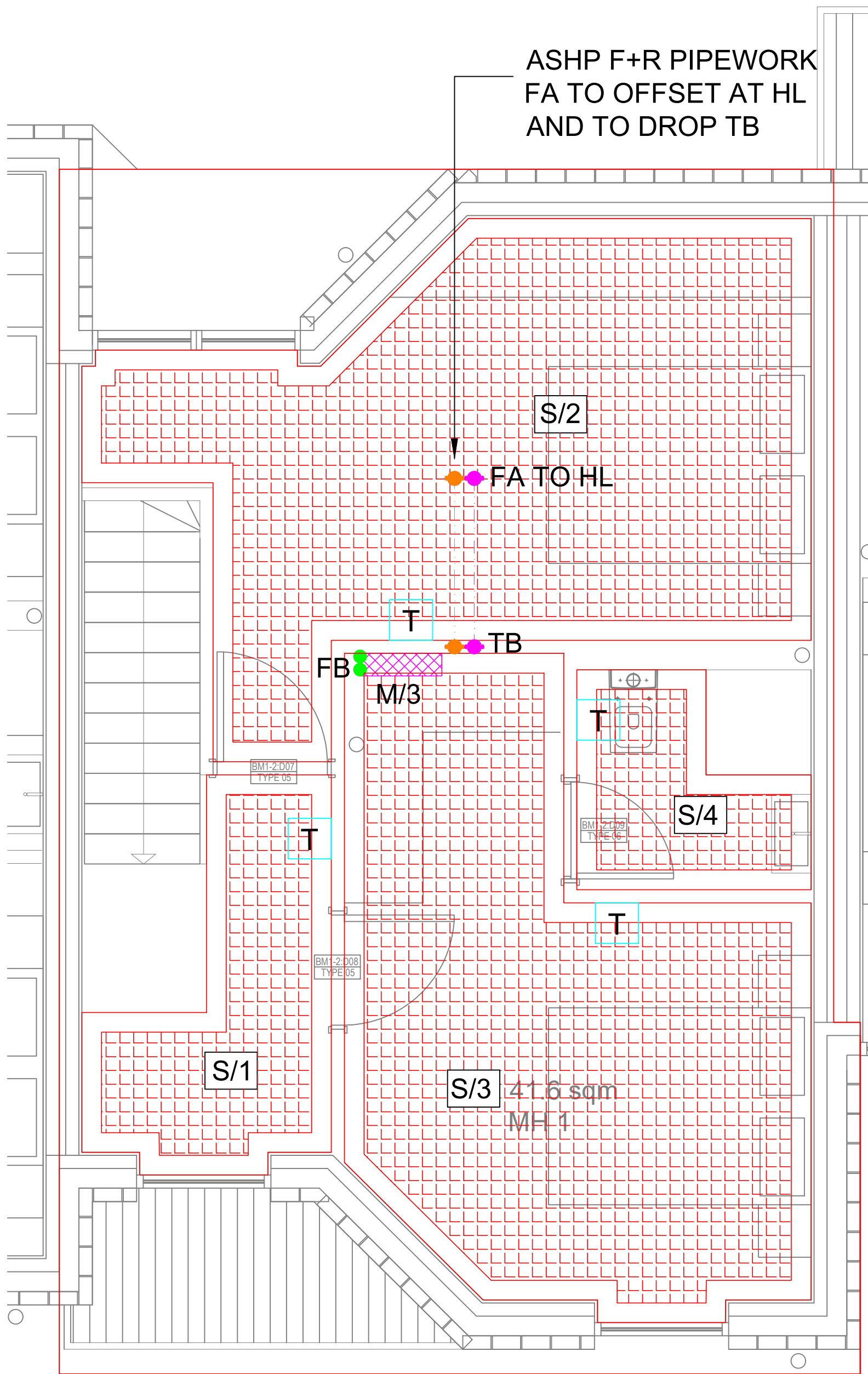
DRAWING NO.
1982/M/102H

REV.
T2

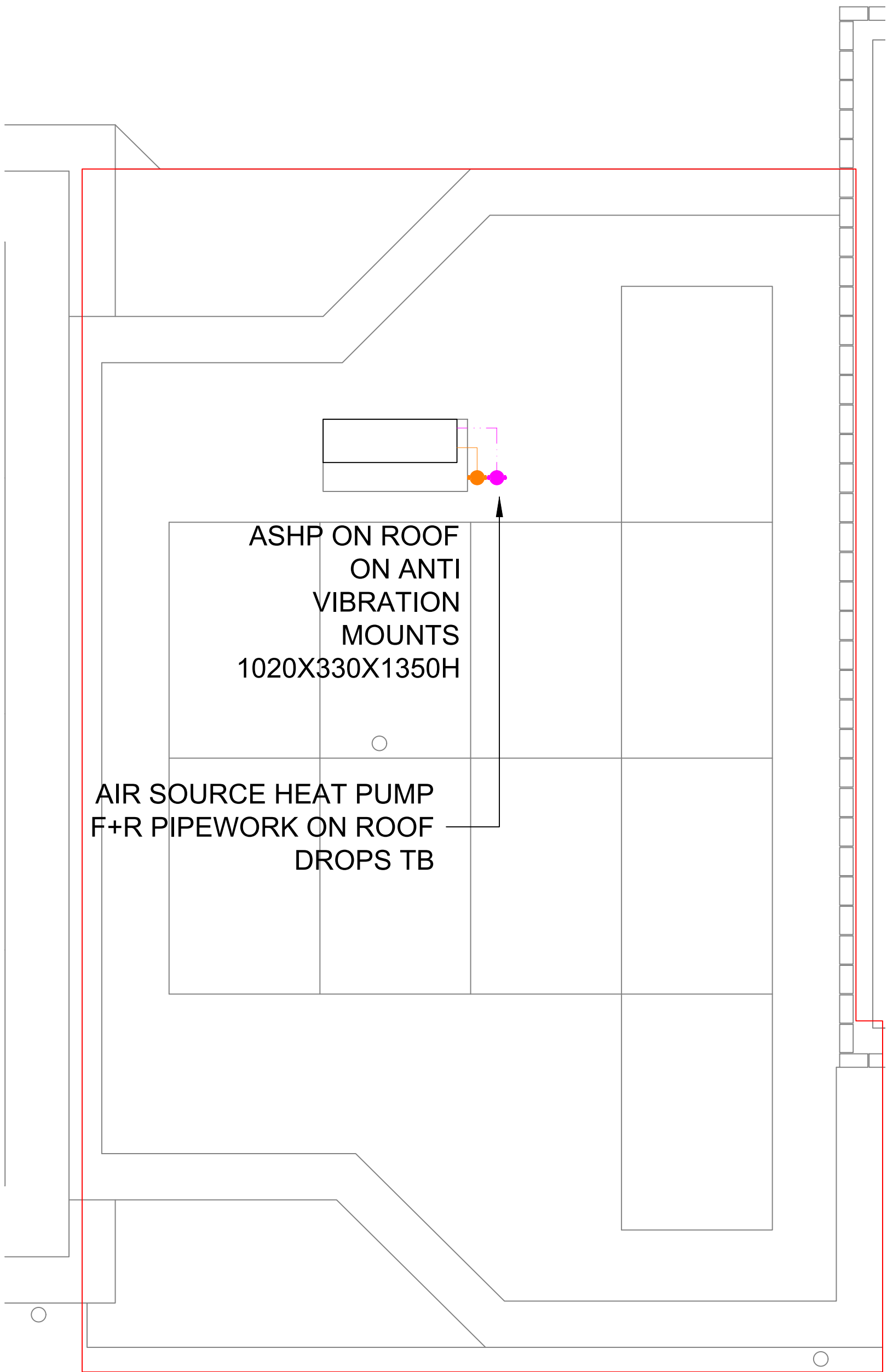
Heating Legend:	
	Heatmiser NEO E Electric Underfloor Heating Controller, with floor sensor
	Heatmiser NEO Heating Controller, supplied with button sensor
	Heatmiser NEO Hub
	Thermistor Sensor
	Button Sensor
	Electric Underfloor Heating
	Wet Underfloor Heating
	Underfloor Heating Manifold
	Surface Mounted Panel Radiators
	Heating Flow
	Heating Return
	ASHP Refrigeration Flow
	ASHP Refrigeration Return

WET UNDERFLOOR HEATING SCHEDULE					
SECOND FLOOR					
REF. No.	Area Served	Type	Area of Heating (m²)	Output W/m²	Total Output (W)
S/1	HALLWAY	WET	4m²	30	120
S/2	BEDROOM 3	WET	15m²	30	450
S/3	BEDROOM 4	WET	13.5m²	30	405
S/4	EN-SUITE	WET	3m²	30	90

MANIFOLD SCHEDULE			
SECOND FLOOR			
REF. No.	AREA SERVED	AREA OF HEATING (m²)	TOTAL OUTPUT (W)
M/3	S/1, S/2, S/3, S/4	355	1065



SECOND FLOOR



ROOF

GENERAL NOTES:

- This drawing is not an Architects drawing and must not be interpreted as such.
- Do not scale off this drawing.
- This drawing must not be used for construction or installation purposed unless stated.
- All dimensions must be verified on site before completing shop drawings or setting out the work.
- This drawing to be read in conjunction with the relevant technical specifications.
- This drawing is to be read in conjunction with Architectural and Structural Engineers drawings.

HW - Hot Water	NRV - Non Return Valve
HL - High Level	S/C - Stop Cock
LL - Low Level	C/V - Control Valve
TA - To Above	DRV - Double Regulating Valve
TB - To Below	LSV - Lock Shield Valve
FA - From Above	IV - Isolation Valve
FB - From Below	STR - Strainer
SS - Stub Stack	HTG - Heating
AAV - Air Admittance Valve	CW - Cold Water
SVP - Soil Vent Pipe	TD - Tundish
DCV - Double Check Valve	F - Flow
SV - Solenoid Valve	R - Return
NRV - Non Return Valve	
PRV - Pressure Relief Valve	
Pipes Hidden H/L	-----
Pipes Hidden L/L	-----
Pipes Exposed H/L	-----
Pipes Solid L/L	-----

T2	Refrigeration pipes marked for clarity.	06/08/2024
T1	Architect layout updated.	23/05/2024
T0	TENDER ISSUE	19/12/2023
REV	MODIFICATIONS	DATE

CARNELL
WARREN

ASSOCIATES

DUKE HOUSE, DUKE STREET, WOKING, GU215BA
PROJECTS@CARNELLWARREN.CO.UK 01483 730995

PROJECT
HORNSEY POLICE
STATION

TITLE
MEWS TYPICAL HOUSE
FIRST FLOOR
HEATING SERVICES

CLIENT
DIXON8 LIMITED

SCALE @ A1
1:50

DATE
DEC '23

DRN
JK

DRAWING NO.
1982/M/103H

REV.
T2

APPENDIX G

Lo-Carbon Sentinel Kinetic Plus

- Acoustic Enclosure option for reduced breakout noise
- Acoustic Top Box option for reduced in-duct noise
- Recognised in SAP PCDB
- Horizontal duct option for space-saving installations
- High airflow, ideal for student accommodation clusters
- Unique folding filter for removal when access is restricted
- Integrated digital controller for simple and accurate commissioning
- Plug and play controls; Humidistat
- BMS connectivity
- LS inputs (Light Switch)
- Volt-free inputs
- Self diagnosis for simplified fault finding
- Adjustable delay On/delay Off timer
- 4 fully adjustable speeds and a purge setting



Increased Performance

The Sentinel Kinetic Plus benefits from the latest high efficiency, backward curved impeller design, ensuring the lowest possible energy consumption, ultra quiet operation and an exceptional performance range covering small one bed apartments to the largest of houses.

For scenarios where noise is a critical issue, an Acoustic Enclosure is available to reduce breakout noise and the Acoustic Top Box will reduce in-duct noise at key frequencies.

Care Homes & Student Accommodation

The Sentinel Kinetic Plus is ideal for larger homes and multiple occupancy units such as care homes and student accommodation. Capable of 400m³/hr at 150Pa, the unit can extract from up to ten bathrooms and a communal kitchen while still achieving almost 90% heat recovery. The fully automatic capability of the Kinetic range means that adequate ventilation is always achieved.

The Kinetic's BMS capability is also ideal for those commercial applications where landlords or property managers want to monitor and optimise building performance and maintenance. The Kinetic BMS can provide status information and its self diagnostics can report if any fault is found.

Spigot Options

Spigots may be re-positioned to give horizontal connection or a combination of vertical and horizontal connection.

Optional 180mm/200mm spigots can simplify connection in commercial installations where larger diameter duct work has been used.

Quick Change Filter

As many systems are placed within cupboards the unique filter design folds as you remove it to ensure easy access in restricted spaces.

Integral Humidity Sensor

The integral humidity sensor increases speed in proportion to relative humidity levels, saving energy and reducing noise. The sensor also reacts to small but rapid increases in humidity, even if the normal trigger threshold is not reached. This unique feature ensures adequate ventilation, even for the smallest wet room. The night time relative humidity setback feature suppresses nuisance tripping as humidity gradually increases with falling temperature.

Models

Model	Stock Ref
Sentinel Kinetic Plus BS	447938
Sentinel Kinetic Plus Right	443028
Sentinel Kinetic Plus Right with Acoustic Top Box & Enclosure	479538
Sentinel Kinetic Plus Right with Acoustic Top Box	479537
Sentinel Kinetic Plus Right with Acoustic Enclosure	479536
Sentinel Kinetic Plus Left	443028L
Sentinel Kinetic Plus Left with Acoustic Top Box & Enclosure	479541
Sentinel Kinetic Plus Left with Acoustic Top Box	479540
Sentinel Kinetic Plus Left with Acoustic Enclosure	479539

Accessories

Model	Stock Ref
Wired Remote Controller	443283
LED Alarm with 15m cable	448356
Opto-coupler for volt-free BMS connection	447340
ISO 45% Coarse (G3) 2x Filter	403702
ISO ePM10 50% Pollen (M5) 1x Filter	444201
180mm/200mm Spigot Kit (One per pack)	446523
Anti Vibration Mounts	68MP033G
Acoustic Purge Fan	477988
Acoustic Purge Fan XL	479829

SAP PCDB Test Results (Kinetic Plus BS)

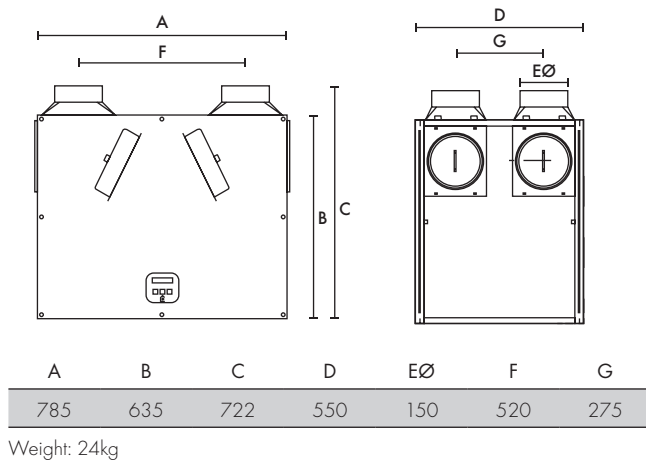
	SAP 2009		SAP 2012	
	Thermal Efficiency %	SFP (W/l/s)	Thermal Efficiency %	SFP (W/l/s)
K+1	91	0.51	91	0.42
K+2	91	0.40	91	0.44
K+3	90	0.41	90	0.52
K+4	90	0.45	90	0.63
K+5	90	0.53	90	0.76
K+6	90	0.60	91	0.90
K+7	90	0.70	91	1.05

SEC Class

Model	SEC Class
Kinetic Plus	A+

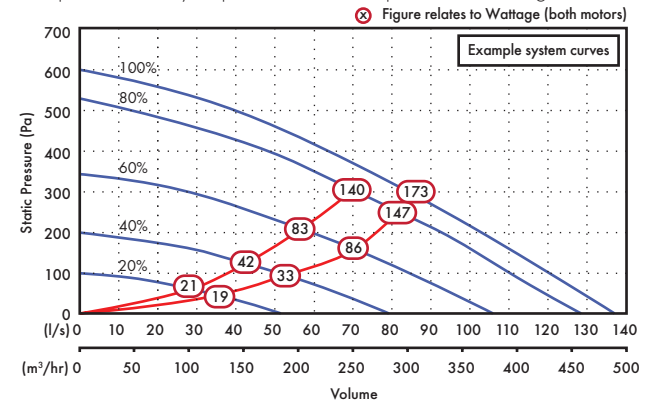
Dimensions (mm)

Unit

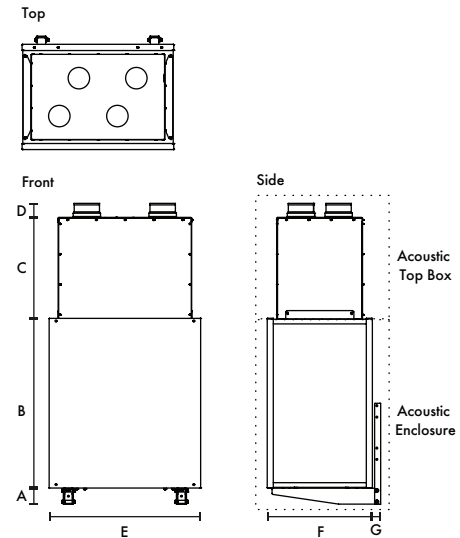


Performance

Fan speeds are fully adjustable within the performance range.



Acoustic Solution



Acoustic Top Box							Acoustic Enclosure		
A	B	C	D	E	F	G	kg	kg	Spigot
80	733	501	71	855	583	40	17	33	150

Sound Data (Unit only)

Unit setting	Test mode	Octave band, Hz, dB SWL										SPL dB(A)	
		63	125	250	500	1k	2k	4k	8k	LwA	at 3m		
20%	Supply	54.4	60.9	50.6	45.9	34.3	23.6	19.1	24.5	51.3	30.8		
	Extract	48.4	56.7	43.7	35.9	21.4	16	18.7	24.5	42.3	24.8		
	Breakout	42.6	40.2	39.6	38	31.1	24.3	19.4	24.6	35.1	17.6		
40%	Supply	61.6	64.6	58.4	55.5	45.9	37.2	24.7	25.1	58.8	38.3		
	Extract	54.9	62.2	51.5	44.8	32.1	24.1	19.7	24.6	48.8	31.3		
	Breakout	51.1	49.3	48.9	45.9	41.3	35.7	26.7	25.6	44.0	26.5		
60%	Supply	67.5	67.5	73.2	62.4	53.4	47.5	33.5	28.3	69.2	48.7		
	Extract	62.5	61.7	60.1	51.1	39.2	32.1	23.2	24.8	54.0	36.5		
	Breakout	54.9	53	58.4	55.1	49.7	43.9	35.4	31.9	52.8	35.3		
80%	Supply	70.5	71.1	73.8	66.5	58.3	53.2	39.7	33.3	71.3	50.8		
	Extract	68.4	65.9	71.8	55.6	43.6	37.1	27.3	25.5	63.8	46.3		
	Breakout	59.2	56.8	63.6	57.3	54.2	49	41	37.5	56.8	39.3		
100%	Supply	72.8	73.1	75.2	70.4	61.6	56.6	44.2	37.6	73.9	53.4		
	Extract	71.7	69	71.8	57.4	45.7	39.9	30.9	26.6	64.1	46.6		
	Breakout	61.2	58.8	67.9	59.6	56.7	52.2	44.4	41.2	60.1	42.6		

Sound Data (Unit with Acoustic Solution)

Unit setting	Test mode	Octave band, Hz, dB SWL										SPL dB(A)	
		63	125	250	500	1k	2k	4k	8k	LwA	at 3m		
20%	Supply	55.7	49.2	36.6	23.6	17.4	14.9	17.8	23.3	36.1	18.6		
	Extract	51.4	42.4	30.3	20.9	16.8	14.9	17.8	23.3	30.8	13.3		
	Breakout	37.4	39.7	30.0	22.7	15.6	14.0	17.9	23.3	28.4	7.9		
40%	Supply	59.7	59.7	45.5	32.2	22.2	15.2	17.9	23.3	45.1	27.6		
	Extract	54.8	55.0	38.0	26.8	18.1	14.9	17.8	23.3	40.2	22.7		
	Breakout	45.7	48.5	39.9	32.8	24.2	17.5	18.0	23.4	36.8	16.3		
60%	Supply	66.1	61.9	53.6	41.0	29.8	18.3	18.0	23.3	49.5	32.0		
	Extract	60.6	55.9	48.4	34.9	23.8	16.3	17.9	23.3	43.8	26.3		
	Breakout	51.1	51.0	52.4	40.9	33.2	26.1	19.7	23.4	44.5	24.0		
80%	Supply	70.0	67.6	68.5	48.1	37.9	25.3	19.4	23.6	60.7	43.2		
	Extract	65.4	59.7	57.2	41.6	31.3	21.8	19.2	23.4	50.4	32.9		
	Breakout	55.6	55.6	57.9	47.9	40.4	34.3	26.1	23.7	51.3	30.8		
100%	Supply	72.1	70.1	66.4	51.6	41.9	29.7	21.7	24.0	60.0	42.5		
	Extract	68.2	62.4	60.6	45.5	36.0	26.6	21.7	23.6	53.8	36.3		
	Breakout	57.6	58.8	63.3	51.0	44.2	38.5	31.0	24.9	56.3	35.8		

Tested according to BS EN 13141-7:2010. Breakout quoted spherical. Supply and Extract quoted hemispherical. For in-duct data, end reflections are added based on the spigot size of the unit.

Consultant's Specification

Operation

The supply and extract ventilation unit shall be as Sentinel Kinetic Plus as manufactured by Vent-Axia and shall be sized as indicated on the drawings and shall be in accordance with the particular specification.

Supply air to the room shall be pre-heated by the extract air via the integrated composite plastic counterflow heat recovery cell. The Sentinel Kinetic Plus shall automatically vary the ventilation rate via EC/DC motors, as it receives signals from one of the optional interconnected sensors.

When a signal is received, the fans shall either vary their speed proportionally or on a trickle and boost principle.

The unit shall have the facility to commission the supply and extract fans individually via in-built minimum and maximum speed adjustment, or alternative wired remote control unit. The fans themselves shall have independent, infinitely variable speed control.

Unit Specification

The unit shall be manufactured with an ABS outer case construction, and incorporate a reversible core to allow for left or right hand mounting.

The unit shall have a high efficiency composite plastic counterflow heat exchanger, supply and extract filters, automatic summer bypass, integral minimum and maximum infinitely variable speed controls with fascia mounted failure indication.

The unit shall have low energy, high efficiency EC/DC fan/motor assemblies with sealed for life bearings. The impellers shall be high efficiency backward curved centrifugal type.

The unit shall have a heat exchanger cell with a thermal efficiency of up to 92% when tested to EN 308. This shall be protected by ISO 45% Coarse (G3) grade synthetic filters on supply and extract. Complete with a condensate drip tray and drain connection.

To reduce breakout noise, the MVHR unit shall be provided with an Acoustic Enclosure of steel construction lined with class 'O' acoustic foam. To reduce in-duct noise, the top of the MVHR shall be fitted with an Acoustic Top Box to provide attenuation to the 4 ducts of the unit. This Acoustic Top Box shall be of steel construction lined with acoustic class 'O' foam with the MVHR spigots linked to the Top Box via 4 separate attenuated ducts. The acoustic enclosure and top box shall each be independently tested for noise to BS EN 13141-7.

The unit shall be constructed with a removable Core allowing full maintenance access. The removable Core shall provide access to the following:

- ✓ Supply and extract filter
- ✓ Heat exchanger
- ✓ Access to the electrical connections

Access shall be provided for wiring termination and setup/commissioning. The backlit LCD user interface therein may be duplicated for remote mounting if required.

Units shall be as manufactured by Vent-Axia Ltd.

The MVHR unit shall incorporate an Expanded Polystyrene (EPS) inner chassis with custom motor and impeller mounting features. The inner chassis will assist in reducing noise and act as a large anti-vibration mount to avoid transmission through to the back mounting plate or the base of the unit.

The MVHR unit shall be tested to ensure it meets the maximum allowable vibration of no more than 1 mm/s, measured on the unit wall fixing points.

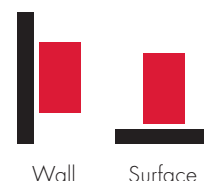
Sound tested to BS EN 13141-7:2010

Standard Controls

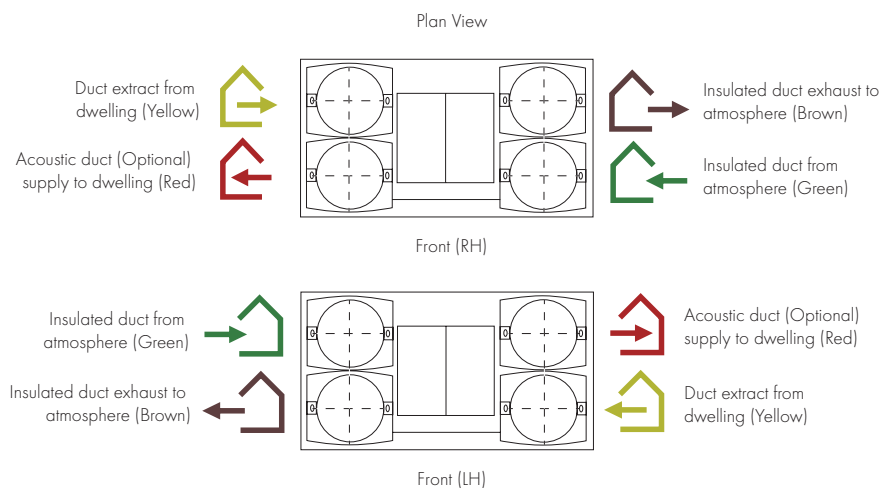
All Sentinel Kinetic units shall incorporate the following functions integrally mounted, pre-wired and factory fitted by the manufacturer:

- ✓ Integral infinitely variable fan speed control on supply and extract
- ✓ Integral min/max ventilation control/set point
- ✓ Integral BMS input/output interfaces – control and status indication
- ✓ Heating interlocks
- ✓ 0-10V proportional speed adjustment
- ✓ Volt free contacts
- ✓ 24V sensor supply
- ✓ Integral on/off or trickle boost function from remote switch, e.g. PIR occupancy detector
- ✓ Fully automatic summer bypass
- ✓ Switched Live input with adjustable 'delay-on' feature
- ✓ Fan failure or component failure indicated via individual fault code display
- ✓ Running time counter
- ✓ Control panel PIN number lock
- ✓ Automatic frost protection effective to -20°C
- ✓ The unit shall incorporate an integral humidity sensor with the following features:
 - Ambient Response; Raises the humidity trigger point as dwelling temperature reduces
 - Rapid Response: Monitors the rate of change in humidity and triggers increased airflow even if the humidity trigger threshold is not reached
 - Proportional Response; Incrementally increases the fan speed to reduce noise and reduce energy consumption
- ✓ The unit shall be controlled by the 'Sentinel' control devices (enablers and sensors) as detailed in the schedule or on the drawings.
- ✓ Tool free filter access

Mounting Option

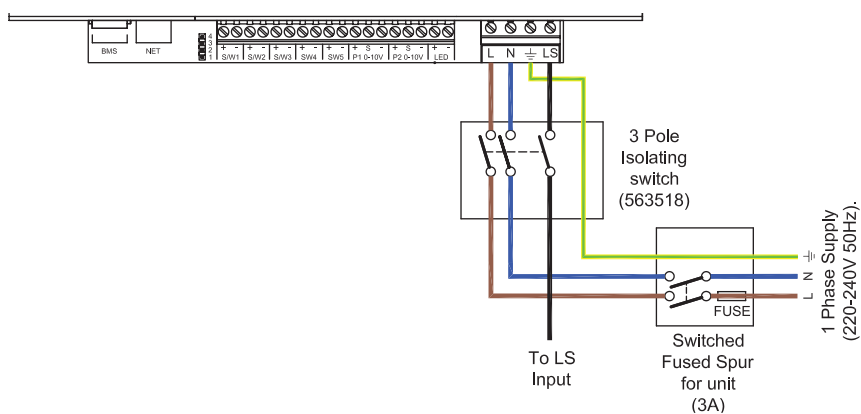


Airflow Direction

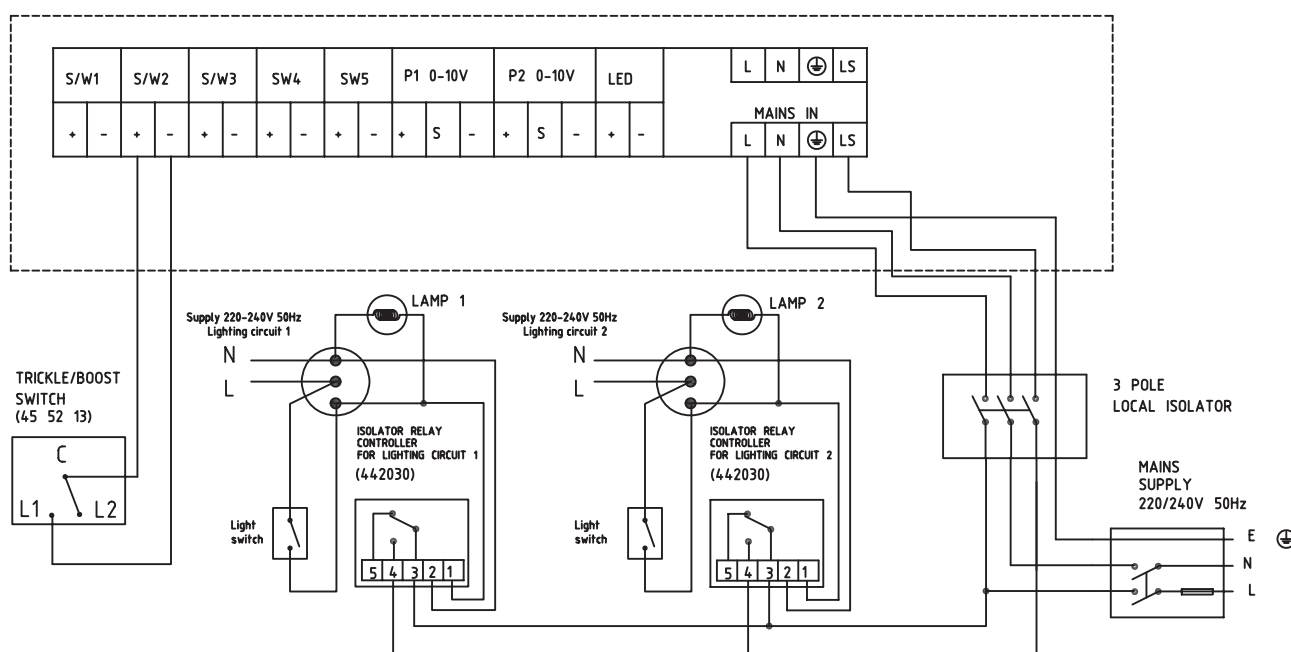


Electrical Connection

Please note: Electrical connection should be carried out by an appropriately qualified person and in accordance with current wiring regulations.



Trickle to Boost by two lighting circuits or Trickle/Boost Switch



APPENDIX H

Ventilation Legend:

- Dahkin AC Controller
- Dahkin Touch Hub
- Refrigerant Pipes
- Return Air Duct
- Supply Air Duct
- Exhaust Air Duct - To Outside
- Fresh Air Intake Duct - From Outside
- Standard 600mm Attenuator

GENERAL NOTES:

- This drawing is not an Architects drawing and must not be interpreted as such.
- Do not scale off this drawing.
- This drawing must not be used for construction or installation purposed unless stated.
- All dimensions must be verified on site before completing shop drawings or setting out the work.
- This drawing to be read in conjunction with the relevant technical specifications.
- This drawing is to be read in conjunction with Architectural and Structural Engineers drawings.

HW - Hot Water	NRV - Non Return Valve
HL - High Level	S/C - Stop Cock
LL - Low Level	C/V - Control Valve
TA - To Above	DRV - Double Regulating Valve
TB - To Below	LSV - Lock Shield Valve
FA - From Above	IV - Isolation Valve
FB - From Below	STR - Strainer
SS - Stub Stack	HTG - Heating
AAV - Air Admittance Valve	CW - Cold Water
SVP - Soil Vent Pipe	TD - Tundish
DCV - Double Check Valve	F - Flow
SV - Solenoid Valve	R - Return
NRV - Non Return Valve	
PRV - Pressure Relief Valve	
Pipes Hidden H/L	-----
Pipes Hidden L/L	-----
Pipes Exposed H/L	-----
Pipes Solid L/L	-----

OVERHEATING EXTRACT
FAN TO REQUIRED ROOMS

KITCHEN EXTRACT
THROUGH AIRBRICK

EXHAUST AIR THROUGH
AIRBRICK

INTAKE AIR THROUGH
AIRBRICK

MVHR AT H/L VENT AXIA SENTINEL
KINETIC PLUS
630H x 520W x 776L

ALL DUCT WORK IN
ENTRANCE HALL TO BE
FIRE RATED

T2	MVHR Unit and ductwork updated.	05/08/2024
T1	Architects layout updated.	23/05/2024
T0	TENDER ISSUE	19/12/2023
REV	MODIFICATIONS	DATE

CARNELL
WARREN

ASSOCIATES

DUKE HOUSE, DUKE STREET, WOKING, GU215BA
PROJECTS@CARNELLWARREN.CO.UK 01483 730995

PROJECT
HORNSEY POLICE
STATION

TITLE
BLOCK B
FLAT B2
VENTILATION

CLIENT
DIXON8 LIMITED

SCALE @ A1
1:50

DATE
DEC '23

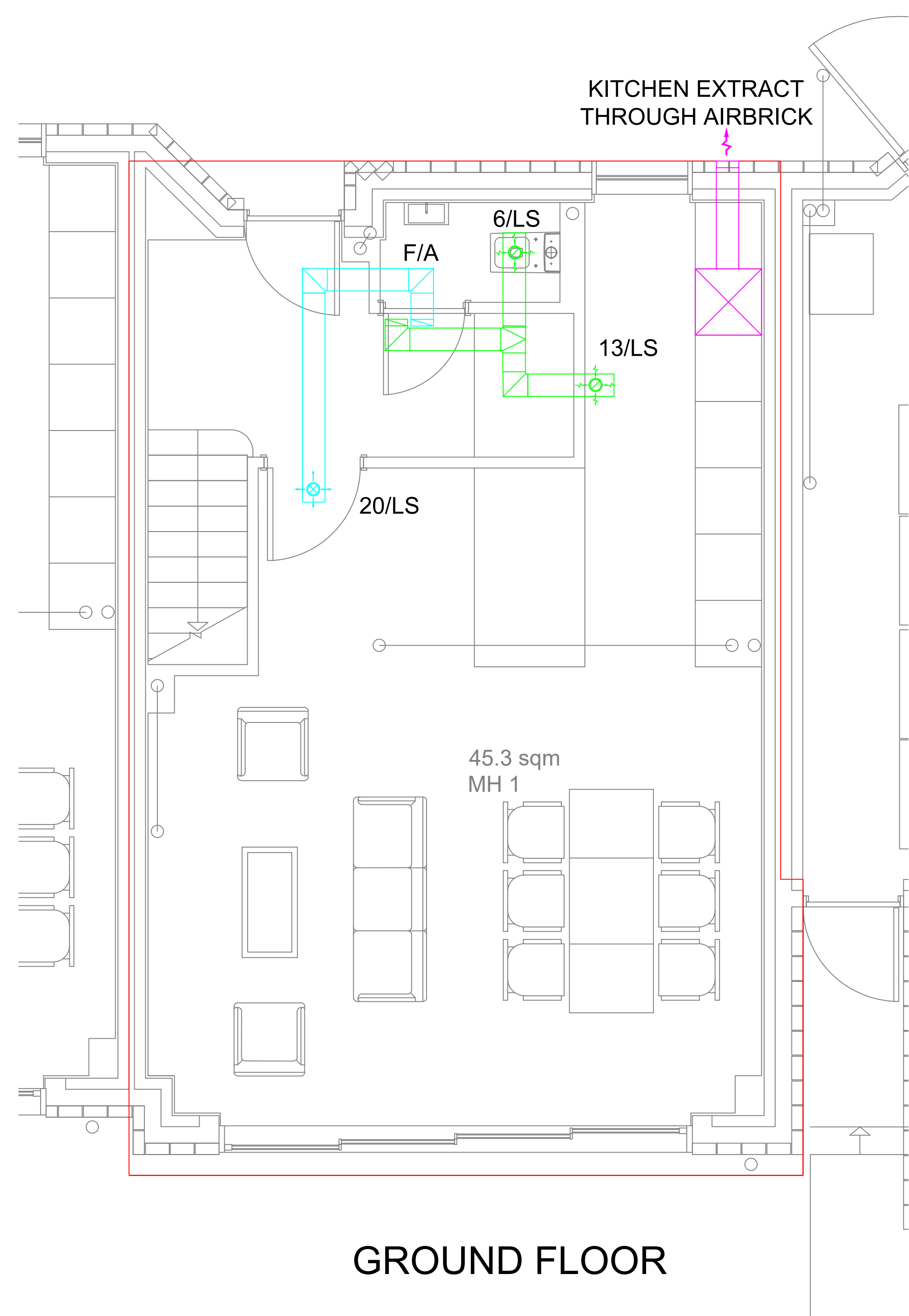
DRN
JK

DRAWING NO.
1982/M/201F

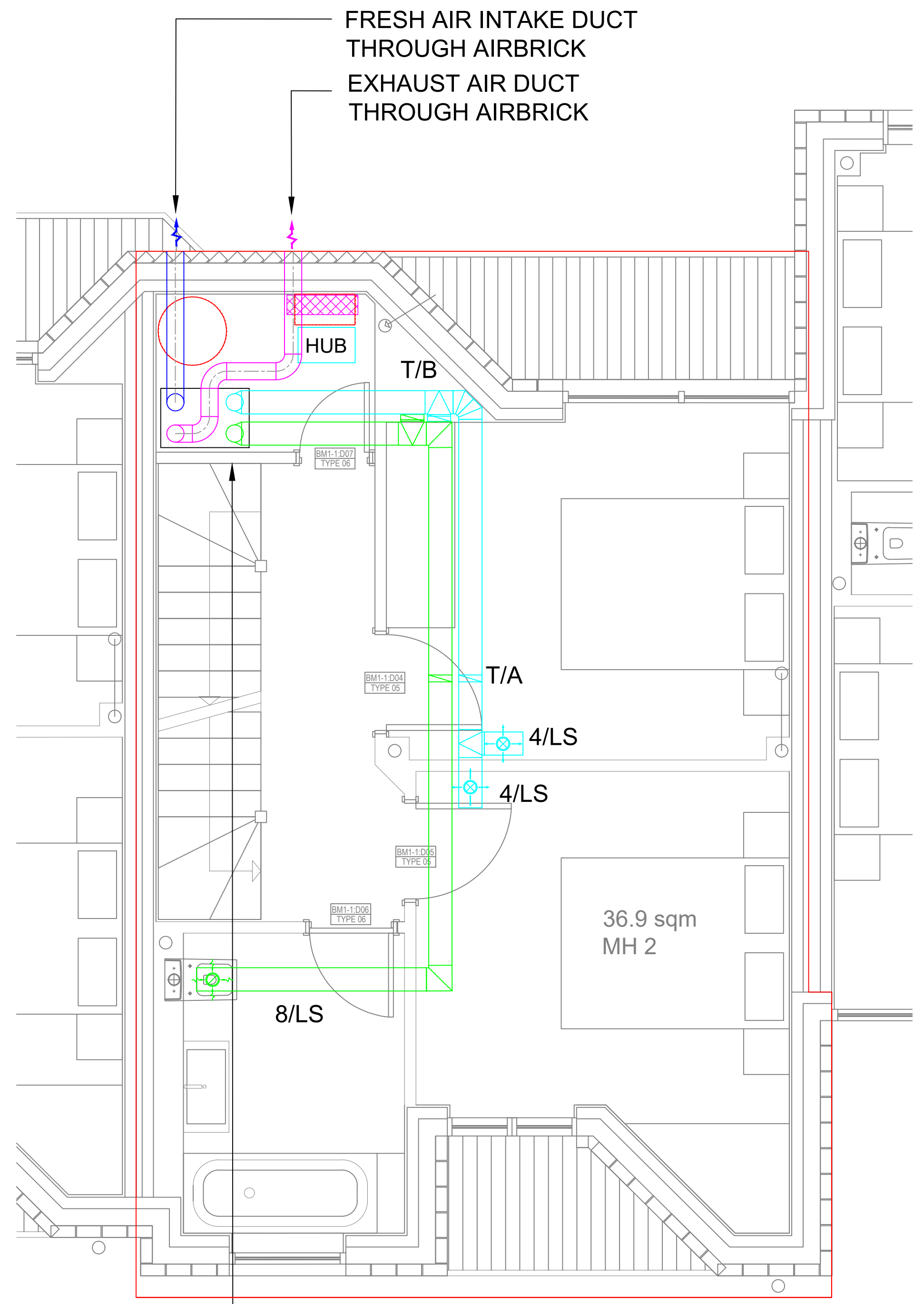
REV.
T2

Ventilation Legend:

- Dakin AC Controller
- Dakin Touch Hub
- Refrigerant Pipes
- Return Air Duct
- Supply Air Duct
- Exhaust Air Duct - To Outside
- Fresh Air Intake Duct - From Outside
- Standard 600mm Attenuator



GROUND FLOOR



FIRST FLOOR

MVHR AT H/L VENT AXIA SENTINEL
KINETIC PLUS
630H x 520W x 776L
EXHAUST & SUPPLY FROM ROOF

GENERAL NOTES:

- This drawing is not an Architects drawing and must not be interpreted as such.
- Do not scale off this drawing.
- This drawing must not be used for construction or installation purposed unless stated.
- All dimensions must be verified on site before completing shop drawings or setting out the work.
- This drawing to be read in conjunction with the relevant technical specifications.
- This drawing is to be read in conjunction with Architectural and Structural Engineers drawings.

HW - Hot Water	NRV - Non Return Valve
HL - High Level	S/C - Stop Cock
LL - Low Level	C/V - Control Valve
TA - To Above	DRV - Double Regulating Valve
TB - To Below	LSV - Lock Shield Valve
FA - From Above	IV - Isolation Valve
FB - From Below	STR - Strainer
SS - Stub Stack	HTG - Heating
AAV - Air Admittance Valve	CW - Cold Water
SVP - Soil Vent Pipe	TD - Tundish
DCV - Double Check Valve	F - Flow
SV - Solenoid Valve	R - Return
NRV - Non Return Valve	
PRV - Pressure Relief Valve	

Pipes Hidden H/L -----
Pipes Hidden L/L -----
Pipes Exposed H/L -----
Pipes Solid L/L -----

T2	MVHR relocated.	23/05/2024
T1	Architect layout updated.	23/05/2024
T0	TENDER ISSUE	19/12/2023
REV	MODIFICATIONS	DATE

CARNELL
WARREN
ASSOCIATES

DUKE HOUSE, DUKE STREET, WOKING, GU215BA
PROJECTS@CARNELLWARREN.CO.UK 01483 730995

PROJECT
HORNSEY POLICE
STATION

TITLE
MEWS HOUSE
GROUND & FIRST
FLOOR VENTILATION
LAYOUT

CLIENT
DIXON8 LIMITED

SCALE @ A1
NTS

DATE
DEC '23

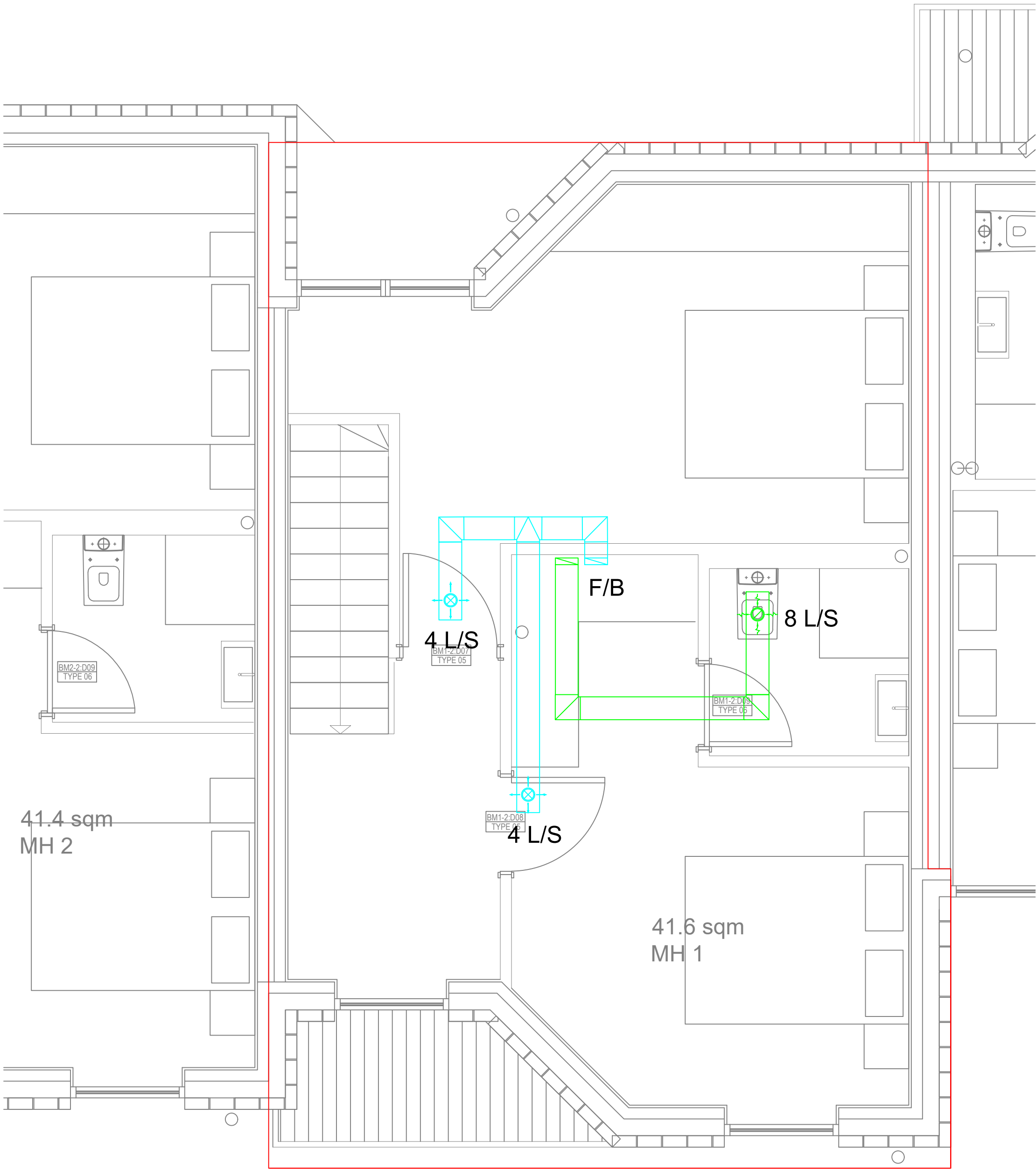
DRN
JK

DRAWING NO.
1982/M/202H

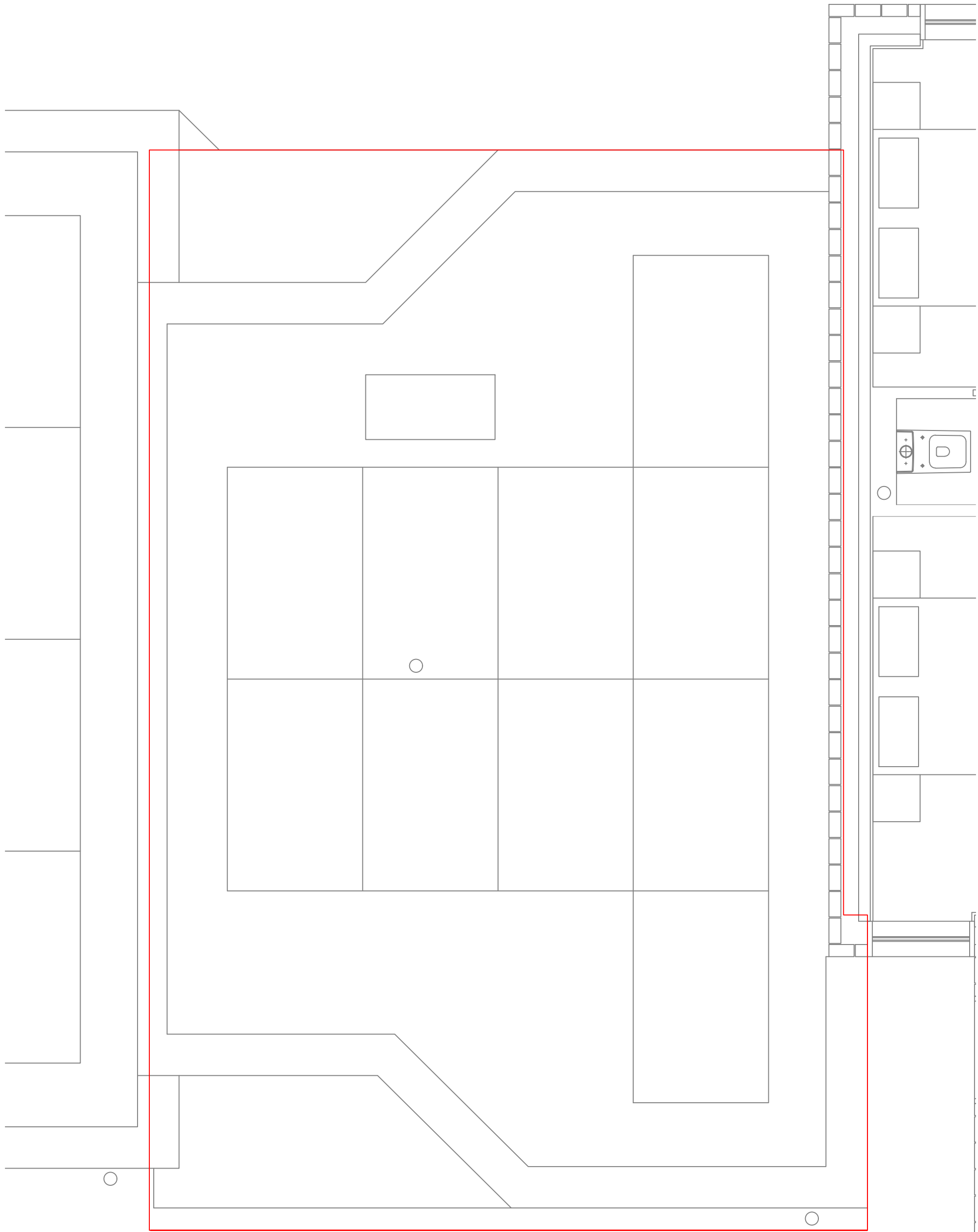
REV.
T2

Ventilation Legend:

- Daikin AC Controller
- Daikin Touch Hub
- Refrigerant Pipes
- Return Air Duct
- Supply Air Duct
- Exhaust Air Duct - To Outside
- Fresh Air Intake Duct - From Outside
- Standard 600mm Attenuator



SECOND FLOOR



ROOF

GENERAL NOTES:

- This drawing is not an Architects drawing and must not be interpreted as such.
- Do not scale off this drawing.
- This drawing must not be used for construction or installation purposed unless stated.
- All dimensions must be verified on site before completing shop drawings or setting out the work.
- This drawing to be read in conjunction with the relevant technical specifications.
- This drawing is to be read in conjunction with Architectural and Structural Engineers drawings.

HW - Hot Water	NRV - Non Return Valve
HL - High Level	S/C - Stop Cock
LL - Low Level	C/V - Control Valve
TA - To Above	DRV - Double Regulating Valve
TB - To Below	LSV - Lock Shield Valve
FA - From Above	IV - Isolation Valve
FB - From Below	STR - Strainer
SS - Stub Stack	HTG - Heating
AAV - Air Admittance Valve	CW - Cold Water
SVP - Soil Vent Pipe	TD - Tundish
DCV - Double Check Valve	F - Flow
SV - Solenoid Valve	R - Return
NRV - Non Return Valve	
PRV - Pressure Relief Valve	
Pipes Hidden H/L	-----
Pipes Hidden L/L	-----
Pipes Exposed H/L	-----
Pipes Solid L/L	-----

T3	MVHR relocated.	07/08/2024
T2	Architect layout updated.	23/05/2024
T1	Architects comments added.	14/03/2024
T0	TENDER ISSUE	19/12/2023
REV	MODIFICATIONS	DATE

CARNELL
WARREN

ASSOCIATES

DUKE HOUSE, DUKE STREET, WOKING, GU215BA
PROJECTS@CARNELLWARREN.CO.UK 01483 730995

PROJECT
HORNSEY POLICE
STATION

TITLE
MEWS HOUSE 1
GROUND FLOOR
VENTILATION

CLIENT
DIXON8 LIMITED

SCALE @ A1
NTS

DATE
DEC '23

DRN
JK

DRAWING NO.
1982/M/203H

REV.
T3

APPENDIX I

PROJECT DESCRIPTION:	
SYSTEM SIZE	37.45KW DC STC
MODULE TYPE	(70) LONGI SOLAR LR5-66HTH-535M 535W

INDEX SHEET	
A.00	SITE PLAN
A.01	LAYOUT PLAN
S.00	FRAMING DETAILS
D.00-D03	SPECIFICATION SHEETS



C6 SPECTRUM
BUSINESS ESTATE
ANTHONY'S WAY,
ROCHESTER, KENT
ME2 4NP

PRO. DATE	19/09/2024	
DESIGN BY	DR	
CHECKED BY	JD	
DATE	REV.	DESCRIPTION
08/10/2024	1	Add Panels

PROJECT NAME

HORNSEY POLICE
STATION

SHEET NAME

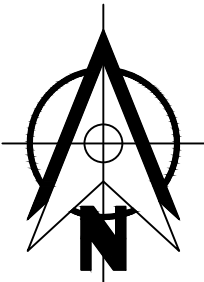
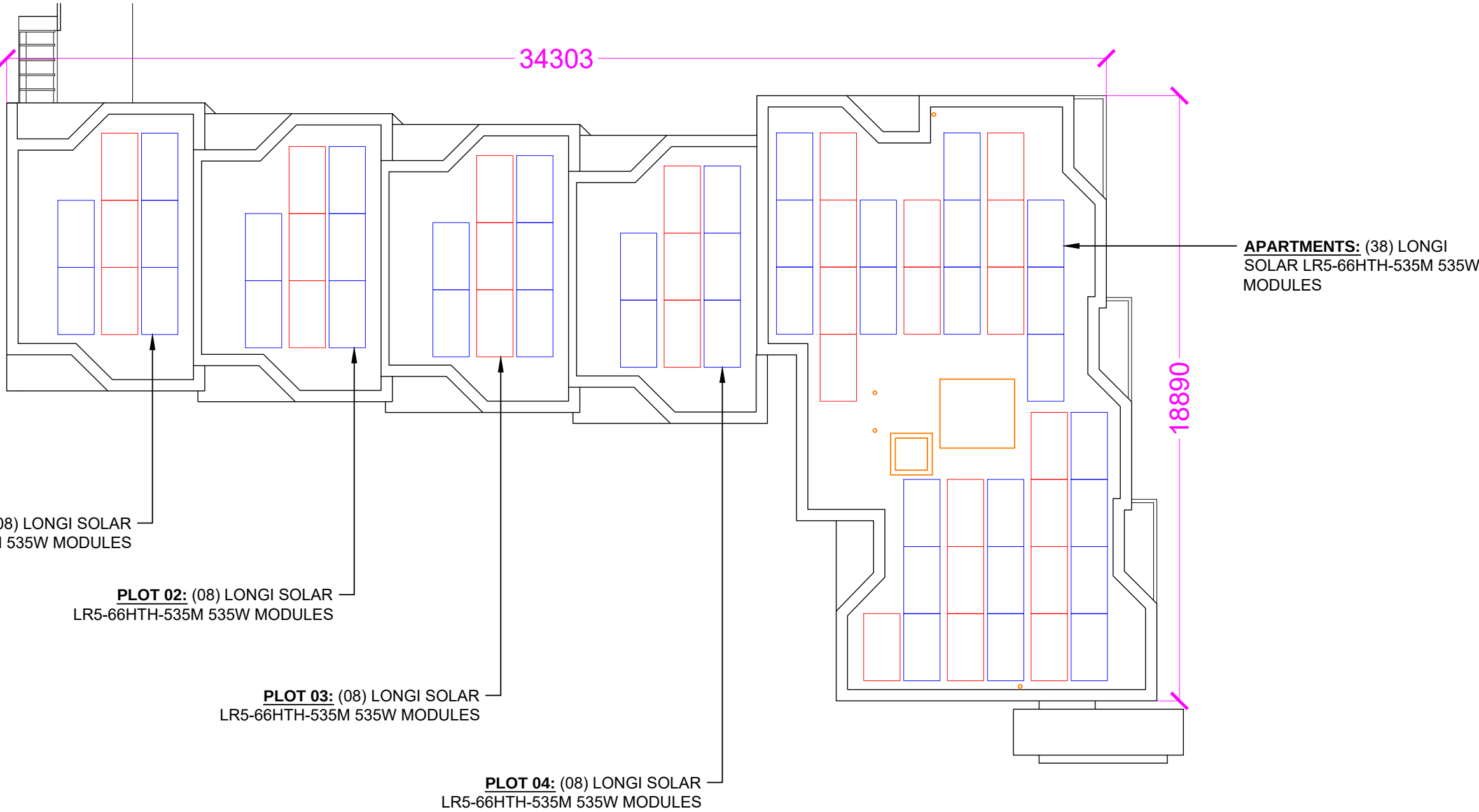
SITE PLAN

SHEET SIZE

ANSI B
279 X 432

SHEET NUMBER

A.00



1 SITE PLAN
SCALE: 1:150

MODULES AREA & ROOF AREA CALC'S			
# OF MODULES	MODULES AREA (Sq. Meter)	ROOF AREA (Sq. Meter)	ROOF AREA COVERED BY MODULES (%)
70	165.90	334.93	49.53

LEGENDS

EAST FACING MODULE

WEST FACING MODULE



C6 SPECTRUM
BUSINESS ESTATE
ANTHONY'S WAY,
ROCHESTER, KENT
ME2 4NP

PRO. DATE	19/09/2024	
DESIGN BY	DR	
CHECKED BY	JD	
DATE	REV.	DESCRIPTION
08/10/2024	1	Add Panels

PROJECT NAME

HORNSEY POLICE
STATION

SHEET NAME

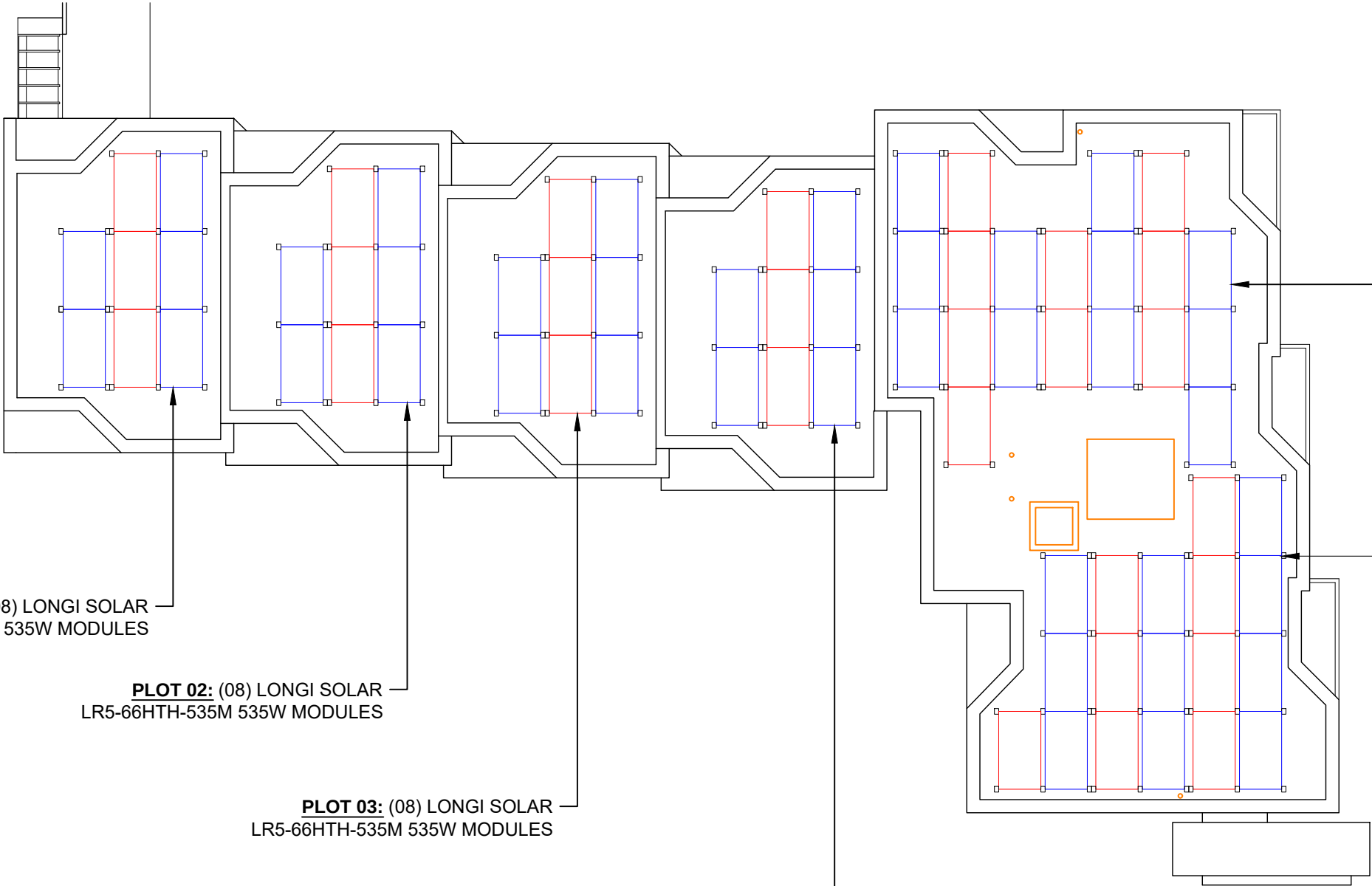
LAYOUT PLAN

SHEET SIZE

ANSI B
279 X 432

SHEET NUMBER

A.01



PLOT 01: (08) LONGI SOLAR
LR5-66HTH-535M 535W MODULES

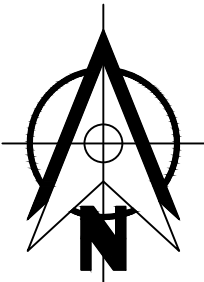
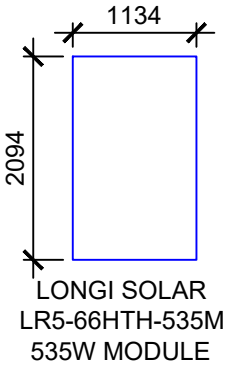
PLOT 02: (08) LONGI SOLAR
LR5-66HTH-535M 535W MODULES

PLOT 03: (08) LONGI SOLAR
LR5-66HTH-535M 535W MODULES

PLOT 04: (08) LONGI SOLAR
LR5-66HTH-535M 535W MODULES

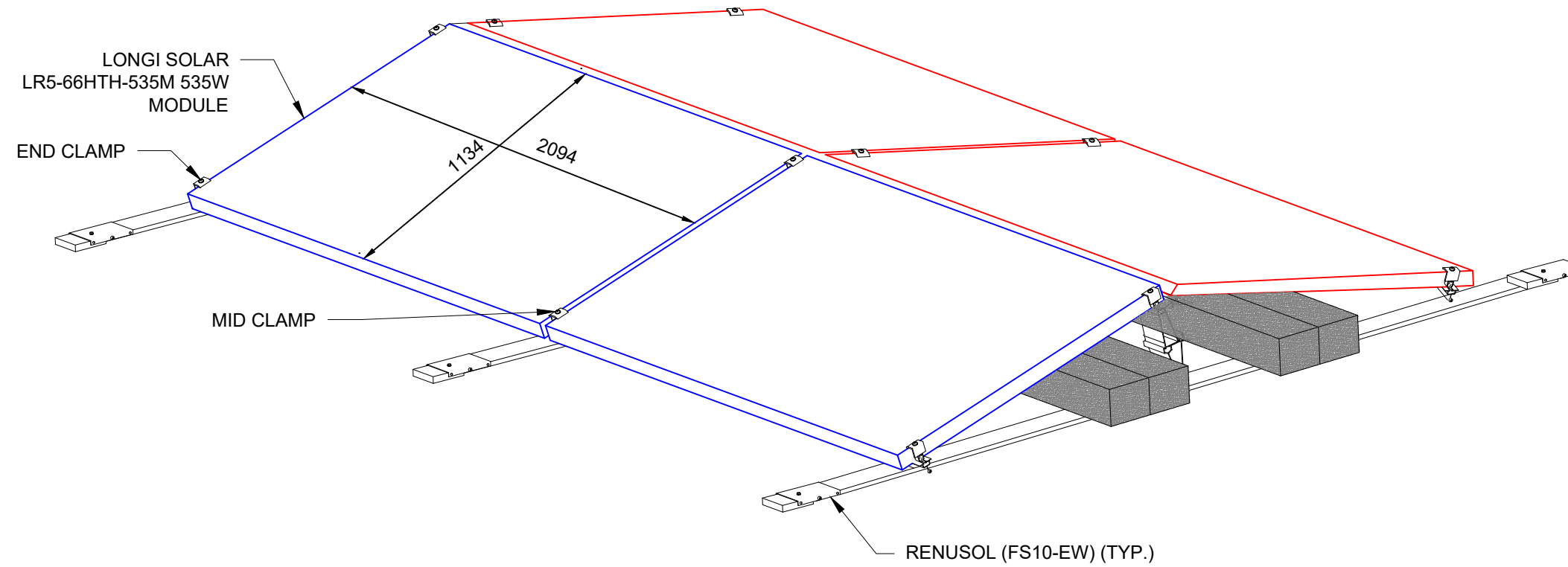
APARTMENTS: (38) LONGI
SOLAR LR5-66HTH-535M
535W MODULES

RENUSOL (FS10-EW)
ATTACHMENT (TYP.)

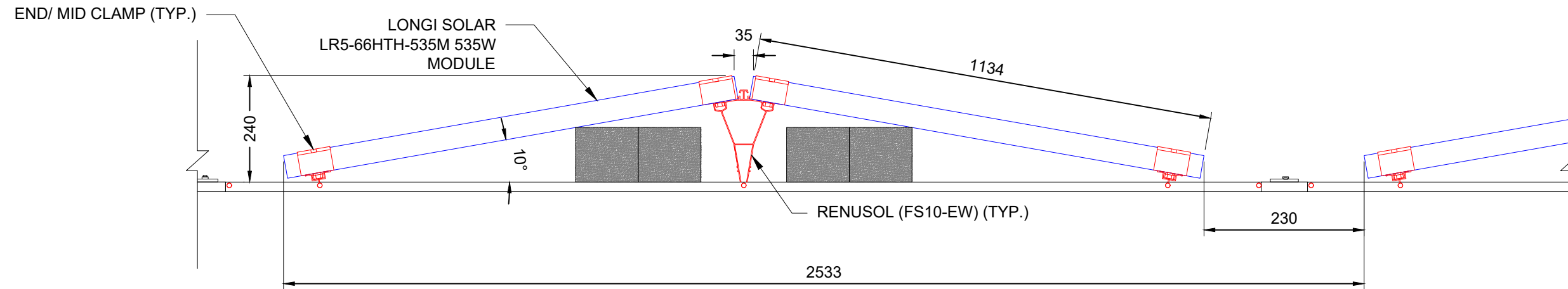


LAYOUT PLAN

SCALE: 1:150



1 ISOMETRIC VIEW
SCALE: NTS



1 STRING PLAN
SCALE: NTS



C6 SPECTRUM
BUSINESS ESTATE
ANTHONY'S WAY,
ROCHESTER, KENT
ME2 4NP

PRO. DATE		19/09/2024
DESIGN BY		DR
CHECKED BY		JD
DATE	REV.	DESCRIPTION
08/10/2024	1	Add Panels

PROJECT NAME

**HORNSEY POLICE
STATION**

SHEET NAME
**FRAMING
DETAILS**

SHEET SIZE
**ANSI B
279 X 432**

SHEET NUMBER
S.00

Hi-MO 6
Explorer

LR5-66HTH 520~540M

- Suitable for Distribution Market
- Simple design embodies modern style
- Better energy generation performance
- High-quality module guarantees long-term reliability

25 25-year Warranty for
Materials and Processing

25 25-year Warranty for Extra
Linear Power Output

Complete System and Product Certifications

IEC 61215, IEC 61730, UL 61730
ISO9001:2015: ISO Quality Management System
ISO14001: 2015: ISO Environment Management System
ISO45001: 2018: Occupational Health and Safety
IEC62941: Guideline for module design qualification and type approval

LONGI



Hi-MO 6

LR5-66HTH 520~540M

22.7%
MAX MODULE
EFFICIENCY

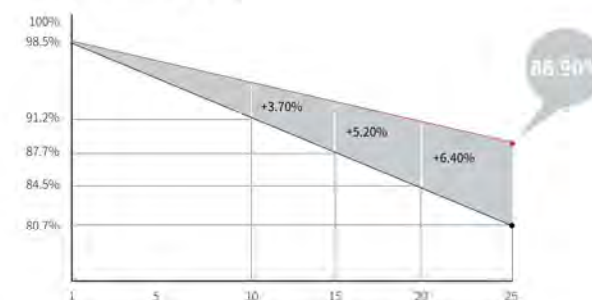
0~3%
POWER
TOLERANCE

<1.5%
FIRST YEAR
POWER DEGRADATION

0.40%
YEAR 2-25
POWER DEGRADATION

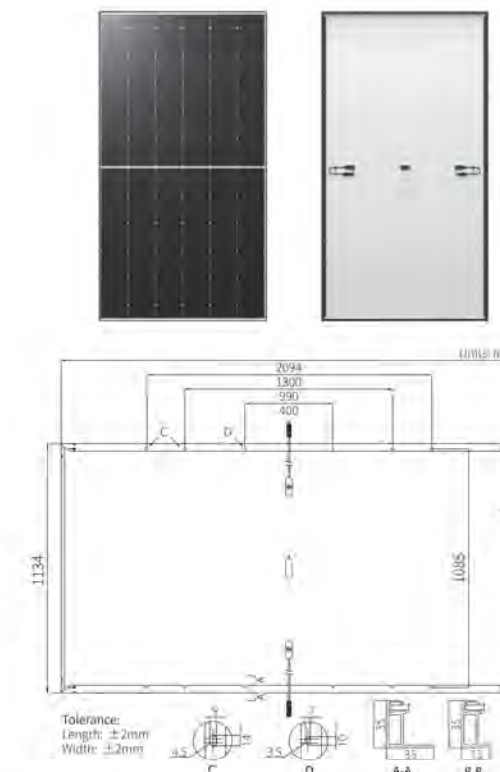
Additional Value

25-Year Power Warranty



Mechanical Parameters

Cell Orientation	132 (6×22)
Junction Box	IP68, three diodes
Output Cable	4mm ² , ±1400mm length can be customized
Connector	EVO2
Glass	Single glass, 3.2mm coated tempered glass
Frame	Anodized aluminum alloy frame
Weight	26.0kg
Dimension	2094×1134×35mm
Packaging	31pcs per pallet / 155pcs per 20' GP / 682pcs per 40' HC



Electrical Characteristics	STC: AM1.5 1000W/m ² 25°C		NOCT: AM1.5 800W/m ² 20°C 1m/s		Test uncertainty for Pmax: ±3%	
	LR5-66HTH-520M	LR5-66HTH-525M	LR5-66HTH-530M	LR5-66HTH-535M	LR5-66HTH-540M	
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)	520	388.6	525	392.3	530	396.0
Open Circuit Voltage (Voc/V)	47.58	44.68	47.73	44.82	47.88	44.96
Short Circuit Current (Isc/A)	14.05	11.35	14.12	11.41	14.20	11.47
Voltage at Maximum Power (Vmp/V)	39.91	36.42	40.06	36.55	40.22	36.70
Current at Maximum Power (Imp/A)	13.03	10.68	13.11	10.74	13.18	10.80
Module Efficiency (%)	21.9	22.1	22.3	22.5	22.7	

Operating Parameters

Operational Temperature	-40°C ~ +85°C
Power Output Tolerance	0 ~ 3%
Voc and Isc Tolerance	±3%
Maximum System Voltage	DC1500V (IEC/UL)
Maximum Series Fuse Rating	25A
Nominal Operating Cell Temperature	45±2°C
Protection Class	Class II
Fire Rating	UL type 1 or 2 IEC Class C

Mechanical Loading

Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Hailstone Test	25mm Hailstone at the speed of 23m/s

Temperature Ratings (STC)

Temperature Coefficient of Isc	+0.050%/°C
Temperature Coefficient of Voc	-0.230%/°C
Temperature Coefficient of Pmax	-0.290%/°C

No.8369 Shangyuan Road, Xi'an Economic And
Technological Development Zone, Xi'an, Shaanxi, China.
Web: www.longi.com

Specifications included in this datasheet are
subject to change without notice. LONGI
reserves the right of final interpretation.
(20230410Preliminary V01) DG



C6 SPECTRUM
BUSINESS ESTATE
ANTHONY'S WAY,
ROCHESTER, KENT
ME2 4NP

PRO.DATE		19/09/2024
DESIGN BY		DR
CHECKED BY		JD
DATE	REV.	DESCRIPTION
08/10/2024	1	Add Panels

PROJECT NAME

HORNSEY POLICE
STATION

SHEET NAME

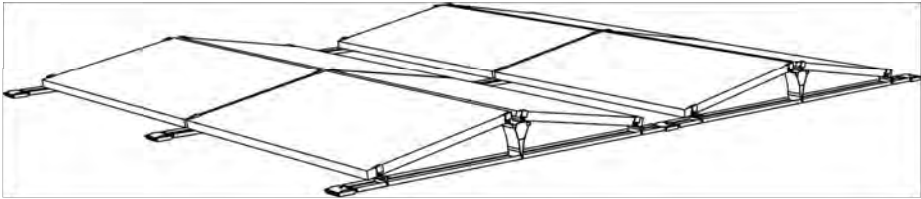
SPECIFICATION
SHEET

SHEET SIZE

ANSI B
279 X 432

SHEET NUMBER

D.00



System Datasheet

FS10-EW / FS10-EW XL

General

System	Ballasted PV-mounting system
Content	Ground rails, rail connector, building protection mat, low post, high post, clamps
System warranty	10 years
Application area	Flat roof on industrial, agricultural (except hydrogen sulfide exposition) and residential buildings
Roof covering	Bitumen, concrete, foil, gravel
Roof slope	max. 5° without additional measures

System properties

System orientation	East-West
Module tilt	10°
System weight approx.	1,15 kg/m²plus ballast (project specific)
Weight PV-module included approx.:	11,8 kg/m²plus ballast (project specific)
Friction coefficient	$\mu = 0,5$ is to be determined and ensured upon installation surface.
Material	Aluminum, stainless steel, rubber granulate
Minimum edge distance	0,6 m
Max. Wind Dynamic Pressure	$q_p = 1,5 \text{ kN/m}^2$ (with simultaneously acting snow load of $s_k = 1,5 \text{ kN/m}^2$)
Max. Wind Dynamic Pressure	$q_p = 1,0 \text{ kN/m}^2$ (with simultaneously acting snow load of $s_k = 2,5 \text{ kN/m}^2$)

Modules

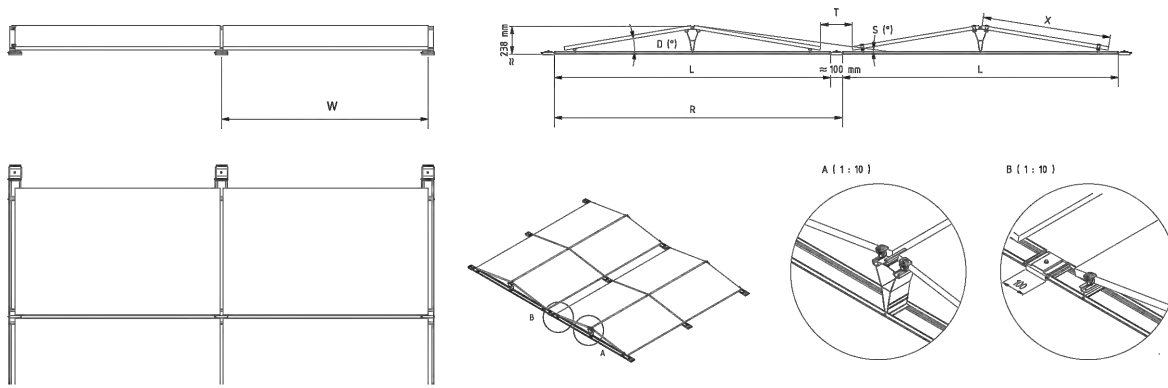
Type	Suitable for standard 60/72 cell panels. Approval for panel corner clamping is to be obtained.
Module width:	FS10-EW: 950-1.052 mm / FS10-EW XL: 1053-1.168 mm
Module guidance	Horizontal/Landscape

Certifications

Wind loads	Determined in wind tunnel tests by Ruscheweyh Consult GmbH
PV layout	Provided by Renusol (www.pv-configurator.com)
Ballast plan	Provided by Renusol (www.pv-configurator.com)

Services

PV layout	Provided by Renusol (www.pv-configurator.com)
Ballast plan	Provided by Renusol (www.pv-configurator.com)



System	FS10-EW XL	
Ground rail	R500499	
Rail length	L:	2362 mm
Row spacing	R:	2462 mm
Module width	X ₁ :	Min: 1053 mm
	X ₂ :	Max: 1168 mm
Passageway	T(X ₁):	Min: 355 mm
	T(X ₂):	Max: 125 mm
System width	W:	Module length +24mm
Module inclination	D:	9°
Shading angle	S:	≈ 7,0° - 9,0°

System	FS10-EW	
Ground rail	R500500	
Rail length	L:	2260 mm
Row spacing	R:	2360 mm
Module width	X ₁ :	Min: 950 mm
	X ₂ :	Max: 1052 mm
Passageway	T(X ₁):	Min: 455 mm
	T(X ₂):	Max: 255 mm
System width	W:	Module length +24mm
Module inclination	D:	10°
Shading angle	S:	≈ 6,7° - 7,9°

System	FS10-EW	
Ground rail	R500407	
Rail length	L:	2060 mm
Row spacing	R:	2160 mm
Module width	X ₁ :	Min: 950 mm
	X ₂ :	Max: 1052 mm
Passageway	T(X ₁):	Min: 255 mm
	T(X ₂):	Max: 55 mm
System width	W:	Module length +24mm
Module inclination	D:	10°
Shading angle	S:	≈ 7,8° - 9,3°

System	FS10-EW	
Ground rail	R500501	
Rail length	L:	1989 mm
Row spacing	R:	2090 mm
Module width	X ₁ :	Min: 950 mm
	X ₂ :	Max: 1020 mm
Passageway	T(X ₁):	Min: 185 mm
	T(X ₂):	Max: 45 mm
System width	W:	Module length +24mm
Module inclination	D:	10°
Shading angle	S:	≈ 9,0° - 9,5°

FS10-EW 09 | 2021
EN | Renusol System Datasheet
Misprints and errors, technical or other changes and changes in the availability of products are expressively reserved

2/2

C6 SPECTRUM
BUSINESS ESTATE
ANTHONY'S WAY,
ROCHESTER, KENT
ME2 4NP

PRO. DATE	19/09/2024	
DESIGN BY	DR	
CHECKED BY	JD	
DATE	REV.	DESCRIPTION
08/10/2024	1	Add Panels

PROJECT NAME

HORNSEY POLICE
STATION

SHEET NAME

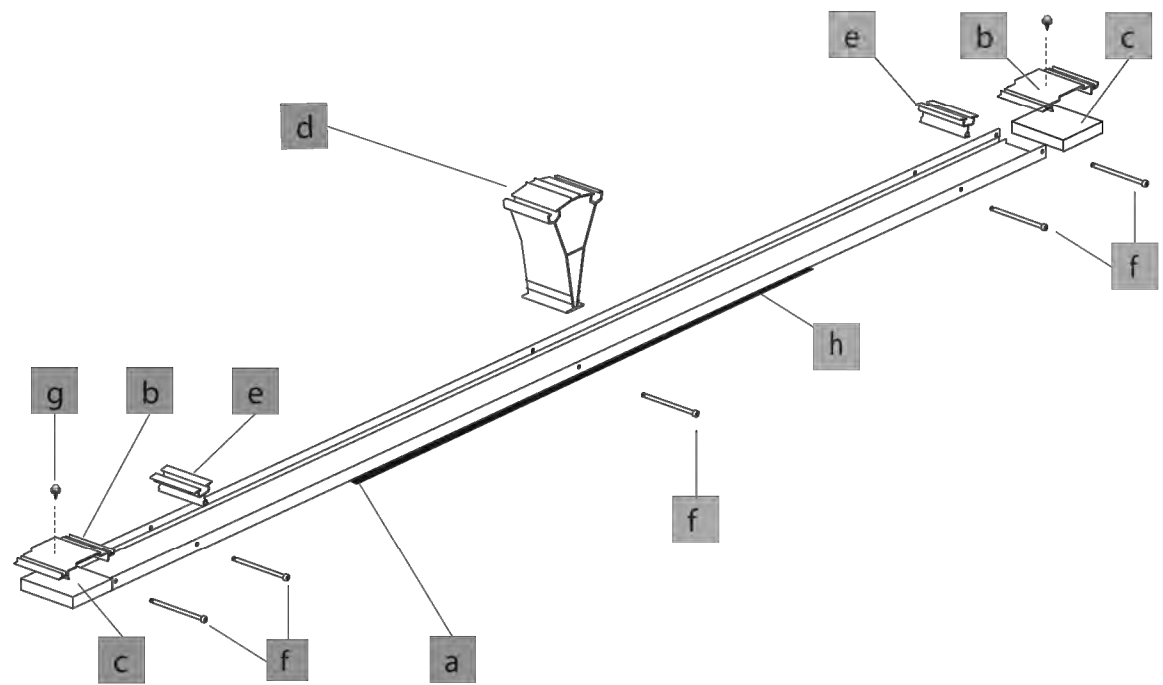
SPECIFICATION
SHEET

SHEET SIZE

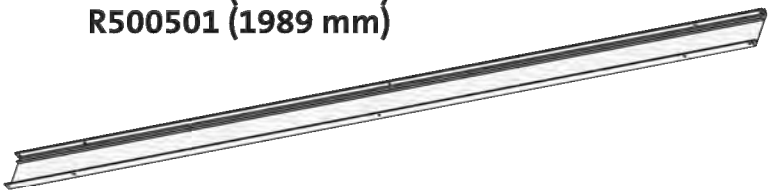
ANSI B
279 X 432

SHEET NUMBER

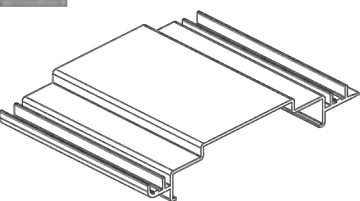
D.01



a R500499 (2362 mm) - FS10-EW XL
R500500 (2260 mm)
R500407 (2060 mm)
R500501 (1989 mm)



b R500404

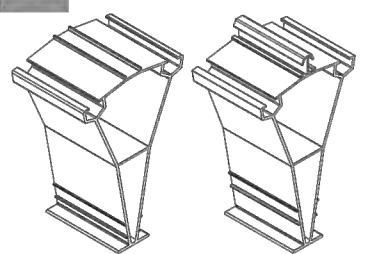


c R500410/R500411

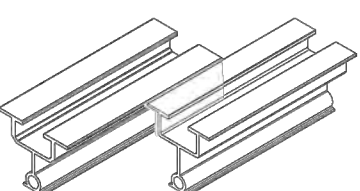


R500410: Bituminöse Abdichtung /Bituminous sealing
R500411: Folienabdichtung / Foil sealing

d R500520 - FS10-EW
R500423 - FS10-EW XL



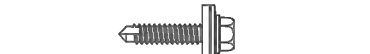
e R500420 - FS10-EW
R500419 - FS10-EW XL



f R900314



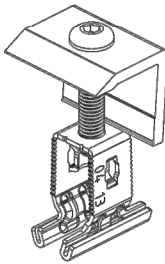
g R900229



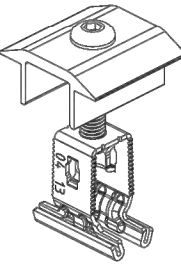
h R500412



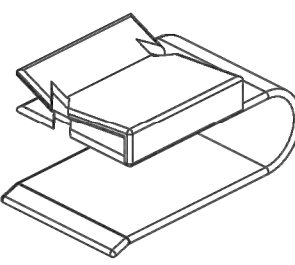
R420081



R420082



R900260 (optional)



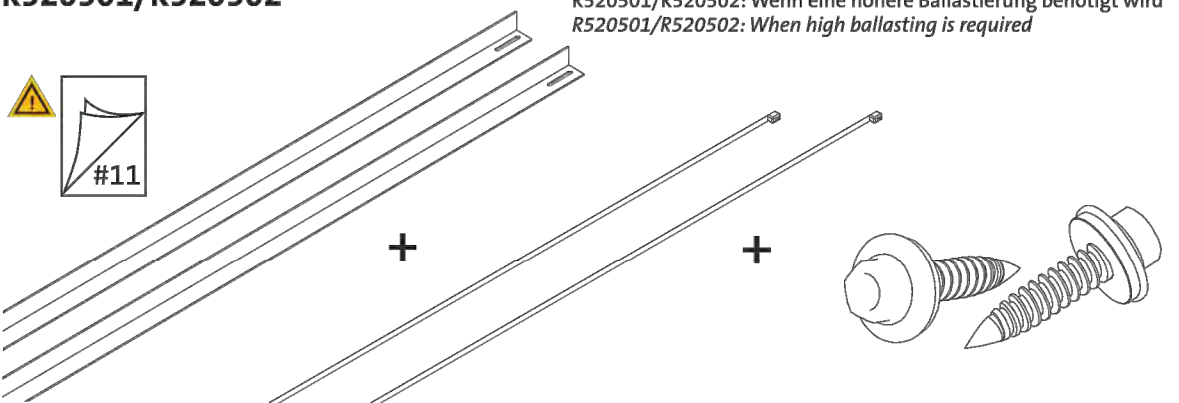
R900035 (optional)



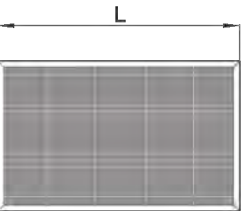
R520501/R520502



R520501/R520502: Wenn eine höhere Ballastierung benötigt wird
R520501/R520502: When high ballasting is required



Modullänge L / Modul length L	Artikel No.
1770 mm	R520501
2120 mm	R520502



S8

S5

C6 SPECTRUM
BUSINESS ESTATE
ANTHONY'S WAY,
ROCHESTER, KENT
ME2 4NP

PRO. DATE		19/09/2024
DESIGN BY		DR
CHECKED BY		JD
DATE	REV.	DESCRIPTION
08/10/2024	1	Add Panels

PROJECT NAME

HORNSEY POLICE
STATION

SHEET NAME

SPECIFICATION
SHEET

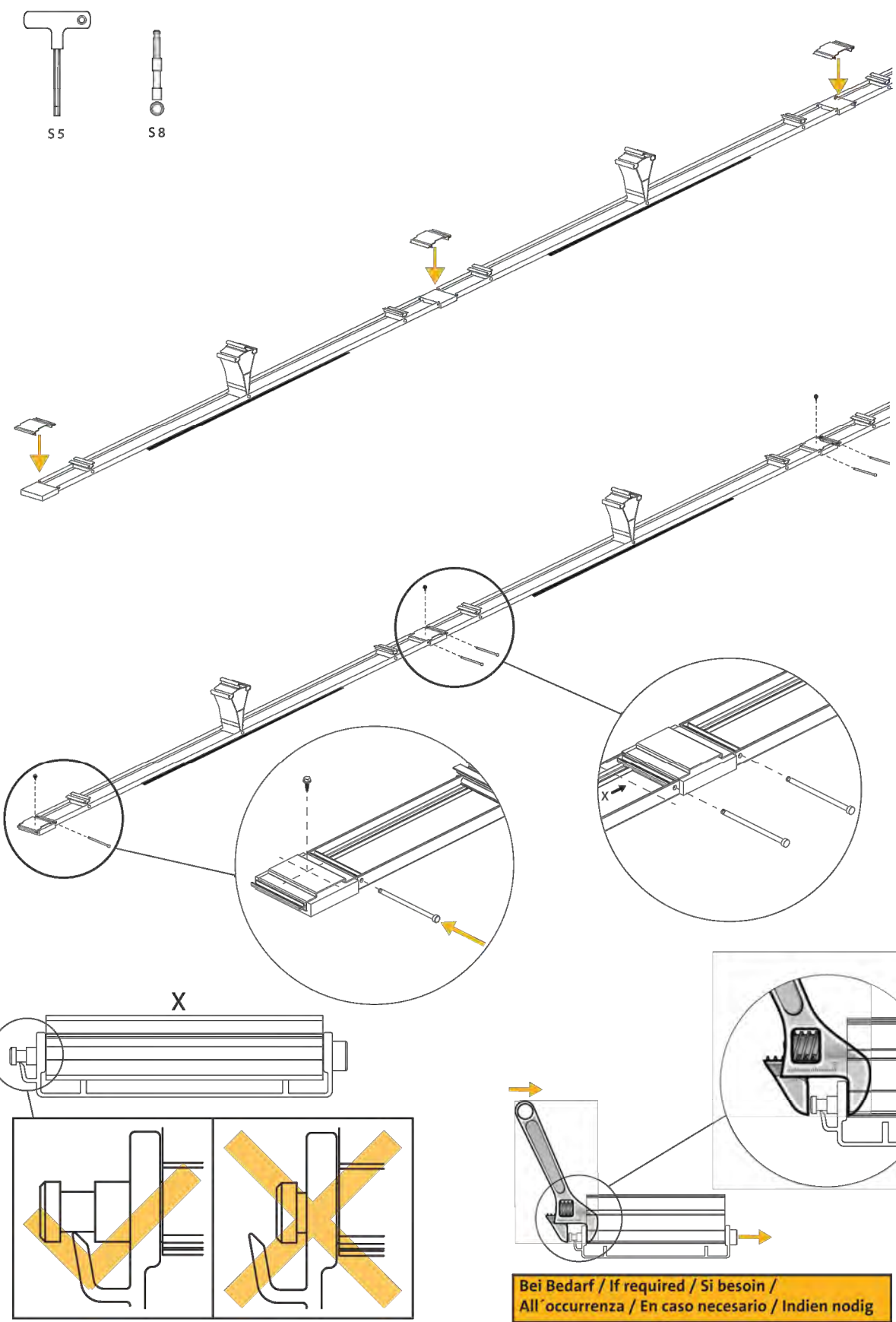
SHEET SIZE

ANSI B
279 X 432

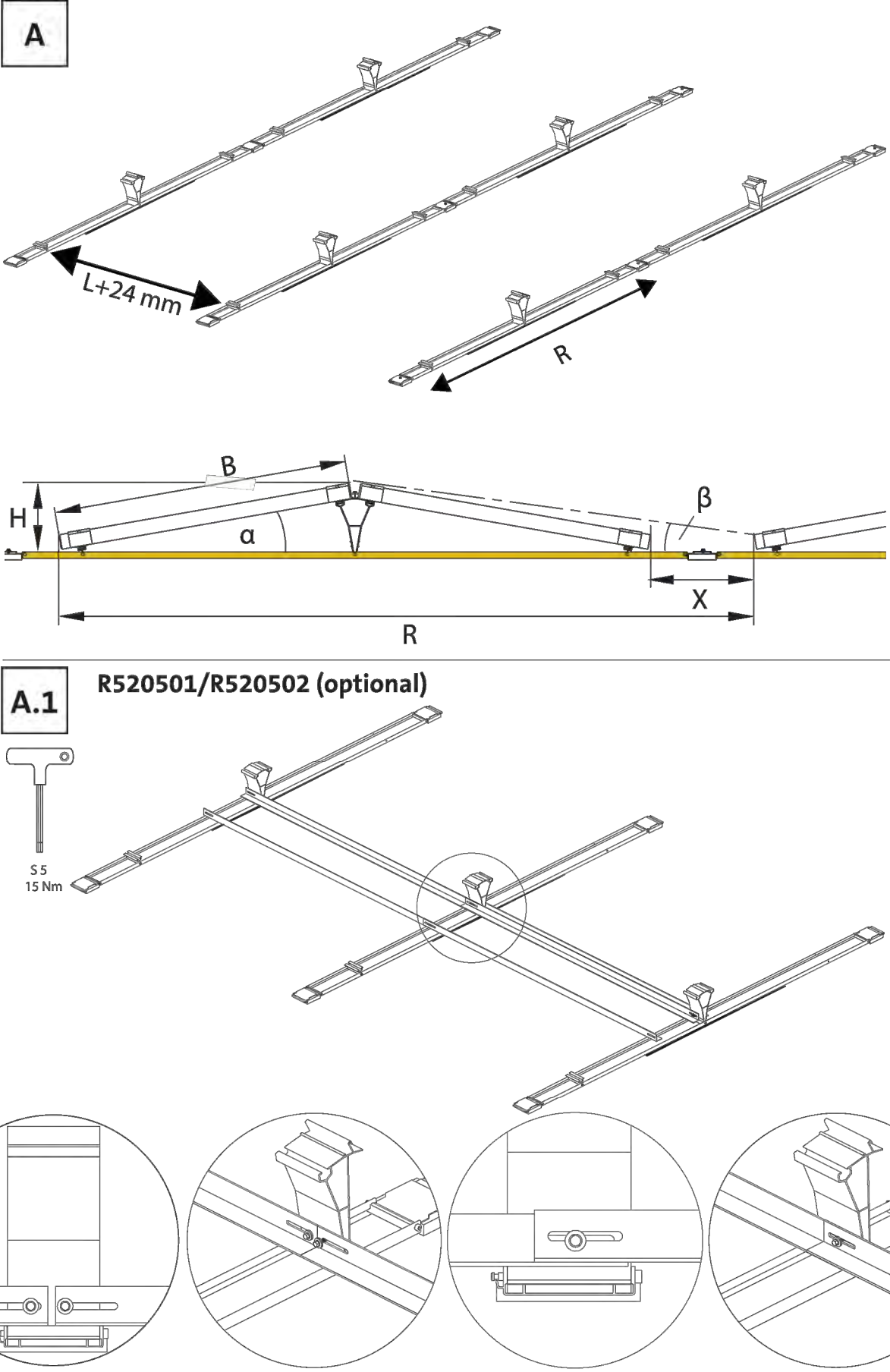
SHEET NUMBER

D.02

FS10-EW



FS10-EW



PRO. DATE		19/09/2024
DESIGN BY		DR
CHECKED BY		JD
DATE	REV.	DESCRIPTION
08/10/2024	1	Add Panels

PROJECT NAME

HORNSEY POLICE
STATION

SHEET NAME
SPECIFICATION
SHEET

SHEET SIZE
ANSI B
279 X 432

SHEET NUMBER
D.03

APPENDIX J



Renewable Energy Specialists

Hornsey Police Station

Project ID: 9349

Installation Type: Solar Photovoltaic

Client: Roseguill Developments

Unit C6, Spectrum Business Centre,
Anthony's Way, Medway City Estate
Rochester, Kent,
ME2 4NP

T: 01322 479957

E: info@elco-group.co.uk

W: www.egsolar.co.uk

TABLE OF CONTENTS

SECTION TITLE	SECTION No.
COVER LETTER; Directors Overview	01
TENDER LETTER	02
TENDER SUMMARY	03
TENDER CLARIFICATIONS	04
MATERIALS SCHEDULE	05

COVER LETTER

Directors Overview

Elco-Group are delighted to present our Bid Document for the design, supply, install & commissioning of the solar PV works at Hornsey Police Station and are happy to have been invited to tender for this project. Speaking on behalf of the entire Elco-Group team, there is a willingness to operate in a collaborative and transparent way for the benefit of yourselves and the client. We look forward to working with you on this exciting project.

The EG team chosen has been selected based upon their experience in the commercial sector and their past proven ability to deliver high quality standards on a range of PV projects. We have a substantial local resource, ready for deployment to assist with pre-construction activities and support the professional team to ensure a seamless transition in the later detailed design stages.

Elco Group's inclusion in your shortlist of PV contractors confirms to us your understanding of our capabilities and that we are able to deliver such an important project for Roseguill Developments . We are capable of delivering all services required on site. Our experience allows us to realise our clients vision of the project and to help them work toward this, adding value at key stages of the programme. Key to this, is the quality and commitment of our staff. Our approach to working aligned with Roseguill Developments safety principles hopefully enforces this commitment and continues to ensure all of our operatives are safe and able to concentrate on the task at hand.

We identify a key success in this project as being able to offer an entire electrical solution within the preferred framework. Our experienced operations teams, working collaboratively with your own project's delivery team will enable you to focus on the major elements of this project, allowing the PV elements to be incorporated in a timely and transparent manner.

Our commercial understanding and experience within this sector will help you to deliver on budget and on time. Innovation on the delivery of PV services will give us the edge and our immediately available workforce will help to start the project moving without delay.

TENDER LETTER

20th August 2024

Roseguill Developments

1A Chestnut House Farm Close,
Shenley,
Radlett,
WD7 9AD

FAO: Mark Bouchat

Dear Mark,

We thank you for your valued enquiry and have much pleasure in forwarding our quotation for the design, supply, installation and commissioning of **(Please see summary)** solar PV arrays; All modules to be mounted on flat roofs.

System also includes inverters, DC & AC isolators, kWh meter, cabling, electrical connections and all fixings and fittings,

The total project cost is:

£29,324.10 + VAT

TENDER SUMMARY

PLOT	NO.PANELS	KWP	COST
1	6	3.2	£3,523.65
2	6	3.2	£3,523.65
3	6	3.2	£3,523.65
4	6	3.2	£3,523.65
Apartments	46	24.61	£15,229.50
TOTAL	70	37.41	£29,324.10

TENDER CLARIFICATIONS

- 1) Our tender is based on normal working hours i.e. 8.00am to 5.30pm.
- 2) Our tender excludes VAT and is open for acceptance for 30 days.
- 3) 3. Payment terms (subject to an agreed credit account being opened and trade credit insurance cover being obtained):
 - Materials and labour will be included in monthly applications if contract period extends over one month
 - Monthly applications, when applicable, will be submitted on the 28th day of the month for work carried out during the month unless otherwise agreed.
- 4) Our systems are designed to accommodate only minor discrepancies in structure tolerance.
- 5) We will require you to provide a suitably rated AC supply, run to the location of our inverter. This will typically be run from a main distribution board or the intake. – We will confirm the technical details. We will require you to provide a suitably rated lockable isolator at the distribution board end of the supply cable. We will provide the isolator at the inverter position.
- 6) In domestic installations where the inverter supply is connected to a consumer unit, we require a dedicated RCBO for our works. – Our installation should not share an RCD with other circuits.
- 7) In any situations where CT metering is required, a secondary supply is required to be provided to each meter location.
- 8) We have made no further allowances for paying any fees, statutory or otherwise.
- 9) We anticipate the following lead and duration times

	Activity	Time	Clarifications
A	Start on site from order	2 weeks (TBC)	From receipt of full design information and assuming one week design approval period.
B	Installation	(TBC)	PV Installation

- 10) If your PV systems generation capacity exceeds 16 amps per phase then a 'G99 application' to the DNO will be required. We will provide you with the form with the technical details of our components completed. It will be your responsibility to complete the remainder of the form, to include customer's details, MPAN number, site map, meter location etc, and issue to the DNO. The DNO may request an additional price for Witness Testing this is not included within the above tender.

TENDER CLARIFICATIONS

- 11) If the procurement of materials is not undertaken within 12 months of date shown on tender letter, we hold the right to include up to 10% uplift for rate of inflation charge. You be will be notified of any increases of price in advance.
- 12) Unless specifically noted in our quotation we have assumed that roof heights, to which PV equipment is to be installed, are lower than 50M. – Buildings taller than 50M require special fixing arrangements for the PV equipment which need to be quoted separately.

TENDER CLARIFICATIONS

Description	Incl.	Notes
Calculation of operating parameters and design of electrical system to main point of connection.	✓	
Design of support frame and roof fixing detail	✓	
Calculations to indicate the suitability of the supporting roof structures will provide the strength and integrity to suit our system's weight and fixings		By others
Delivery of materials and equipment to site	✓	
Offloading	✓	
Secure on site storage		Provided by others
Scaffolding, edge protection and access equipment		Provided by others
Lifting equipment		Provided by others
Site welfare facilities (temporary and permanent)		Provided by others
Power supplies (110V AC) within 10m of the workface		Provided by others
Installation of electrical and mechanical PV components	✓	
Connection of main LV switchboard to utility		Provided by others
DC and AC circuit inspection and test to the main LV switchboard in accordance with BS7671:2001	✓	
Final testing and commissioning	✓	
Instruction of local maintenance team	✓	
Liaison with DNO regarding application, witness testing etc.	✓	
Documentation, O&M Manuals etc.	✓	
Performance and/or Guarantee Bond		Not included

TENDER CLARIFICATIONS

Description	Incl.	Notes
Solar Modules	✓	
Mounting frame for panels	✓	
Mounting Structure	✓	
Frame for PV Inverter		
DC isolator switch(es)	✓	
DC cables, connectors and containment	✓	
Inverter(s)	✓	
AC Isolators (local)	✓	
AC cables, connectors and containment to AC marshalling	✓	
Export MPAN		Where applicable
AC G99 Protection		Where applicable
AC cable (final connection to AC isolator from inverter)	✓	
Generation meter (OFGEM approved)	✓	
Cable makers, ties, labels and electrical schematic	✓	
PV Disconnect Switch/Isolator	✓	
Public Display Unit with readout of main parameters		Not included
Data logging / monitoring	•	Not included
Earth, equipotential or lighting protection bonding		Provided by others

TENDER CLARIFICATIONS

Element	Period
Solar PV modules	10 Years Product Warranty 25 years Linear Performance Guarantee
Inverters	5-year manufacturer's warranty (extended warranty available on request)
Solar Thermal	N/A
Complete System	1 year "turnkey" warranty, covering the elements stated in the table

Please be aware that all customers are liable for obtaining planning permission for these systems

Elements covered	Turnkey Warranty
System becomes inoperable as a result of defects in material or workmanship	✓
Specified level of power of the solar modules only as per module warranty terms and conditions	✓
Defective installation (not included in supply - only)	✓
Labour cost	✓
Specified level of power	Not Covered
Specified level of energy	Not Covered
Damage caused by electrical surges, lightning, fire, flood, pest damage, accidental breakage, actions of third parties and other events or accidents outside reasonable control and not arising under normal operating conditions.	Not Covered

MATERIALS SCHEDULE

Element	Product
Solar PV modules	Longi 535W Superior Module Efficiency
Inverter's	Solis 20 Kw/15kW/4kW 3 & 1 Phase Inverter
Mounting System	Renusol FS10 E/W
Generation Meter	Emlite 3 & 1 phase meter

All the above items are subject to availability when procuring materials, if a product becomes unavailable you will be notified and provided a like for like replacement.

All data sheets attached below.

Hi-MO 6

Explorer

LR5-66HTH 520~540M

- Suitable for Distribution Market
- Simple design embodies modern style
- Better energy generation performance
- High-quality module guarantees long-term reliability



25-year Warranty for
Materials and Processing



25-year Warranty for Extra
Linear Power Output

Complete System and Product Certifications

IEC 61215, IEC 61730, UL 61730

ISO9001:2015: ISO Quality Management System

ISO14001: 2015: ISO Environment Management System

ISO45001: 2018: Occupational Health and Safety

IEC62941: Guideline for module design qualification and type approval

LONGi



22.7%
MAX MODULE
EFFICIENCY

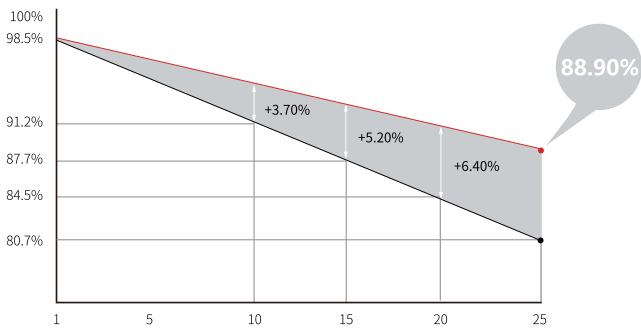
0~3%
POWER
TOLERANCE

<1.5%
FIRST YEAR
POWER DEGRADATION

0.40%
YEAR 2-25
POWER DEGRADATION

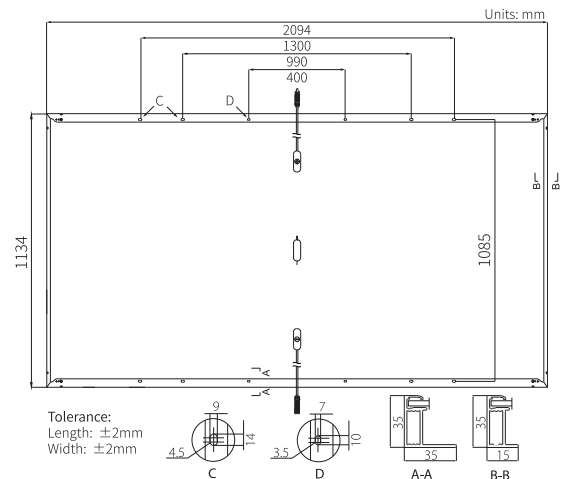
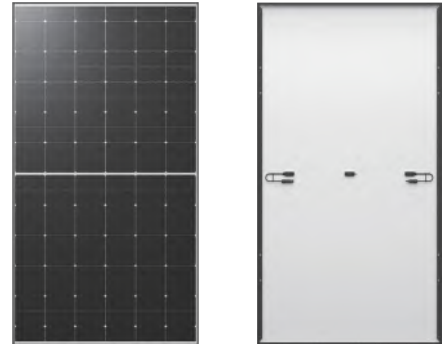
Additional Value

25-Year Power Warranty



Mechanical Parameters

Cell Orientation	132 (6×22)
Junction Box	IP68, three diodes
Output Cable	4mm ² , ±1400mm length can be customized
Connector	EVO2
Glass	Single glass, 3.2mm coated tempered glass
Frame	Anodized aluminum alloy frame
Weight	26.0kg
Dimension	2094×1134×35mm
Packaging	31pcs per pallet / 155pcs per 20' GP / 682pcs per 40' HC



Electrical Characteristics

STC : AM1.5 1000W/m² 25°C NOCT : AM1.5 800W/m² 20°C 1m/s Test uncertainty for Pmax: ±3%

Module Type	LR5-66HTH-520M		LR5-66HTH-525M		LR5-66HTH-530M		LR5-66HTH-535M		LR5-66HTH-540M	
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)	520	388.6	525	392.3	530	396.0	535	399.8	540	403.5
Open Circuit Voltage (Voc/V)	47.58	44.68	47.73	44.82	47.88	44.96	48.03	45.10	48.18	45.24
Short Circuit Current (Isc/A)	14.05	11.35	14.12	11.41	14.20	11.47	14.28	11.53	14.36	11.59
Voltage at Maximum Power (Vmp/V)	39.91	36.42	40.06	36.55	40.22	36.70	40.38	36.85	40.53	36.99
Current at Maximum Power (Imp/A)	13.03	10.68	13.11	10.74	13.18	10.80	13.25	10.86	13.33	10.92
Module Efficiency(%)	21.9		22.1		22.3		22.5		22.7	

Operating Parameters

Operational Temperature	-40°C ~ +85°C
Power Output Tolerance	0 ~ 3%
Voc and Isc Tolerance	±3%
Maximum System Voltage	DC1500V (IEC/UL)
Maximum Series Fuse Rating	25A
Nominal Operating Cell Temperature	45±2°C
Protection Class	Class II
Fire Rating	UL type 1 or 2 IEC Class C

Mechanical Loading

Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Hailstone Test	25mm Hailstone at the speed of 23m/s

Temperature Ratings (STC)

Temperature Coefficient of Isc	+0.050%/°C
Temperature Coefficient of Voc	-0.230%/°C
Temperature Coefficient of Pmax	-0.290%/°C

Solis-3P(3-20)K-4G

Solis Three Phase Inverters



360 degree

Features:

- ▶ Max. efficiency 98.7%
- ▶ Wide voltage range and low startup voltage
- ▶ 2 MPPT design with precise MPPT algorithm
- ▶ THDi<1.5%, low harmonic distortion against grid
- ▶ Multiple protections levels
- ▶ Intergrated Export Power Manager (EPM)



Model:

Solis-3P3K-4G	Solis-3P4K-4G	Solis-3P5K-4G
Solis-3P6K-4G	Solis-3P8K-4G	Solis-3P9K-4G
Solis-3P10K-4G	Solis-3P12K-4G	Solis-3P15K-4G
Solis-3P17K-4G	Solis-3P20K-4G	

Datasheet

Model Name	Solis-3P3K-4G	Solis-3P4K-4G	Solis-3P5K-4G	Solis-3P6K-4G	Solis-3P8K-4G	Solis-3P9K-4G	Solis-3P10K-4G	Solis-3P12K-4G	Solis-3P15K-4G	Solis-3P17K-4G	Solis-3P20K-4G
------------	---------------	---------------	---------------	---------------	---------------	---------------	----------------	----------------	----------------	----------------	----------------

Input DC

Recommended max. PV power	4.5 kW	6 kW	7.5 kW	9 kW	12 kW	13.5 kW	15 kW	18 kW	22.5 kW	25.5 kW	30 kW
Max. input voltage	1000 V										
Rated voltage	600 V										
Start-up voltage	180 V										
MPPT voltage range	160-850 V										
Max. input current	11 A / 11 A							22 A / 22 A			
Max. short circuit current	17.2 A / 17.2 A							34.3 A / 34.3 A			
MPPT number/Max. input strings number	2/2							2/4			

Output AC

Rated output power	3 kW	4 kW	5 kW	6 kW	8 kW	9 kW	10 kW	12 kW	15 kW	17 kW	20 kW
Max. apparent output power	3.3 kVA	4.4 kVA	5.5 kVA	6.6 kVA	8.8 kVA	9.9 kVA	11 kVA	13.2 kVA	16.5 kVA	18.7 kVA	22 kVA
Max. output power	3.3 kW	4.4 kW	5.5 kW	6.6 kW	8.8 kW	9.9 kW	11 kW	13.2 kW	16.5 kW	18.7 kW	22 kW
Rated grid voltage	3/N/PE, 220 V / 380 V, 230 V / 400V										
Rated grid frequency	50 Hz / 60 Hz										
Rated grid output current	4.6A/4.3A	6.1A/5.8A	7.6A/7.2A	9.1A/8.7A	12.2A/11.5A	13.7A/13.0A	15.2A/14.4A	18.2A/17.3A	22.8A/21.7A	25.8A/24.6A	30.4A/28.9A
Max. output current	4.7 A	6.4 A	7.9 A	9.5 A	12.7 A	14.3 A	15.9 A	19.1 A	23.8 A	27 A	31.8 A
Power Factor	>0.99 (0.8 leading - 0.8 lagging)										
THDi	<1.5%										

Efficiency

Max. efficiency	98.3%					98.7%					
EU efficiency	97.8%					98.1%					

Protection

DC reverse-polarity protection	Yes										
Short circuit protection	Yes										
Output over current protection	Yes										
Surge protection	Yes										
Grid monitoring	Yes										
Anti-islanding protection	Yes										
Temperature protection	Yes										
Integrated AFCI (DC arc-fault circuit protection)	Yes*										
Integrated DC switch	Optional										

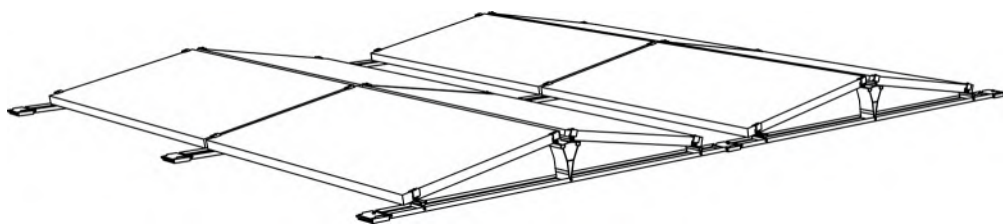
General Data

Dimensions (W*H*D)	310*563*219 mm			
Weight	17.3 kg	18 kg	18.9 kg	19.8 kg
Topology	Transformerless			
Self consumption (night)	<1 W			
Operating ambient temperature range	-25 ~ +60°C			
Relative humidity	0-100%			
Ingress protection	IP65			
Cooling concept	Natural convection		Intelligent redundant fan-cooling	
Max. operation altitude	4000 m			
Grid connection standard	G98 or G99, VDE-AR-N 4105 / VDE V 0124, EN 50549-1, VDE 0126 / UTE C 15 / VFR:2019, RD 1699 / RD 244 / UNE 206006 / UNE 206007-1, CEI 0-21, C10/11, NRS 097-2-1, TOR, EIFS 2018.2, IEC 62116, IEC 61727, IEC 60068, IEC 61683, EN 50530			
Safety/EMC standard	IEC/EN 62109-1/-2, IEC/EN 61000-6-1/-2/-3/-4			

Features

DC connection	MC4 connector										
AC connection	Quick connection plug										
Display	LCD										
Communication	RS485, Optional: Wi-Fi, GPRS										

* Activation required.



System Datasheet

FS10-EW / FS10-EW XL

General

System	Ballasted PV-mounting system
Content	Ground rails, rail connector, building protection mat, low post, high post, clamps
System warranty	10 years
Application area	Flat roof on industrial, agricultural (except hydrogen sulfide exposition) and residential buildings
Roof covering	Bitumen, concrete, foil, gravel
Roof slope	max. 5° without additional measures

System properties

System orientation	East-West
Module tilt	10°
System weight approx.	1,15 kg/m²plus ballast (project specific)
Weight PV-module included approx.:	11,8 kg/m²plus ballast (project specific)
Friction coefficient	$\mu = 0,5$ is to be determined and ensured upon installation surface.
Material	Aluminum, stainless steel, rubber granulate
Minimum edge distance	0,6 m
Max. Wind Dynamic Pressure	$q_p = 1,5 \text{ kN/m}^2$ (with simultaneously acting snow load of $s_k = 1,5 \text{ kN/m}^2$)
Max. Wind Dynamic Pressure	$q_p = 1,0 \text{ kN/m}^2$ (with simultaneously acting snow load of $s_k = 2,5 \text{ kN/m}^2$)

Modules

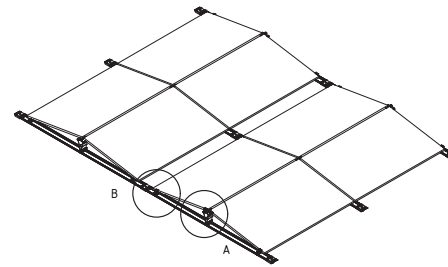
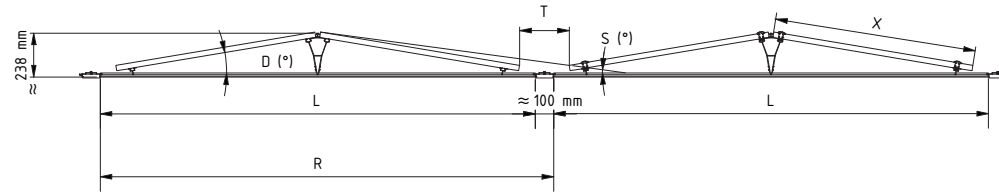
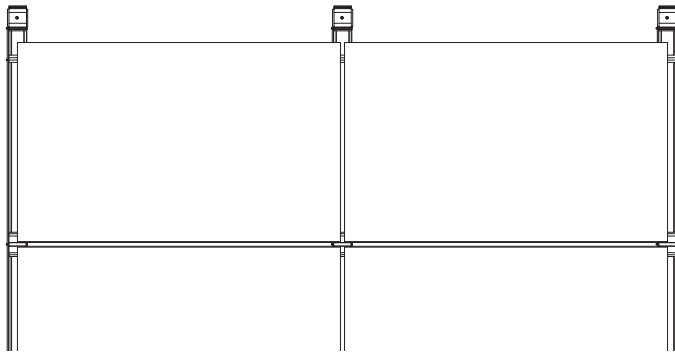
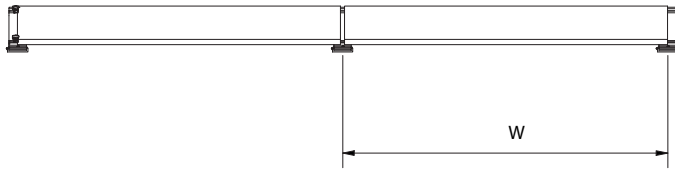
Type	Suitable for standard 60/72 cell panels. Approval for panel corner clamping is to be obtained.
Module width:	FS10-EW: 950-1.052 mm / FS10-EW XL: 1053-1.168 mm
Module guidance	Horizontal/Landscape

Certifications

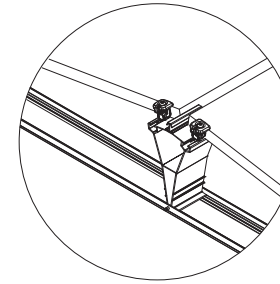
Wind loads	Determined in wind tunnel tests by Ruscheweyh Consult GmbH
PV layout	Provided by Renusol (www.pv-configurator.com)
Ballast plan	Provided by Renusol (www.pv-configurator.com)

Services

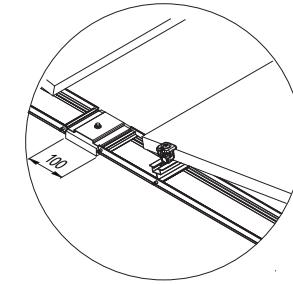
PV layout	Provided by Renusol (www.pv-configurator.com)
Ballast plan	Provided by Renusol (www.pv-configurator.com)



A (1 : 10)



B (1 : 10)



System	FS10-EW XL	
Ground rail	R500499	
Rail length	L:	2362 mm
Row spacing	R:	2462 mm
Module width	X ₁ :	Min: 1053 mm
	X ₂ :	Max: 1168 mm
Passageway	T(X ₁):	Min: 355 mm
	T(X ₂):	Max: 125 mm
System width	W:	Module length +24mm
Module inclination	D:	9°
Shading angle	S;	≈ 7,0° - 9,0°

System	FS10-EW	
Ground rail	R500500	
Rail length	L:	2260 mm
Row spacing	R:	2360 mm
Module width	X ₁ :	Min: 950 mm
	X ₂ :	Max: 1052 mm
Passageway	T(X ₁):	Min: 455 mm
	T(X ₂):	Max: 255 mm
System width	W:	Module length +24mm
Module inclination	D:	10°
Shading angle	S:	≈ 6,7° - 7,9°

System	FS10-EW	
Ground rail	R500407	
Rail length	L:	2060 mm
Row spacing	R:	2160 mm
Module width	X ₁ :	Min: 950 mm
	X ₂ :	Max: 1052 mm
Passageway	T(X ₁):	Min: 255 mm
	T(X ₂):	Max: 55 mm
System width	W:	Module length +24mm
Module inclination	D:	10°
Shading angle	S:	≈ 7,8° - 9,3°

System	FS10-EW	
Ground rail	R500501	
Rail length	L:	1989 mm
Row spacing	R:	2090 mm
Module width	X ₁ :	Min: 950 mm
	X ₂ :	Max: 1020 mm
Passageway	T(X ₁):	Min: 185 mm
	T(X ₂):	Max: 45 mm
System width	W:	Module length +24mm
Module inclination	D:	10°
Shading angle	S:	≈ 9,0° - 9,5°

The emlite EMP1 Three phase metering range offers high quality accurate meters that are suitable for direct connected domestic, commercial, Solar PV and light industrial applications.

Features -

- Fully MID approved
- 4 quadrant power measurement (Import and Export, Active and Reactive Energy)
- Optional Power Quality Information - Volts, Current, Power etc.
- Optional pulsed outputs
- Optical communications port
- Solid brass terminals

The EMP1.az and EMP1.av are the entry models of the emlite three phase metering range. They are suitable for a host of different applications where basic consumption or generation metering is required. The EMP1.az and EMP1.av variants covered in this information sheet are of solid high quality construction and benefit from features normally found in more expensive metering.



- Accuracy Class A or B (MID) [active energy] and Cl 2 [reactive energy*]
- 4 quadrant energy measurement
- Optional power quality information*
- Configurable pulsed outputs**
- Multiple terminal cover options (Short, Extended(Standard), Extended plus)
- Clear easy to read 8 digit LCD with specific symbols for different quantities.
- Solid Brass terminals
- Optional finger guard for main terminals

NB: * denotes standard setting, ** pulse set for kWh import as standard

Three Phase Whole Current Meter

EMP1.AV only

Pulsed Output

An opto-isolated pulse output can provide data for collection by an energy management system or AMR data logger. These pulses are output via the meter's auxiliary terminals.

The output conforms to IEC 62053-31.



Technical Data - Meter

Electrical

Voltage	Nominal voltage	3 x 230v
	Voltage withstand	400V continuously
Frequency	Nominal frequency	50Hz, variation $\pm 5\%$
Current	Basic current (Iref)	5, 10, 15 and 20*
	Maximum (Imax)	100A

Metrology

Accuracy	Active energy	Class B, to EN 50470 1-3*
	Reactive energy	Class 2, to IEC 62053-23

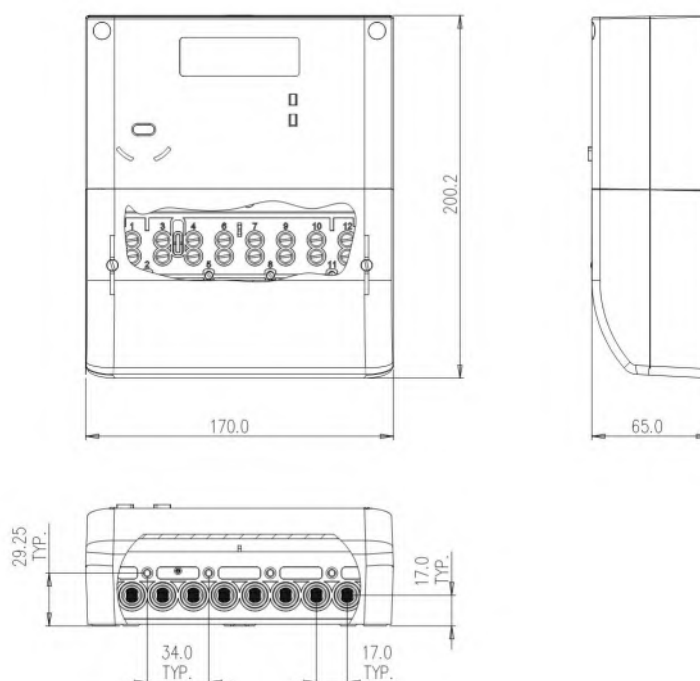
Environmental

Temperature Range	-25°C to +55°C
-------------------	----------------

Physical

Ingress protection	IP54, to BS EN 60529
Terminal arrangement	DIN43857-Part 2, fixing centres of 150 $\pm$ 1mm
	Main Terminal size 8.2mm $\varnothing \pm 0.2$
Terminal Construction	Solid brass

Dimensions



NB * denotes standard setting