

3 New Road,
London N8 8TA
22 MAY2024

3NR R01 ENERGY STATEMENT AND REQUIREMENTS 2024

PART 1: ENERGY REPORT

PART 2: OVERHEATING STATEMENT

PART 3: SUSTAINABILITY STATEMENT

**PART 4: EXTERNAL AND INTERNAL ASHP POSITON WITH
HEATING OUTPUTS AND MVHR POSITION**

PART 5: EXISTING AND PROPOSED ROOF PLAN



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PART 1

ENERGY REPORT



BEYOND BUILDING

Energy Strategy

3 New Road London, N8 8TA

On behalf of Acorn Property Group

APG.NR.N8

R01

8th May 24

Revision History

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Calculations contained within this report have been produced based on information supplied to Energist by the Client and the Design Team. Any alterations to the technical specification on which this report is based will invalidate its findings.

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Contents

EXECUTIVE SUMMARY	4
1. INTRODUCTION	7
2. METHODOLOGY	9
3. THE DEVELOPMENT BASELINE	11
4. BE LEAN: REDUCED ENERGY DEMAND	12
5. BE CLEAN: HEATING INFRASTRUCTURE	15
6. BE GREEN: LOW-CARBON AND RENEWABLE ENERGY	17
7. BE SEEN: ENERGY MODELLING	19
8. MAINS WATER CONSUMPTION	20
9. SITE-WIDE RESULTS	21
10. CONCLUSION AND RECOMMENDATIONS	22
APPENDICES	23
APPENDIX 1: LIST OF ABBREVIATIONS	23
APPENDIX 2: PLANNING POLICY AND DESIGN GUIDANCE	24
APPENDIX 3: ENERGY ASSESSMENT RESULTS.....	28
APPENDIX 4: SAMPLE SAP REPORTS	29
APPENDIX 5: LZCT ASSESSMENT.....	30
APPENDIX 6: DRAWINGS OF THE INTERNAL AND EXTERNAL MVHR AND ASHP POSITIONING.....	40

EXECUTIVE SUMMARY

This Energy Strategy has been produced by Energist UK on behalf of Acorn Property Group ('the Applicant'), who are constructing the scheme at 3 New Road London. It supports the planning permissions for the site, ref: HGY/2016/1562, granted in 2017. Planning Policy and Part L of the Building Regulations have moved on since in respect of energy and Sustainability. The Applicant wants to bring the scheme up to date with current requirements.

By adopting principles of sustainable design, and through the incorporation of efficient, Low and Zero-Carbon (LZC) technologies, the Applicant will successfully deliver The London Plan (2021) planning policies, with reference to Policy D4 Housing Quality and Standards; Policy SI1 Improving air quality; Policy SI2 Minimising Greenhouse Gas Emissions; Policy SI3 Energy Infrastructure, and Policy SI4 Managing Heat Risk. This Energy Strategy has been written in accordance with the Energy Assessment Guidance, Greater London Authority guidance on preparing energy assessments as part of planning applications (2022).

The Applicant is committed to a design approach that aligns with the principles of the energy hierarchy. The development will achieve a total reduction in regulated CO₂ emissions of 78% betterment over the L1B Notional Target emissions, Approved Document Part L (AD L) 2021 through Be Lean and Be Green measures. This methodology is a deviation from the methodology outlined within the energy assessment guidance due to the change of use nature of the scheme.

Be Lean: Passive design measures have been included and lead to a significant reduction in regulated CO₂ emissions over the AD L 2021 notional baseline. A combination of 'Be Lean' measures including energy-efficient building fabric; insulation to all heat loss floors, walls and roofs; double-glazed windows; low-energy lighting; and efficient heating and ventilation systems all contribute to an enhancement in the energy performance. This report demonstrates a 12% improvement at 'be lean' stage, exceeding the 10%, set out within the London Plan Policy SI 2.

Be Clean: The feasibility of supplying decentralised energy to the development has been assessed in accordance with the heating hierarchy. The Development does not lie in the vicinity of a heat network or a Heat Network Priority and Opportunity Area. Due to the

existing nature of the building, there is limited space available for a plant room, so a communal heating system is not viable.

Be Green: After maximising the 'Be Lean' design measures to reduce energy demand, the proposed strategy is to implement individual Air Source Heat Pumps to serve the Heating and Hot water for each apartment. This will supply efficient and low carbon space heating and hot water to all units within the proposed Development. The incorporation of the heat pump technology will deliver a 65% reduction in regulated CO₂ emissions over the 'be lean' position. Overall, this represents a 78% reduction in regulated CO₂ emissions through all measures, thus exceeding the required standard of 35% improvement over the baseline (and the GLA aspirational 50% target).

The development has maximised every opportunity to reduce emissions where practicable on site through a combination of efficient fabric and design; efficient heating systems and to make significant reductions in CO₂ emissions against the baseline.

	Total regulated emissions (Tonnes CO₂ / year)	CO₂ savings (Tonnes CO₂ / year)	Percentage savings (%)
Part L1B 2021 baseline	9.0		
Be lean	7.9	1.1	12%
Be clean	7.9	0.0	0%
Be green	2.0	5.9	65%
Total Savings	-	7.0	78%

Figure 1 - Site-wide carbon reduction.

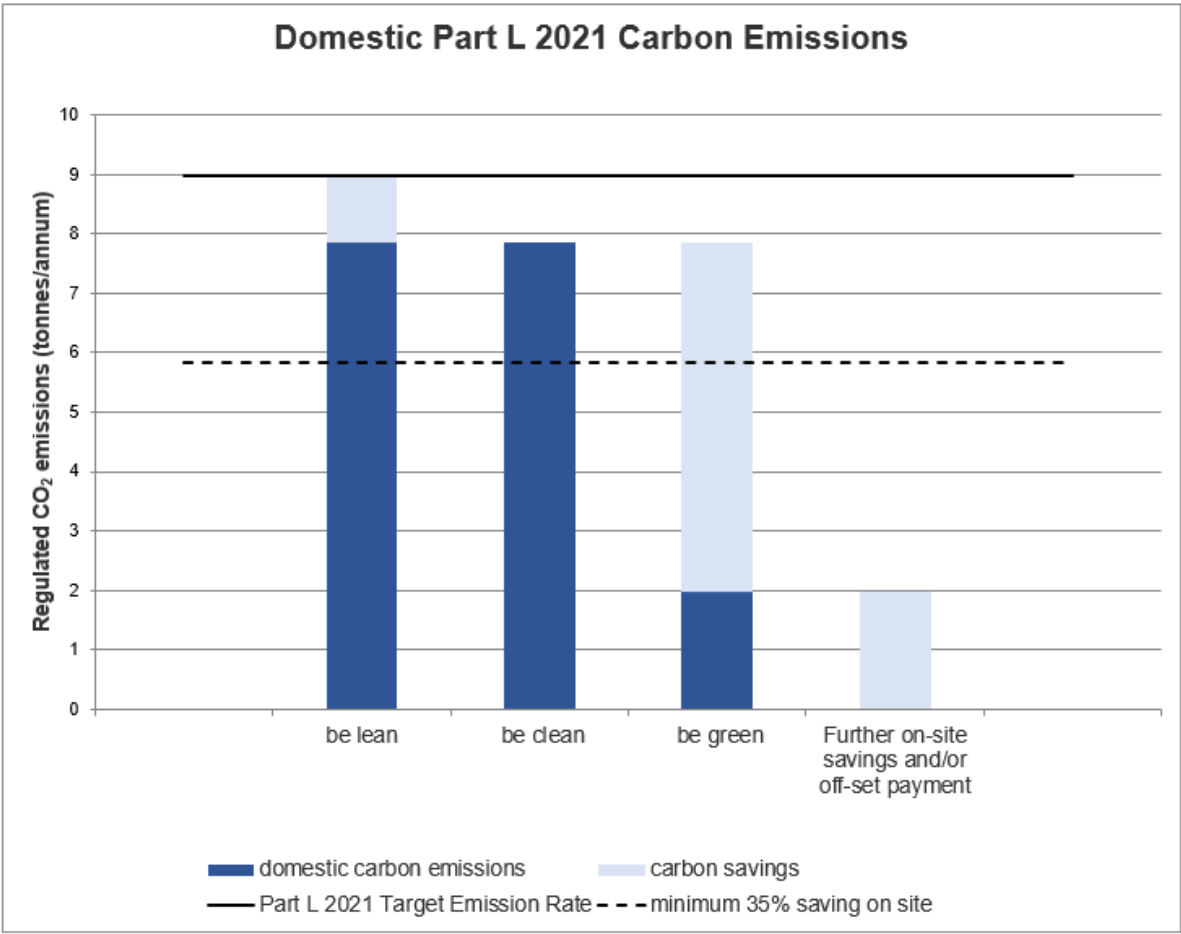


Figure 2 - Domestic carbon emission performance

1. INTRODUCTION

This Energy Strategy has been produced by Energist UK on behalf of Acorn Property Group ('the Applicant').

The scheme consists of the construction of 5 dwellings built over three storeys at the existing office element of the scheme located at 3 New Road, London. The scheme is therefore to be assessed as change of use.

This Energy Strategy supports the planning permissions for the site, ref: HGY/2016/1562, granted in 2017. Planning Policy and Part L of the Building Regulations have moved on since in respect of energy and Sustainability. This application is being submitted to the London Borough of Haringey.

Map 1. Site location for 3 New Road, London.



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This Energy Strategy will demonstrate the approach adopted by the Applicant to comply with:

- i) National Planning Policy Framework (2023).
- ii) The London Plan (2021) Planning Policies SI1 to SI4 on climate change mitigation measures to:
 - Achieve a minimum 35% on-site reduction in CO₂ emissions over Building Regulations (50% aspirational target), by implementing principles of the energy hierarchy.
 - Achieve a minimum 10% domestic, improvement on Building Regulations from energy efficiency (Be Lean).
 - Evaluate the viability of heat networks in accordance with the following hierarchy:
 1. Connection to an area wide heat network
 2. Communal heating system:
 - Site-wide heat network
 - Building-level heating system
 3. Individual heating system
 - Reduce the potential for overheating through the incorporation of passive design measures in accordance with the cooling hierarchy.
 - Maximise opportunities for the installation of renewable energy technologies.
- iii) Energy Assessment Guidance, Greater London Authority guidance on preparing energy assessments as part of planning applications (2022).

This Energy Strategy describes demand-reduction measures, energy-efficiency measures and Low- and Zero-Carbon (LZC) technologies in relation to how the Applicant meets the objectives of the energy hierarchy: Be Lean and Be Green.

2. METHODOLOGY

The purpose of the Energy Strategy is to demonstrate the Applicant's commitment to delivering the principles of the energy hierarchy.

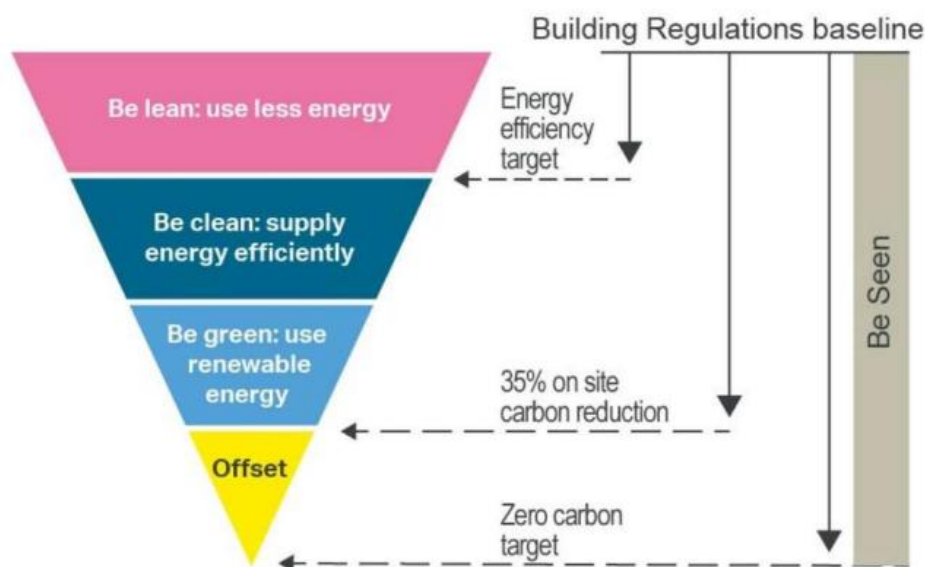


Figure 3 - The London Plan Energy Hierarchy

The Strategy is assessed against, and presented, to align with the following steps:

The Baseline: The development's baseline energy demand will be calculated to establish the minimum on-site standard for compliance with AD L 2021. This is taken from the DER achieved when notional minimum values are input to achieve a minimum 'pass' under L1B methodology. Using threshold U-values for all fabric, and 89.5% efficiency gas boiler. Due to the change of use nature of the scheme, this methodology is deemed appropriate.

Be Lean: The Development's Dwelling Emission Rate (DER) will be calculated to explain how the Applicant's design specification has led to a reduced energy demand and an improved fabric-energy efficiency.

Be Clean: The potential to provide energy to the Development in an efficient way, by either connecting to a District Heat Network (DHN) or installing a site-wide, low-carbon energy system on site.

Be Green: Low- and Zero-Carbon (LZC) technologies will be assessed for their suitability and viability in relation to the development. Solutions will be put forward for the Development and the resulting regulated CO₂ emission savings presented.

2.1 Assessment Methods

At each stage of the energy hierarchy, the estimated energy performance of the Development has been calculated using the SAP 10.2 methodology to calculate all five residential dwellings. The results have then been input into the GLA energy reporting spreadsheet to accurately reflect the emissions for the entire scheme.

SAP calculates the regulated energy demands associated with hot water, space heating and fixed electrical items. Part L1b is used for the purposes of the change of use energy assessment.

3. THE DEVELOPMENT BASELINE

In order to measure the effectiveness of 'Be Lean' demand-reduction measures, it is first necessary to calculate the baseline energy demand for the development and this has been done using the SAP 10.2 methodology. This is also referred to as the L1B baseline.

The resulting AD L1B 2021 baseline for the development has been calculated using Part L model designs which have been applied to the Applicant's development details. The baseline energy demand represents the maximum regulated CO₂ emissions that are permitted for the development in order to comply with AD L1B 2021.

The resulting baseline under AD L1B 2021 has been calculated as 9.0 t.CO₂/yr for domestic areas. Refer to Appendix 3 for energy assessment summary spreadsheet.

4. BE LEAN: REDUCED ENERGY DEMAND

The development achieves a high-quality sustainable design by integrating the following passive and active design measures to reduce energy demand:

- Energy-efficient building fabric and insulation to all heat loss floors, walls, and roofs, targeting a low heat demand.
- Highly efficient glazing throughout.
- Low-energy lighting throughout the development.

Designing an efficient thermal envelope will greatly reduce the need for space heating as heat transmittance through the thermal elements is reduced, whilst low air permeability rates will also reduce heating demand by reducing the volume of air that can penetrate the building, minimising heat losses in the winter and heat gains in the summer.

As part of a fabric first approach, the building fabric has been carefully considered and specified to meet or exceed AD L 2021 minimum requirements, along with the specification of energy efficient plant. The following 'Be Lean' design specification is proposed.

Table 1: Be Lean Design Specification

Element	'Be Lean' Design Specification
Ground Floor U-Value (W/m ² .K)	0.09
External Wall U-Value (W/m ² .K)	0.17
Party Wall U-Value (W/m ² .K)	0.00 (fully filled and sealed)
Corridor Walls U-Value (W/m ² .K)	0.18
Roof U-Value (W/m ² .K)	0.2
Glazing U-Value (W/m ² .K)	1.6
Glazing G-Value	0.63
Design Air Permeability m ³ /m ² /h @ 50 Pa	15 - Default
Thermal Bridging	0.20 - Default
Ventilation	Natural with intermittent fans
Cooling	N/A
Lighting	85 lm/W
Space Heating	89.5% efficiency communal gas boiler
Space Heating controls	Time and temperature zone control with delayed start thermostat
Domestic Hot water	From main heating system
Renewables	None

4.1 Be Lean Carbon Emissions Reduction

The Applicant's design specification and proposed demand-reduction measures for the Development have been modelled using SAP 10.2 methodology. The subsequent TER's and DERs are then populated within the GLA spreadsheet in alignment with the GLA's energy assessment guidance (2022). No manual adjustment for notional PV allocation has been incorporated due to the change of use nature of the scheme and that a notional DER has been utilised as the baseline. This allows the effectiveness of 'Be Lean' measures to be assessed as a percentage reduction in CO₂ emissions over the baseline. Refer to Appendix 3 for an energy assessment summary.

By incorporating sustainable design, the Applicant will reduce regulated CO₂ emissions over AD L 2021 across the development. These reductions are illustrated below.

Table 2 - CO₂ savings from adopting an energy efficient specification.

	Total regulated emissions (Tonnes.CO₂/yr)	Regulated CO₂ emissions savings (Tonnes.CO₂/yr)	Percentage saving (%)
AD L 2021 baseline	9.0	-	-
Be Lean: savings from demand reduction	7.9	1.1	12%

5. BE CLEAN: HEATING INFRASTRUCTURE

The next step in the energy hierarchy is to consider how the remaining energy demand can be met and whether there is the potential for this to be done through the mechanism of establishing and/or linking up with an existing or planned District Heat Network. This is assessed in line with Planning Policy SI 3 of The London Plan (2021), and the requirements of the GLA Energy Assessment Guidance (2022).

To ensure compliance with the energy hierarchy, the potential to supply energy efficiently to the development and further reduce regulated CO₂ emissions through 'Be Clean' measures, has been evaluated. This has been done with attention to the following hierarchy for selecting an energy system:

- 1). Connection to an area wide heat network.
- 2). Communal heating system:
 - Site-wide heat network.
 - Building-level heating system.
- 3). Individual heating system.

5.1 Area-wide Heat Network

The London Heat Map has been consulted to establish whether the development lies within proximity of an existing or proposed area-wide DHN. The development does not lie within the vicinity of an existing DHN. The closest proposed DHN is Wood Green Energy Centre Network which is approximately 1.5 kilometres to the North East.



5.2 Application Viability

The Development does not lie within the vicinity of an existing or proposed heat network or is in a Heat Network Priority and Opportunity Area.

A site wide communal heating scheme is not viable due to limited space for a plant room. Therefore no reduction is demonstrated at be clean stage.

6. BE GREEN: LOW-CARBON AND RENEWABLE ENERGY

In line with planning policy SI 2 of The London Plan (2021) and Energy Assessment Guidance, the Applicant seeks to maximise opportunities for incorporating Low and Zero-Carbon (LZC) technologies as part of their energy strategy for the development.

In accordance with the energy hierarchy, the Applicant has adopted 'Be Lean' measures as a priority for the scheme and demonstrates an 12% reduction in regulated CO₂ emissions over the AD L 2021 baseline in regulated CO₂ emissions over the AD L 2021 baseline.

LZC technologies have been assessed for their viability as a component of a complementary heating strategy for the Development. A detailed review of the LZC technologies is provided in Appendix 5, including wind, solar thermal, biomass, and other heat pump technologies. The Applicant's adopted strategy for LZC technologies is compatible with the 'Be Lean' design specification.

6.1 Proposed Low and Zero Carbon Technologies

The current proposals for the development are:

- In order to maximise carbon savings and minimise Occupant running cost, it is proposed that apartments are served by individual Air Source Heat Pumps (ASHP) for the heating and hot water demand. The communal ASHP will have an efficiency of 282%.

The proposed energy strategy is an all-electric solution to serve space heating and hot water generation. This takes full advantage of the decarbonisation of national grid supplied electricity, futureproofing the development as carbon emissions continue to decline with greening of the grid, enabling a zero carbon ready development. The internal and external positioning of the MVHR and ASHP units can be found in Appendix 6. The existing building has an extensive green roof which is curved and due to the nature of the construction and form it is not possible to fix PV panels to the structure. The scheme already exceeds the requirements for change of use.

6.2 Be Green Carbon Emissions Reduction

It has been calculated that the incorporation of the above heat pump systems will provide a further improvement over AD L 2021 of 5.9 t.CO₂/yr or 65% for the proposed development.

Table 4 - Predicted CO₂ savings from adopting proposed low and zero-carbon technologies.

	Total regulated emissions (Tonnes.CO₂/yr)	Regulated CO₂ emissions savings (Tonnes.CO₂/yr)	Percentage saving (%)
AD L 2021	9.0	-	-
Be Lean: savings from demand reduction	7.9	1.1	12%
Be Clean: savings from heat network	7.9	0.0	0%
Be Green: savings from renewable energy	2.0	5.9	65%

7. BE SEEN: ENERGY MODELLING

All apartments shall be provided with individual smart meters. The specific system to be adopted has not been selected and shall be subject to detailed design. However, the systems selected shall enable the monitoring of heat and energy (including unregulated energy) via an energy display device, to allow residents to manage their energy use in line with the GLA requirements. By monitoring energy use in real time, residents will directly be able to reduce unregulated energy consumption.

The Applicant is committed to keeping energy costs down for tenants, occupants, and commercial users throughout the scheme, and this will in part be achieved through high efficiency heat pumps with excellent primary energy delivery rates, and through the metering strategy.

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

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

For residential uses, the methodology for reporting energy consumption (kWh/m²) and carbon emissions estimates (Tonnes.CO₂/m²) should follow a Building Regulations Part L compliant methodology using SAP. This is as per current planning calculation and reporting methodologies.

8. MAINS WATER CONSUMPTION

It is acknowledged that the water consumption of homes has a significant impact on not only direct operational running costs (i.e., water consumption charges), but also indirectly through additional energy usage and the heating of water for domestic use. This is, in part, reflected in SAP 10.2 methodology which assumes reduced energy consumption should a dwelling be compliant with Approved Document Part G.

The Applicant will reduce water demand across the site by incorporating water-efficient fixtures and fittings as a standard specification within each new dwelling. A standard of 110 litres per person per day will be achieved (excluding an allowance of 5 litres or less per person per day for external water consumption) in line with the latest GLA Guidance.

The standard of 110 litres of water per person per day can be met using the specification set out below.

Element	Performance
Kitchen Taps flow rate	5 Litres per minute
Other basin Taps flow rate	4 Litres per minute
WCs Flush Volume	6/3 Litres
Shower Flow rate	8 Litres per minute
Bath Volume	150 Litres
Dishwasher water consumption	1.25 litres per place setting
Washing-machine water consumption	8.17 litres per Kg

9. SITE-WIDE RESULTS

Following the Energy Hierarchy stages detailed above, the final carbon emissions are summarised below for the site.

	Total regulated emissions (Tonnes CO₂ / year)	CO₂ savings (Tonnes CO₂ / year)	Percentage savings (%)
Part L 2021 baseline	9.0		
Be lean	7.9	1.1	12%
Be clean	7.9	0.0	0%
Be green	2.0	5.9	65%
Total Savings	-	7	78%

Figure 3 - Site-wide carbon reduction.

In summary, the following design measures have been incorporated into the proposed Development design, in accordance with the Energy Hierarchy, in order to reduce carbon emission as far as practicable:

- Energy-efficient building fabric and insulation to all floors, walls and roofs.
- High-efficiency BFRC Approved double-glazed windows throughout.
- Balancing solar gains in winter and minimising it in summer.
- Low-energy lighting throughout the Development.

10. CONCLUSION AND RECOMMENDATIONS

The Applicant has demonstrated a firm commitment to deliver climate change mitigation measures for the proposed development by following a design approach that aligns with the principles of the energy hierarchy. The Development will achieve a total reduction in regulated CO₂ emissions of 78% over the Approved Document Part L1B (AD L) 2021 baseline through Be Lean and Be Green measures and therefore successfully delivers the GLA London Plan target of a 35% minimum on-site reduction in regulated CO₂ emissions over AD L 2021 (and the 50% optional target).

Be Lean: Passive design measures have been included and lead to a significant reduction in regulated CO₂ emissions over the AD L1B 2021 baseline. A combination of 'Be Lean' measures including energy-efficient building fabric; insulation to all heat loss floors, walls and roofs; double-glazed windows and low-energy lighting all contribute to an enhancement in the energy performance. This report demonstrates an 12% improvement, this exceeds the 10%, target set out within the London Plan Policy SI 2. The Applicant has maximized specification and fabric requirements for the Be lean stage.

Be Clean: The feasibility of supplying decentralised energy to the development has been assessed in accordance with the heating hierarchy. The Development does not lie in the vicinity of a heat network or a Heat Network Priority and Opportunity Area.

Be Green: After maximising the 'Be Lean' design measures to reduce energy demand, the proposed strategy is to implement individual Air Source Heat Pumps to serve the Heating and Hot water for each apartment. This will supply efficient and low carbon space heating and hot water to all units within the proposed Development. The incorporation of the heat pump technology will deliver a 65% reduction in regulated CO₂ emissions over AD L1B 2021. Thus, exceeding the required standard of 35% improvement over the baseline (and the GLA aspirational 50% target).

APPENDICES

APPENDIX 1: LIST OF ABBREVIATIONS

AD L 2021	Approved Document Part L of Buildings Regulations 2021
ASHP	Air Source Heat Pump
BER	Building Emission Rate
BRE	Building Research Establishment
CIBSE	Chartered Institution of Building Services Engineers
COP	Coefficient of Performance
DER	Dwelling Emission Rate
DHN	District Heat Network
DHW	Domestic Hot Water
EAHP	Exhaust Air Heat Pump
EVC	Electric Vehicle Charging
FEES	Fabric Energy Efficiency Standard
GLA	Greater London Authority
LZC	Low and Zero-Carbon technologies
NCM	National Calculation Methodology
PV	Photovoltaics
SAP	Standard Assessment Procedure
SBEM	Simplified Building Energy Model
TER	Target Emission Rate
TFEE	Target Fabric Energy Efficiency
VRF	Variable Refrigerant Flow

APPENDIX 2: PLANNING POLICY AND DESIGN GUIDANCE

The Climate Change Act (2008)

Passed in November 2008, the Climate Change Act mandated that the UK would reduce emissions of six key greenhouse gases, including Carbon Dioxide, by 80% by 2050.

As a consequence, the reduction of carbon dioxide emissions is at the forefront of National, Regional and Local Planning Policy, along with continuing step changes in performance introduced by the Building Regulations Approved Document L (2013).

Approved Document L (2021)

This development is subject to the requirements of Approved Document L (2021). ADL 2013 represented an approximate reduction of 6% in the Target Emission Rate (kg/CO₂/sqm per annum) over the requirements of Approved Document L (2010) for residential development and an aggregate 9% reduction for non-residential development. ADL 2021 has seen a further 31% improvement over these targets. It also sees the introduction of a Primary Energy Target, a measure of heating demand (kW hrs/sqm per annum) to ensure new-build dwellings with low-carbon heating systems still meet satisfactory energy-efficiency standards.

National Planning Policy (2023)

The National Planning Policy Framework encourages Local Planning Authorities to '*support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change*' (NPPF paragraph 157), '*whilst taking a proactive approach to mitigating and adapting to climate change, taking into account the long-term implication for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of over shading from rising temperatures*'. (NPPF Paragraph 158).

Paragraph 160, upholds the requirement for Local Plans to:

'a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, and their future re-powering and life extension, while ensuring that adverse impacts are addressed appropriately (including cumulative landscape and visual impacts)

- b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and
- c) *identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for colocating potential heat customers and suppliers*

In paragraph 162, NPPF stipulates that local planning authorities should take account of the benefits of decentralised energy and passive design measures as a means of energy efficiency in new development: *'In determining planning applications, local planning authorities should expect new development to:*

- a) *comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and*
- b) *take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.'*

The London Plan (2021)

Policy SI 2 Minimising greenhouse gas emissions

- A. Major development should be net zero-carbon. This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:
 - I. Be Lean: use less energy and manage demand
 - II. Be Clean: exploit local energy resources and supply energy efficiently and cleanly
 - III. Be Green: maximise opportunities for renewable energy on-site
 - IV. Be Seen: monitor, verify and report on energy performance
- B. Major development proposals should include a detailed energy strategy to demonstrate how the zero carbon target will be met within the framework of the energy hierarchy.
- C. A minimum on-site reduction of at least 35 per cent beyond Building Regulations is required for major development. Residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided,

in agreement with the borough, either:

- through a cash in lieu contribution to the borough's carbon offset fund, or
- off-site provided that an alternative proposal is identified, and delivery is certain.

- D. Boroughs must establish and administer a carbon offset fund. Offset fund payments must be ring-fenced to implement projects that deliver carbon reductions. The operation of offset funds should be monitored and reported on annually.
- E. Major development proposals should calculate and minimise carbon emissions from any other part of the development, including plant or equipment, that are not covered by Building Regulations, i.e., unregulated emissions.
- F. Development proposals referable to the Mayor should calculate whole life-cycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce lifecycle carbon emissions.

Policy SI 3 Energy infrastructure

- A. Boroughs and developers should engage at an early stage with relevant energy companies and bodies to establish the future energy and infrastructure requirements arising from largescale development proposals such as Opportunity Areas, Town Centres, other growth areas or clusters of significant new development.
- B. Energy masterplans should be developed for large-scale development locations (such as those outlined in Part A and other opportunities) which establish the most effective energy supply options.
- C. Development Plans should identify the need for, and suitable sites for, any necessary energy infrastructure requirements including energy centres, energy storage and upgrades to existing infrastructure identify existing heating and cooling networks, identify proposed locations for future heating cooling networks and identify opportunities for expanding and interconnecting existing networks as well as establishing new networks.
- D. Major development proposals within Heat Network Priority Areas should have a communal low temperature heating system. The heat source for the communal heating system should be selected in accordance with the following heating hierarchy:
 - a) connect to local existing or planned heat networks

- b) use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)
 - c) use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network)
 - d) use ultra-low NOx gas boilers
- E. Heat networks should achieve good practice design and specification standards for primary, secondary and tertiary systems comparable to those set out in the CIBSE/ADE Code of Practice CP1 or equivalent.

Policy SI4 Managing Heat Risk:

Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

- 1) reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
- 2) minimise internal heat generation through energy efficient design
- 3) manage the heat within the building through exposed internal thermal mass and high ceilings
- 4) provide passive ventilation
- 5) provide mechanical ventilation
- 6) provide active cooling systems.

APPENDIX 3: ENERGY ASSESSMENT RESULTS

GLA spreadsheet provided separately.

RESIDENTIAL CO₂ ANALYSIS (PART L1)

[illegible]

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 web																
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	
		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)
Residential use (total)	323	7690.73	13266.67	0	0	0	0	0	0	0	Yes	Yes	41.07328173	23.8103096	35	15
Landlord Circulation (in Residential Blocks)	0	0	0	0	0	0	0	0	0	0	Yes	Yes				
Total	323	7690.73	13266.67	0	0	0	0	0	0	0						
Non-residential predicted energy use																
		EUI & space heating demand (kWh/year)									Has the following energy use been included?		Results		Table 4 of the guidance comparison	
		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				

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	9.0	2.9
After energy demand reduction (be lean)	7.9	2.9
After heat network connection (be clean)	7.9	2.9
After renewable energy (be green)	2.0	2.9

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	1.1	12%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	5.9	65%
Cumulative on site savings	7.0	78%
Annual savings from off-set payment	2.0	-
(Tonnes CO₂)		
Cumulative savings for off-set payment	59	-
Cash in-lieu contribution (£)	5,650	

*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

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	9.0		
Be lean	7.9	1.1	12%
Be clean	7.9	0.0	0%
Be green	2.0	5.9	65%
Total Savings	-	7.0	78%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	59.5	-

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 /y ear) (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	41.07328173	23.8103096	35	15	& dwellings / & Landlord Circulation	

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 TFEE/DFEE.

RESIDENTIAL CO₂ ANALYSIS (PART L1)

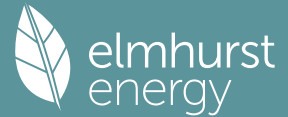
				Baseline		'Be Lean'	'Be Clean'	'Be Green'	Fabric Energy Efficiency (FEE)		Baseline		'Be Lean'			'Be Clean'			'Be Green'	
Unit identifier (e.g. plot number, dwelling)	Model total floor area	Number of units	Total area represented by model	TER	Energy saving/generation technologies (-)	DER	DER	DER	Target 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
	(m²) (Row 4)		(m²)	(kgCO ₂ / m²) (Row 273)	(kgCO ₂ p.a.) (Row 269)	(kgCO ₂ / m²) (Row 273 or 384)	(kgCO ₂ / m²) (Row 273 or 384)	(kgCO ₂ / m²) (Row 273 or 384)	(kWh/m²)	(kWh/m²)	(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.)
Flat 1	52.2	1	52.2	32.44	0.00	26.52	26.52	6.57	41.40	75.38	1,693	0	1,384	1,384	309	1,384	1,384	0	343	1,041
Flat 2	70	1	70	27.18	0.00	23.00	23.00	5.80	35.49	66.59	1,903	0	1,610	1,610	293	1,610	1,610	0	406	1,204
Flat 3	75.7	1	75.7	24.30	0.00	22.23	22.23	5.66	35.26	67.15	1,840	0	1,683	1,683	157	1,683	1,683	0	428	1,254
Flat 4	62.8	1	62.8	25.56	0.00	22.91	22.91	5.81	32.89	64.45	1,605	0	1,439	1,439	166	1,439	1,439	0	365	1,074
Flat 5	62.6	1	62.6	30.81	0.00	27.80	27.80	7.03	42.73	84.38	1,929	0	1,740	1,740	188	1,740	1,740	0	440	1,300

APPENDIX 4: SAMPLE SAP REPORTS

Notional, Be Lean & Be Green sample Worksheets for SAP to be provided separately.

NOTIONAL

Full SAP Calculation Printout



Property Reference	Flat 1			Issued on Date	11/04/2024
Assessment Reference	Plot 1_Copy_Copy	Prop Type Ref	HTA		
Property	Flat 1, 3 New Road, London, N8 8TA				
SAP Rating	76 C	DER	32.44	TER	16.18
Environmental	77 C	% DER < TER			-100.49
CO ₂ Emissions (t/year)	1.47	DFEE	92.60	TFEE	41.40
Compliance Check	See BREL	% DFEE < TFEE			-123.65
% DPER < TPER	-106.64	DPER	177.19	TPER	85.75
Assessor Details	Ms. Ruth Pike			Assessor ID	AU93-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	52.2000 (1b)	2.6000 (2b)	135.7200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	135.7200 (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	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7500	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.6375 (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	0.8128	0.7969	0.7809	0.7013	0.6853	0.6056	0.6056	0.5897	0.6375	0.6853	0.7172	0.7491 (22b)
Effective ac	0.8303	0.8175	0.8049	0.7459	0.7348	0.6834	0.6834	0.6739	0.7032	0.7348	0.7572	0.7805 (25)

3. Heat losses and heat loss parameter

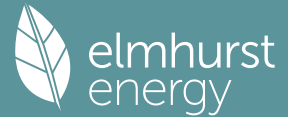
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Solid Doors			2.2000	3.0000	6.6000		(26)
Windows (Uw = 1.60)			10.0800	1.5038	15.1579		(27)
Ground Floor			52.2000	0.2500	13.0500	75.0000	3915.0000 (28a)
External Wall 1	42.5000	7.2400	35.2600	0.3000	10.5780	110.0000	3878.6000 (29a)
Wall to corridor	17.5000	5.0400	12.4600	0.3000	3.7380	110.0000	1370.6000 (29a)
Total net area of external elements Aum(A, m ²)			112.2000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	49.1239		(33)
Party Wall 1			30.0000	0.0000	0.0000	20.0000	600.0000 (32)
Party Ceiling 1			52.2000			20.0000	1044.0000 (32b)
Internal Wall Stud			50.0000			9.0000	450.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		11258.2000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							215.6743 (35)
Thermal bridges (Default value 0.200 * total exposed area)							22.4400 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		71.5639 (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
	37.1886	36.6141	36.0510	33.4060	32.9111	30.6074	30.6074	30.1808	31.4948	32.9111	33.9122	34.9588 (38)

elmhurst
energy

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	28.7559	28.9086	29.0599	29.7921	29.9333	30.6082	30.6082	30.7365	30.3446	29.9333	29.6492	29.3578
alpha	2.9171	2.9272	2.9373	2.9861	2.9956	3.0405	3.0405	3.0491	3.0230	2.9956	2.9766	2.9572
util living area	0.9891	0.9845	0.9750	0.9470	0.8850	0.7679	0.6395	0.6973	0.8747	0.9619	0.9839	0.9902 (86)
MIT	18.8653	19.0299	19.3413	19.8274	20.2820	20.6436	20.7964	20.7628	20.4693	19.9043	19.3347	18.8705 (87)
Th 2	19.2783	19.2855	19.2926	19.3261	19.3324	19.3619	19.3619	19.3675	19.3505	19.3324	19.3196	19.3064 (88)
util rest of house	0.9855	0.9793	0.9659	0.9255	0.8323	0.6504	0.4472	0.5133	0.7936	0.9422	0.9775	0.9871 (89)
MIT 2	17.4131	17.5816	17.8948	18.3936	18.8223	19.1444	19.2370	19.2295	19.0135	18.4807	17.9105	17.4387 (90)
Living area fraction									fLA = Living area / (4) =			0.4923 (91)

Full SAP Calculation Printout



MIT	18.1281	18.2947	18.6070	19.0995	19.5410	19.8826	20.0047	19.9844	19.7302	19.1816	18.6117	18.1437 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.9781	18.1447	18.4570	18.9495	19.3910	19.7326	19.8547	19.8344	19.5802	19.0316	18.4617	17.9937 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9817	0.9745	0.9599	0.9192	0.8346	0.6816	0.5125	0.5744	0.8080	0.9373	0.9730	0.9836	(94)
Useful gains	414.3800	453.9871	485.6354	526.1726	521.9052	427.5683	304.8809	309.8588	388.8015	401.1532	396.6740	401.0668	(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	1487.5277	1432.7808	1286.7458	1054.8962	803.5173	524.3995	332.5403	349.4313	564.7833	880.8867	1198.3889	1469.3384	(97)
Space heating kWh	798.4219	657.7493	596.0261	380.6810	209.5194	0.0000	0.0000	0.0000	0.0000	356.9217	577.2347	794.7941	(98a)
Space heating requirement - total per year (kWh/year)												4371.3483	
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	798.4219	657.7493	596.0261	380.6810	209.5194	0.0000	0.0000	0.0000	0.0000	356.9217	577.2347	794.7941	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4371.3483	
Space heating per m2										(98c) / (4) =		83.7423	(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	798.4219	657.7493	596.0261	380.6810	209.5194	0.0000	0.0000	0.0000	0.0000	356.9217	577.2347	794.7941	(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)	944.8780	778.4016	705.3564	450.5101	247.9519	0.0000	0.0000	0.0000	0.0000	422.3926	683.1180	940.5847	(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	245.5242	217.3513	231.0507	203.0267	196.8265	177.3371	174.8029	181.6203	183.5158	204.6988	217.8024	242.7882	(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	274.3287	242.8506	258.1572	226.8455	219.9179	198.1420	195.3104	202.9277	205.0456	228.7138	243.3547	271.2717	(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	4.5268	4.0888	4.5268	4.3808	4.5268	4.3808	4.5268	4.5268	4.3808	4.5268	4.3808	4.5268	(231)
Lighting	15.8758	12.7361	11.4675	8.4016	6.4896	5.3021	5.9200	7.6951	9.9952	13.1142	14.8124	16.3170	(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													5173.1933 (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													2766.8659 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans: central heating pump													53.3000 (230c)
Total electricity for the above, kWh/year													53.3000 (231)
Electricity for lighting (calculated in Appendix L)													128.1265 (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													8121.4857 (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	5173.1933	0.2100	1086.3706	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2766.8659	0.2100	581.0418	(264)

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Space and water heating			1667.4124 (265)
Pumps, fans and electric keep-hot	53.3000	0.1387	7.3934 (267)
Energy for lighting	128.1265	0.1443	18.4926 (268)
Total CO2, kg/year			1693.2984 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			32.4400 (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	5173.1933	1.1300	5845.7084 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2766.8659	1.1300	3126.5585 (278)
Space and water heating			8972.2669 (279)
Pumps, fans and electric keep-hot	53.3000	1.5128	80.6322 (281)
Energy for lighting	128.1265	1.5338	196.5246 (282)
Total Primary energy kWh/year			9249.4238 (286)
Dwelling Primary energy Rate (DPER)			177.1900 (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	52.2000 (1b)	x 2.6000 (2b)	= 135.7200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 135.7200 (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) =	0.1474 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3974	(18)
Number of sides sheltered		2	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3378	(21)

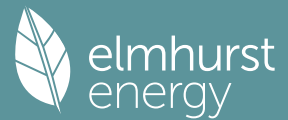
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4306	0.4222	0.4138	0.3715	0.3631	0.3209	0.3209	0.3124	0.3378	0.3631	0.3800	0.3969 (22b)
Effective ac	0.5927	0.5891	0.5856	0.5690	0.5659	0.5515	0.5515	0.5488	0.5570	0.5659	0.5722	0.5788 (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			2.2000	1.0000	2.2000		(26)
TER Opening Type (Uw = 1.20)			10.0800	1.1450	11.5420		(27)
Ground Floor			52.2000	0.1300	6.7860		(28a)
External Wall 1	42.5000	7.2400	35.2600	0.1800	6.3468		(29a)
Wall to corridor	17.5000	5.0400	12.4600	0.1800	2.2428		(29a)
Total net area of external elements Aum(A, m2)			112.2000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.1176		(33)
Party Wall 1			30.0000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							225.6743 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.6100 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	34.7276 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	26.5468	26.3855	26.2274	25.4850	25.3461	24.6994	24.6994	24.5797	24.9485	25.3461	25.6271	25.9209 (38)
Heat transfer coeff	61.2744	61.1131	60.9550	60.2126	60.0737	59.4270	59.4270	59.3072	59.6761	60.0737	60.3547	60.6485 (39)
Average = Sum(39)m / 12 =												60.2119

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HLP	1.1738	1.1707	1.1677	1.1535	1.1508	1.1384	1.1384	1.1362	1.1432	1.1508	1.1562	1.1618 (40)
HLP (average)												1.1535
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7550 (42)
Hot water usage for mixer showers	53.6446	52.8384	51.6637	49.4160	47.7573	45.9075	44.8560	46.0219	47.2999	49.2860	51.5820	53.4391 (42a)
Hot water usage for baths	23.1922	22.8477	22.3627	21.4684	20.7987	20.0562	19.6551	20.1367	20.6611	21.4557	22.3684	23.1138 (42b)
Hot water usage for other uses	32.6027	31.4171	30.2316	29.0460	27.8605	26.6749	26.6749	27.8605	29.0460	30.2316	31.4171	32.6027 (42c)
Average daily hot water use (litres/day)												100.6001 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	109.4394	107.1033	104.2579	99.9304	96.4164	92.6385	91.1860	94.0191	97.0070	100.9733	105.3675	109.1555 (44)
Energy conte	173.3253	152.5136	160.2405	136.7997	129.7950	113.9099	110.2816	116.4152	119.6194	137.0198	150.1153	170.9111 (45)
Energy content (annual)												Total = Sum(45)m = 1670.9464
Distribution loss (46)m = 0.15 x (45)m	25.9988	22.8770	24.0361	20.5200	19.4693	17.0865	16.5422	17.4623	17.9429	20.5530	22.5173	25.6367 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	50.9589	46.0274	50.9589	49.2807	49.1328	45.6848	46.4674	47.9111	47.8391	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	224.2842	198.5410	211.1994	186.0804	178.9278	159.5946	156.7490	164.3263	167.4585	187.9787	199.4304	221.8700 (62)
WWHRS	-24.5241	-21.6893	-22.7118	-18.8062	-17.5267	-14.9978	-14.0580	-14.9493	-15.5173	-18.2931	-20.7239	-24.0699 (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	199.7601	176.8517	188.4877	167.2741	161.4010	144.5969	142.6910	149.3770	151.9412	169.6855	178.7065	197.8001 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2028.5729 (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	70.3704	62.2176	66.0197	57.8061	55.4400	49.2962	48.2855	50.6858	51.7332	58.2988	62.2421	69.5677 (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	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485 (66)
Lighting gains (calculated in Appendix L9 or L9a), also see Table 5	78.0008	86.3580	78.0008	80.6008	78.0008	80.6008	78.0008	78.0008	80.6008	78.0008	80.6008	78.0008 (67)
Appliances gains (calculated in Appendix L13 or L13a), also see Table 5	152.9446	154.5317	150.5323	142.0180	131.2703	121.1690	114.4206	112.8335	116.8330	125.3472	136.0949	146.1963 (68)
Cooking gains (calculated in Appendix L15 or L15a), also see Table 5	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988 (71)
Water heating gains (Table 5)	94.5838	92.5858	88.7362	80.2862	74.5162	68.4670	64.8998	68.1261	71.8517	78.3586	86.4474	93.5049 (72)
Total internal gains	377.8538	385.8000	369.5938	355.2296	336.1118	319.5613	306.6458	308.2850	318.6100	334.0312	355.4677	370.0266 (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
Northeast					5.0400	11.2829	0.6300	0.7000			0.7700			17.3790 (75)
Northwest					5.0400	11.2829	0.6300	0.7000			0.7700			17.3790 (81)
Solar gains	34.7580	70.7509	127.4706	209.3434	281.3986	300.0007	280.6445	223.7330	155.3249	86.4632	43.7345			28.3851 (83)
Total gains	412.6118	456.5509	497.0644	564.5730	617.5104	619.5619	587.2903	532.0180	473.9350	420.4944	399.2023			398.4117 (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	53.4037	53.5446	53.6835	54.3454	54.4711	55.0638	55.0638	55.1750	54.8340	54.4711	54.2175	53.9548
alpha	4.5602	4.5696	4.5789	4.6230	4.6314	4.6709	4.6709	4.6783	4.6556	4.6314	4.6145	4.5970
util living area	0.9905	0.9837	0.9673	0.9091	0.7789	0.5880	0.4395	0.5016	0.7609	0.9415	0.9827	0.9918 (86)
MIT	19.6391	19.8151	20.1065	20.5213	20.8272	20.9642	20.9925	20.9867	20.8860	20.4909	20.0076	19.6156 (87)
Th 2	19.9410	19.9435	19.9459	19.9574	19.9595	19.9696	19.9696	19.9714	19.9657	19.9595	19.9552	19.9506 (88)
util rest of house	0.9877	0.9790	0.9575	0.8826	0.7226	0.5035	0.3395	0.3949	0.6811	0.9185	0.9768	0.9895 (89)
MIT 2	18.3758	18.6005	18.9683	19.4796	19.8169	19.9491	19.9671	19.9665	19.8879	19.4570	18.8548	18.3528 (90)
Living area fraction	18.9978	19.1985	19.5287	19.9925	20.3143	20.4489	20.4719	20.4688	20.3793	19.9660	19.4224	18.9745 (92)
MIT	18.9978	19.1985	19.5287	19.9925	20.3143	20.4489	20.4719	20.4688	20.3793	19.9660	19.4224	18.9745 (93)
Temperature adjustment												0.0000
adjusted MIT	18.9978	19.1985	19.5287	19.9925	20.3143	20.4489	20.4719	20.4688	20.3793	19.9660	19.4224	18.9745 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9844	0.9747	0.9528	0.8837	0.7430	0.5438	0.3888	0.4474	0.7152	0.9186	0.9729	0.9865	(94)
Useful gains	406.1665	445.0167	473.5876	498.8849	458.8287	336.9245	228.3309	238.0055	338.9712	386.2836	388.4003	393.0234	(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	900.5955	873.8234	794.1643	667.9060	517.4929	347.5825	230.0982	241.3067	374.7231	562.6519	743.7135	896.0509	(97)
Space heating kWh	367.8552	288.1581	238.5091	121.6952	43.6462	0.0000	0.0000	0.0000	0.0000	131.2180	255.8255	374.2525	(98a)
Space heating requirement - total per year (kWh/year)												1821.1597	
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	367.8552	288.1581	238.5091	121.6952	43.6462	0.0000	0.0000	0.0000	0.0000	131.2180	255.8255	374.2525	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1821.1597	
Space heating per m2										(98c) / (4) =		34.8881	(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 %)													92.4000	(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	367.8552	288.1581	238.5091	121.6952	43.6462	0.0000	0.0000	0.0000	0.0000	131.2180	255.8255	374.2525	(98)	
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)	
Space heating fuel (main heating system)	398.1117	311.8594	258.1267	131.7047	47.2362	0.0000	0.0000	0.0000	0.0000	142.0108	276.8674	405.0351	(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	199.7601	176.8517	188.4877	167.2741	161.4010	144.5969	142.6910	149.3770	151.9412	169.6855	178.7065	197.8001	(64)	
Efficiency of water heater (217)m	85.6710	85.4207	84.8869	83.7103	81.9883	80.3000	80.3000	80.3000	80.3000	83.8367	85.1495	85.7254	(216)	
Fuel for water heating, kWh/month	233.1713	207.0362	222.0457	199.8250	196.8587	180.0708	177.6973	186.0237	189.2170	202.4001	209.8737	230.7367	(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	16.2070	13.0019	11.7067	8.5769	6.6250	5.4127	6.0436	7.8556	10.2037	13.3878	15.1215	16.6575	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-17.9494	-26.2250	-39.0618	-45.5829	-50.6257	-47.8224	-47.2661	-43.9068	-38.2063	-30.7503	-20.0676	-15.4149	(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	-7.5276	-16.0752	-32.3894	-49.2824	-65.7689	-66.2751	-65.4666	-55.1302	-40.0342	-23.1666	-10.1102	-5.9328	(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												1970.9520	(211)	
Space heating fuel - main system 2												0.0000	(213)	
Space heating fuel - secondary												0.0000	(215)	
Efficiency of water heater												80.3000		
Water heating fuel used												2434.9562	(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)												130.7999	(232)	
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation												-860.0386	(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												3762.6695	(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	1970.9520	0.2100	413.8999 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2434.9562	0.2100	511.3408 (264)
Space and water heating			925.2407 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	130.7999	0.1443	18.8785 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-422.8793	0.1338	-56.5880

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PV Unit electricity exported	-437.1593	0.1255	-54.8756
Total			-111.4636 (269)
Total CO2, kg/year			844.5849 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.1800 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1970.9520	1.1300	2227.1758 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2434.9562	1.1300	2751.5005 (278)
Space and water heating			4978.6762 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	130.7999	1.5338	200.6253 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-422.8793	1.4945	-632.0005
PV Unit electricity exported	-437.1593	0.4608	-201.4239
Total			-833.4244 (283)
Total Primary energy kWh/year			4475.9779 (286)
Target Primary Energy Rate (TPER)			85.7500 (287)

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Property Reference	Flat 2			Issued on Date	11/04/2024
Assessment Reference	Flat 2_Copy_Copy		Prop Type Ref	HTA	
Property	Flat 2, 3 New Road, London, N8 8TA				
SAP Rating	77 C	DER	27.18	TER	13.21
Environmental	78 C	% DER < TER			-105.75
CO ₂ Emissions (t/year)	1.64	DFEE	81.58	TFEE	35.49
Compliance Check	See BREL	% DFEE < TFEE			-129.83
% DPER < TPER	-113.60	DPER	148.50	TPER	69.52
Assessor Details	Ms. Ruth Pike			Assessor ID	AU93-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		
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		No	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.7500	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.6375	(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	0.8128	0.7969	0.7809	0.7013	0.6853	0.6056	0.6056	0.5897	0.6375	0.6853	0.7172	0.7491 (22b)
Effective ac	0.8303	0.8175	0.8049	0.7459	0.7348	0.6834	0.6834	0.6739	0.7032	0.7348	0.7572	0.7805 (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
Solid Doors			2.2000	3.0000	6.6000		(26)
Windows (Uw = 1.60)			14.8800	1.5038	22.3759		(27)
Ground Floor			70.0000	0.2500	17.5000	75.0000	5250.0000 (28a)
External Wall 1	47.5000	12.0400	35.4600	0.3000	10.6380	110.0000	3900.6000 (29a)
Wall to corridor	25.0000	5.0400	19.9600	0.3000	5.9880	110.0000	2195.6000 (29a)
Total net area of external elements Aum(A, m ²)			142.5000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	63.1019		(33)
Party Wall 1			30.0000	0.0000	0.0000	20.0000	600.0000 (32)
Party Ceiling 1			70.0000			20.0000	1400.0000 (32b)
Internal Wall Stud			75.0000			9.0000	675.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		14021.2000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							200.3029 (35)
Thermal bridges (Default value 0.200 * total exposed area)							28.5000 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		91.6019 (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
	49.8697	49.0993	48.3442	44.7973	44.1337	41.0445	41.0445	40.4724	42.2344	44.1337	45.4762	46.8797 (38)

Full SAP Calculation Printout



Heat transfer coeff	141.4717	140.7013	139.9461	136.3992	135.7356	132.6464	132.6464	132.0743	133.8363	135.7356	137.0781	138.4816 (39)
Average = Sum(39)m / 12 =												136.3961
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.0210	2.0100	1.9992	1.9486	1.9391	1.8949	1.8949	1.8868	1.9119	1.9391	1.9583	1.9783 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2461 (42)
Hot water usage for mixer showers												
77.3497	76.1873	74.4934	71.2525	68.8608	66.1936	64.6776	66.3586	68.2013	71.0651	74.3756	77.0534	(42a)
Hot water usage for baths												
26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432	(42b)
Hot water usage for other uses												
37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326	(42c)
Average daily hot water use (litres/day)												130.3115 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.7158	138.7879	135.1665	129.5263	124.9942	120.1026	118.1242	121.7289	125.5446	130.6927	136.4238	141.3291 (44)
Energy conte	224.4432	197.6322	207.7459	177.3150	168.2662	147.6801	142.8610	150.7258	154.8090	177.3488	194.3607	221.2872 (45)
Energy content (annual)										Total = Sum	Sum(45)m =	2164.4751
Distribution loss (46)m = 0.15 x (45)m												
33.6665	29.6448	31.1619	26.5972	25.2399	22.1520	21.4291	22.6089	23.2214	26.6023	29.1541	33.1931	(46)
Water storage loss:												
Total storage loss												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month												
275.4022	243.6596	258.7048	226.6300	219.2251	196.9952	193.8199	201.6847	204.1241	228.3077	243.6758	272.2461 (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	275.4022	243.6596	258.7048	226.6300	219.2251	196.9952	193.8199	201.6847	204.1241	228.3077	243.6758	272.2461 (64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum	(64)m =			2764.4751 (64)
Electric shower(s)												2764 (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												
87.3671	77.2195	81.8152	71.2860	68.6882	61.4324	60.2410	62.8561	63.8028	71.7082	76.9537	86.3177	(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
112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
99.7072	110.3901	99.7072	103.0308	99.7072	103.0308	99.7072	99.7072	103.0308	99.7072	103.0308	99.7072	99.7072 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918	188.5918 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306 (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)												
-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450 (71)
Water heating gains (Table 5)												
117.4289	114.9100	109.9667	99.0083	92.3229	85.3228	80.9691	84.4839	88.6150	96.3820	106.8801	116.0184	116.0184 (72)
Total internal gains	474.1250	484.3364	463.5510	444.9328	421.0594	401.3522	384.9697	386.4372	399.0510	417.4777	445.1639	464.0093 (73)

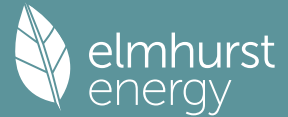
6. Solar gains

[Jan]												
	Area	Solar flux	g	Specific data	FF	Access	Gains					
	m2	Table 6a	W/m2	or Table 6b	Specific data	factor	W					
					or Table 6c	Table 6d						
Northeast	5.0400	11.2829	0.6300	0.7000	0.7700	17.3790 (75)						
Southeast	9.8400	36.7938	0.6300	0.7000	0.7700	110.6476 (77)						
Solar gains	128.0266	223.8492	321.6133	424.1951	498.5921	505.3051	482.8739	425.7929	356.8899	251.5353	154.3976	108.8838 (83)
Total gains	602.1516	708.1856	785.1643	869.1279	919.6515	906.6573	867.8436	812.2301	755.9408	669.0130	599.5615	572.8932 (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	27.5304	27.6812	27.8305	28.5542	28.6939	29.3621	29.3621	29.4893	29.1011	28.6939	28.4128	28.1249
alpha	2.8354	2.8454	2.8554	2.9036	2.9129	2.9575	2.9575	2.9660	2.9401	2.9129	2.8942	2.8750
util living area	0.9845	0.9746	0.9582	0.9199	0.8481	0.7222	0.5865	0.6315	0.8154	0.9368	0.9756	0.9865 (86)
MIT	18.8622	19.0822	19.4224	19.9054	20.3331	20.6684	20.8086	20.7853	20.5363	19.9809	19.3622	18.8576 (87)
Th 2	19.3194	19.3267	19.3338	19.3678	19.3743	19.4043	19.4043	19.4099	19.3927	19.3743	19.3613	19.3478 (88)
util rest of house												
	0.9798	0.9669	0.9447	0.8918	0.7888	0.6050	0.4079	0.4575	0.7215	0.9088	0.9668	0.9825 (89)
MIT 2	17.4510	17.6732	18.0125	18.5037	18.9007	19.1964	19.2794	19.2759	19.0976	18.5902	17.9780	17.4672 (90)
Living area fraction									fLA = Living area / (4) =			0.3886 (91)

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MIT	17.9994	18.2207	18.5604	19.0484	19.4573	19.7683	19.8736	19.8624	19.6566	19.1306	18.5158	18.0074 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.8494	18.0707	18.4104	18.8984	19.3073	19.6183	19.7236	19.7124	19.5066	18.9806	18.3658	17.8574 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9740	0.9590	0.9348	0.8815	0.7858	0.6233	0.4478	0.4952	0.7297	0.8997	0.9594	0.9773	(94)
Useful gains	586.4755	679.1313	733.9492	766.1757	722.6854	565.1080	388.6402	402.2431	551.5827	601.8984	575.2258	559.8793	(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	1916.8506	1853.1323	1666.8096	1363.7684	1032.5835	665.6637	414.3327	437.4846	723.6053	1137.5437	1544.2991	1891.3027	(97)
Space heating kWh	989.7990	788.9287	694.0482	430.2667	230.5642	0.0000	0.0000	0.0000	0.0000	398.5201	697.7328	990.5790	(98a)
Space heating requirement - total per year (kWh/year)												5220.4387	
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	989.7990	788.9287	694.0482	430.2667	230.5642	0.0000	0.0000	0.0000	0.0000	398.5201	697.7328	990.5790	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5220.4387	
Space heating per m2											(98c) / (4) =	74.5777	(99)

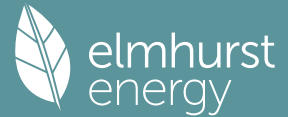
9a. Energy requirements - Individual heating systems, including micro-CHP

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	989.7990	788.9287	694.0482	430.2667	230.5642	0.0000	0.0000	0.0000	0.0000	398.5201	697.7328	990.5790 (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)	1105.9207	881.4846	775.4728	480.7449	257.6136	0.0000	0.0000	0.0000	0.0000	445.2739	779.5897	1106.7922 (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	275.4022	243.6596	258.7048	226.6300	219.2251	196.9952	193.8199	201.6847	204.1241	228.3077	243.6758	272.2461 (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	307.7119	272.2453	289.0556	253.2179	244.9442	220.1064	216.5585	225.3460	228.0716	255.0924	272.2634	304.1856 (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	20.2937	16.2804	14.6587	10.7396	8.2956	6.7775	7.5675	9.8365	12.7767	16.7637	18.9345	20.8578 (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												5832.8924 (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												3088.7990 (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)												163.7821 (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												9126.4734 (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	5832.8924	0.2100	1224.9074	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3088.7990	0.2100	648.6478	(264)

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Space and water heating			1873.5552 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	163.7821	0.1443	23.6388 (268)
Total CO ₂ , kg/year			1902.8812 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			27.1800 (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	5832.8924	1.1300	6591.1684 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	3088.7990	1.1300	3490.3428 (278)
Space and water heating			10081.5112 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	163.7821	1.5338	251.2144 (282)
Total Primary energy kWh/year			10394.7505 (286)
Dwelling Primary energy Rate (DPER)			148.5000 (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	70.0000 (1b)	x 2.6000 (2b)	= 182.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 182.0000 (5)

2. Ventilation rate

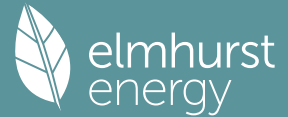
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) = 0.1099 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3599 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3059 (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	0.3900	0.3824	0.3747	0.3365	0.3288	0.2906	0.2906	0.2830	0.3059	0.3288	0.3441	0.3594 (22b)
Effective ac	0.5761	0.5731	0.5702	0.5566	0.5541	0.5422	0.5422	0.5400	0.5468	0.5541	0.5592	0.5646 (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			2.2000	1.0000	2.2000		(26)					
TER Opening Type (Uw = 1.20)			14.8800	1.1450	17.0382		(27)					
Ground Floor			70.0000	0.1300	9.1000		(28a)					
External Wall 1	47.5000	12.0400	35.4600	0.1800	6.3828		(29a)					
Wall to corridor	25.0000	5.0400	19.9600	0.1800	3.5928		(29a)					
Total net area of external elements Aum(A, m2)			142.5000				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =		38.3138		(33)					
Party Wall 1			30.0000	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							210.3029 (35)					
Thermal bridges (User defined value 0.050 * total exposed area)							7.1250 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	45.4388 (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	34.5983	34.4209	34.2470	33.4303	33.2775	32.5662	32.5662	32.4345	32.8402	33.2775	33.5866	33.9098 (38)
Average = Sum(39)m / 12 =	80.0371	79.8597	79.6858	78.8691	78.7163	78.0049	78.0049	77.8732	78.2789	78.7163	79.0254	79.3486 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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HLP	1.1434	1.1409	1.1384	1.1267	1.1245	1.1144	1.1144	1.1125	1.1183	1.1245	1.1289	1.1336 (40)
HLP (average)												1.1267
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2461 (42)
Hot water usage for mixer showers												
61.8798	60.9498	59.5947	57.0020	55.0887	52.9549	51.7420	53.0869	54.5611	56.8521	59.5005	61.6427	(42a)
Hot water usage for baths												
26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432	(42b)
Hot water usage for other uses												
37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326	(42c)
Average daily hot water use (litres/day)												116.0487 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use												
126.2459	123.5505	120.2678	115.2758	111.2220	106.8639	105.1887	108.4572	111.9043	116.4797	121.5487	125.9184	(44)
Energy conte	199.9426	175.9342	184.8472	157.8067	149.7262	131.4016	127.2166	137.9892	158.0618	173.1684	197.1578	(45)
Energy content (annual)												Total = Sum(45)m = 1927.5450
Distribution loss (46)m = 0.15 x (45)m												
29.9914	26.3901	27.7271	23.6710	22.4589	19.7102	19.0825	20.1439	20.6984	23.7093	25.9753	29.5737	(46)
Water storage loss:												
Total storage loss												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month												
250.9015	221.9616	235.8061	207.1218	200.6851	180.7166	178.1755	185.2515	187.3043	209.0207	222.4834	248.1167	(62)
WWHRS	-28.2888	-25.0189	-26.1983	-21.6933	-20.2173	-17.3001	-16.2161	-17.2442	-17.8994	-21.1014	-23.9053	-27.7650 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(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												
222.6127	196.9427	209.6077	185.4285	180.4678	163.4165	161.9594	168.0073	169.4049	187.9193	198.5781	220.3518	(64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2264.6969 (64)
Electric shower(s)												2265 (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												
79.2207	70.0050	74.2014	64.7995	62.5237	56.0198	55.0392	57.3920	58.2102	65.2953	69.9072	78.2947	(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
112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
99.7072	110.3901	99.7072	103.0308	99.7072	103.0308	99.7072	99.7072	103.0308	99.7072	103.0308	99.7072	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	(69)
Pumps, fans	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)												
-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	(71)
Water heating gains (Table 5)												
106.4794	104.1741	99.7331	89.9993	84.0372	77.8053	73.9775	77.1398	80.8475	87.7625	97.0934	105.2348	(72)
Total internal gains												
463.1755	473.6005	453.3173	435.9238	412.7737	393.8347	377.9781	379.0931	391.2835	408.8582	435.3772	453.2257	(73)

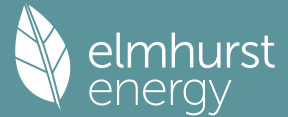
6. Solar gains

[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		
Northeast				5.0400	11.2829	0.6300		0.7000		0.7700		17.3790 (75)
Southeast				9.8400	36.7938	0.6300		0.7000		0.7700		110.6476 (77)
Solar gains	128.0266	223.8492	321.6133	424.1951	498.5921	505.3051	482.8739	425.7929	356.8899	251.5353	154.3976	108.8838 (83)
Total gains	591.2021	697.4497	774.9307	860.1189	911.3658	899.1397	860.8520	804.8859	748.1733	660.3935	589.7748	562.1095 (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	51.0916	51.2051	51.3168	51.8482	51.9489	52.4226	52.4226	52.5113	52.2391	51.9489	51.7457	51.5349
alpha	4.4061	4.4137	4.4211	4.4565	4.4633	4.4948	4.4948	4.5008	4.4826	4.4633	4.4497	4.4357
util living area												
0.9845	0.9681	0.9364	0.8565	0.7181	0.5370	0.3948	0.4385	0.6660	0.8927	0.9699	0.9873	(86)
MIT	19.6767	19.9287	20.2455	20.6170	20.8633	20.9710	20.9941	20.9907	20.9262	20.5966	20.0740	19.6328 (87)
Th 2	19.9656	19.9676	19.9696	19.9791	19.9809	19.9891	19.9891	19.9907	19.9859	19.9809	19.9773	19.9735 (88)
util rest of house												
0.9804	0.9601	0.9206	0.8231	0.6609	0.4592	0.3060	0.3454	0.5869	0.8595	0.9609	0.9840	(89)
MIT 2	18.4484	18.7660	19.1588	19.6047	19.8690	19.9722	19.9871	19.9871	19.9369	19.5949	18.9595	18.3985 (90)
Living area fraction												
MIT	18.9257	19.2178	19.5810	19.9980	20.2554	20.3603	20.3784	20.3771	20.3213	19.9841	19.3926	18.8781 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9257	19.2178	19.5810	19.9980	20.2554	20.3603	20.3784	20.3771	20.3213	19.9841	19.3926	18.8781 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9750	0.9527	0.9135	0.8238	0.6771	0.4884	0.3405	0.3816	0.6143	0.8596	0.9543	0.9792	(94)
Useful gains	576.4082	664.4887	707.8879	708.5676	617.0901	439.1641	293.1611	307.1051	459.5887	567.6600	562.8474	550.3985	(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	1170.5997	1143.4158	1042.3721	875.2911	673.4455	449.3354	294.7324	309.7079	486.9986	738.6850	971.4264	1164.6860	(97)
Space heating kWh	442.0785	321.8391	248.8563	120.0409	41.9284	0.0000	0.0000	0.0000	0.0000	127.2426	294.1769	457.0299	(98a)
Space heating requirement - total per year (kWh/year)												2053.1926	
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	442.0785	321.8391	248.8563	120.0409	41.9284	0.0000	0.0000	0.0000	0.0000	127.2426	294.1769	457.0299	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2053.1926	
Space heating per m2										(98c) / (4) =		29.3313	(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 %)													92.4000	(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		
	442.0785	321.8391	248.8563	120.0409	41.9284	0.0000	0.0000	0.0000	0.0000	127.2426	294.1769	457.0299	(98)	
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)	
Space heating fuel (main heating system)	478.4399	348.3107	269.3250	129.9144	45.3770	0.0000	0.0000	0.0000	0.0000	137.7084	318.3733	494.6211	(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	222.6127	196.9427	209.6077	185.4285	180.4678	163.4165	161.9594	168.0073	169.4049	187.9193	198.5781	220.3518	(64)	
Efficiency of water heater (217)m	85.8217	85.4268	84.7502	83.4733	81.7917	80.3000	80.3000	80.3000	80.3000	83.5637	85.2218	85.9071	(216)	
Fuel for water heating, kWh/month	259.3897	230.5398	247.3241	222.1413	220.6431	203.5075	201.6929	209.2246	210.9650	224.8815	233.0133	256.5001	(219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	20.7172	16.6201	14.9646	10.9637	8.4687	6.9190	7.7254	10.0418	13.0432	17.1134	19.3296	21.2930	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-23.8077	-34.6460	-51.3918	-59.6971	-66.0363	-62.2499	-61.4906	-57.2292	-49.9884	-40.4697	-26.5566	-20.4591	(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	-10.3568	-22.0783	-44.4240	-67.5170	-90.0484	-90.7545	-89.6834	-75.5790	-54.9319	-31.8327	-13.9117	-8.1681	(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												2222.0699	(211)	
Space heating fuel - main system 2												0.0000	(213)	
Space heating fuel - secondary												0.0000	(215)	
Efficiency of water heater												80.3000		
Water heating fuel used												2719.8229	(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)												167.1996	(232)	
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation												-1153.3085	(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												4041.7838	(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	2222.0699	0.2100	466.6347 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2719.8229	0.2100	571.1628 (264)
Space and water heating			1037.7975 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	167.1996	0.1443	24.1321 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-554.0225	0.1339	-74.1929

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PV Unit electricity exported	-599.2860	0.1256	-75.2407
Total			-149.4336 (269)
Total CO2, kg/year			924.4252 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.2100 (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	2222.0699	1.1300	2510.9390 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2719.8229	1.1300	3073.3998 (278)
Space and water heating			5584.3388 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	167.1996	1.5338	256.4563 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-554.0225	1.4949	-828.2060
PV Unit electricity exported	-599.2860	0.4608	-276.1754
Total			-1104.3813 (283)
Total Primary energy kWh/year			4866.5145 (286)
Target Primary Energy Rate (TPER)			69.5200 (287)

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Property Reference	Flat 3			Issued on Date	11/04/2024
Assessment Reference	Flat 3 - 2 bed MF_Copy	Prop Type Ref	HTA		
Property	Flat 3, 3 New Road, London, N8 8TA				
SAP Rating	79 C	DER	24.30	TER	12.64
Environmental	80 C	% DER < TER			-92.25
CO ₂ Emissions (t/year)	1.6	DFEE	72.82	TFEE	35.26
Compliance Check	See BREL	% DFEE < TFEE			-106.54
% DPER < TPER	-100.11	DPER	132.91	TPER	66.42
Assessor Details	Ms. Ruth Pike			Assessor ID	AU93-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	75.7000 (1b)	2.6000 (2b)	196.8200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	196.8200 (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	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7500	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.6375 (21)

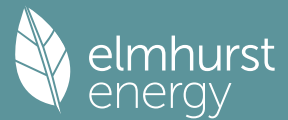
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.8128	0.7969	0.7809	0.7013	0.6853	0.6056	0.6056	0.5897	0.6375	0.6853	0.7172	0.7491 (22b)
Effective ac	0.8303	0.8175	0.8049	0.7459	0.7348	0.6834	0.6834	0.6739	0.7032	0.7348	0.7572	0.7805 (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
Solid Doors			2.2000	3.0000	6.6000		(26)
Windows (Uw = 1.60)			19.9500	1.5038	30.0000		(27)
Opening			4.8000	1.6791	8.0597		(27a)
External Wall 1	52.5000	19.0000	33.5000	0.3000	10.0500	110.0000	3685.0000 (29a)
Wall to corridor	15.0000	3.1500	11.8500	0.3000	3.5550	110.0000	1303.5000 (29a)
sloping roof	44.7600	4.8000	39.9600	0.2000	7.9920	9.0000	359.6400 (30)
Total net area of external elements Aum(A, m ²)			112.2600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	66.2567			(33)
Party Wall 1			37.5000	0.0000	0.0000	20.0000	750.0000 (32)
Party Floor			75.7000			30.0000	2271.0000 (32a)
Party Ceiling 1			38.4000			20.0000	768.0000 (32b)
Internal Wall Stud			95.0000			9.0000	855.0000 (32c)
Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =				9992.1400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							131.9966 (35)
Thermal bridges (Default value 0.200 * total exposed area)							22.4520 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =				88.7087 (37)

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

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(38)m	Jan 53.9306	Feb 53.0974	Mar 52.2808	Apr 48.4451	May 47.7274	Jun 44.3866	Jul 44.3866	Aug 43.7680	Sep 45.6735	Oct 47.7274	Nov 49.1792	Dec 50.6970	(38)
Heat transfer coeff	142.6393	141.8061	140.9895	137.1538	136.4361	133.0953	133.0953	132.4767	134.3822	136.4361	137.8879	139.4057	(39)
Average = Sum(39)m / 12 =												137.1503	
HLP	Jan 1.8843	Feb 1.8733	Mar 1.8625	Apr 1.8118	May 1.8023	Jun 1.7582	Jul 1.7582	Aug 1.7500	Sep 1.7752	Oct 1.8023	Nov 1.8215	Dec 1.8416	(40)
HLP (average)												1.8118	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3762 (42)
Hot water usage for mixer showers	80.0762	78.8729	77.1193	73.7641	71.2881	68.5269	66.9574	68.6977	70.6054	73.5701	76.9973	79.7694 (42a)	
Hot water usage for baths	27.6715	27.2606	26.6819	25.6148	24.8158	23.9299	23.4513	24.0260	24.6517	25.5997	26.6887	27.5780 (42b)	
Hot water usage for other uses	38.9648	37.5479	36.1310	34.7141	33.2972	31.8803	31.8803	33.2972	34.7141	36.1310	37.5479	38.9648 (42c)	
Average daily hot water use (litres/day)												134.9061 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	146.7126	143.6814	139.9322	134.0930	129.4011	124.3370	122.2890	126.0209	129.9712	135.3008	141.2340	146.3123 (44)	
Energy content (annual)	232.3569	204.6003	215.0705	183.5667	174.1988	152.8869	147.8979	156.0402	160.2675	183.6019	201.2137	229.0896 (45)	
Distribution loss (46)m = 0.15 x (45)m	34.8535	30.6900	32.2606	27.5350	26.1298	22.9330	22.1847	23.4060	24.0401	27.5403	30.1821	34.3634 (46)	
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (61)	
Total heat required for water heating calculated for each month	283.3158	250.6277	266.0294	232.8817	225.1577	202.2020	198.8568	206.9991	209.5825	234.5608	250.5288	280.0485 (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	283.3158	250.6277	266.0294	232.8817	225.1577	202.2020	198.8568	206.9991	209.5825	234.5608	250.5288	280.0485 (64)	
12Total per year (kWh/year)												2840.7909 (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	89.9984	79.5365	84.2507	73.3647	70.6608	63.1637	61.9158	64.6231	65.6177	73.7874	79.2323	88.9120 (65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 118.8107	Feb 118.8107	Mar 118.8107	Apr 118.8107	May 118.8107	Jun 118.8107	Jul 118.8107	Aug 118.8107	Sep 118.8107	Oct 118.8107	Nov 118.8107	Dec 118.8107	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.0318	117.3923	106.0318	109.5662	106.0318	109.5662	106.0318	106.0318	109.5662	106.0318	109.5662	106.0318	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.2199	212.4013	206.9042	195.2015	180.4289	166.5448	157.2693	155.0879	160.5850	172.2877	187.0603	200.9444	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	(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)	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	(71)
Water heating gains (Table 5)	120.9656	118.3578	113.2401	101.8954	94.9742	87.7273	83.2202	86.8590	91.1357	99.1766	110.0449	119.5054	(72)
Total internal gains	498.8605	509.7947	487.8193	468.3063	443.0781	422.4815	405.1645	406.6219	419.9301	439.1393	468.3146	488.1248	(73)

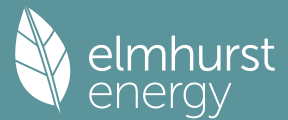
6. Solar gains

[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		
Northeast				10.5000	11.2829		0.6300	0.7000	0.7700		36.2062 (75)		
Southwest				3.1500	36.7938		0.6300	0.7000	0.7700		35.4207 (79)		
Northwest				6.3000	11.2829		0.6300	0.7000	0.7700		21.7237 (81)		
Northwest				4.8000	16.3666		0.6300	0.7000	1.0000		31.1803 (82)		
Solar gains	124.5310	242.4261	413.3660	650.9894	857.2509	907.7648	851.5534	688.7570	494.1182	289.8387	154.6495	103.0355	(83)
Total gains	623.3915	752.2208	901.1854	1119.2956	1300.3290	1330.2463	1256.7178	1095.3789	914.0483	728.9780	622.9641	591.1604	(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	19.4588	19.5732	19.6865	20.2371	20.3435	20.8542	20.8542	20.9516	20.6545	20.3435	20.1294	19.9102
alpha	2.2973	2.3049	2.3124	2.3491	2.3562	2.3903	2.3903	2.3968	2.3770	2.3562	2.3420	2.3273
util living area	0.9656	0.9468	0.9099	0.8238	0.6934	0.5385	0.4226	0.4862	0.7089	0.8866	0.9503	0.9693 (86)
MIT	18.3816	18.6683	19.1495	19.8221	20.3474	20.6772	20.7938	20.7618	20.4711	19.7700	18.9918	18.3732 (87)
Th 2	19.4116	19.4192	19.4266	19.4617	19.4684	19.4994	19.4994	19.5052	19.4874	19.4684	19.4550	19.4411 (88)

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util rest of house	0.9582	0.9354	0.8902	0.7856	0.6276	0.4403	0.2942	0.3523	0.6184	0.8526	0.9377	0.9627 (89)
MIT 2	17.1030	17.3893	17.8625	18.5228	18.9916	19.2760	19.3483	19.3410	19.1314	18.5007	17.7377	17.1154 (90)
Living area fraction									FLA = Living area / (4) =			0.3303 (91)
MIT	17.5253	17.8117	18.2875	18.9519	19.4393	19.7388	19.8257	19.8102	19.5738	18.9199	18.1518	17.5308 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.3753	17.6617	18.1375	18.8019	19.2893	19.5888	19.6757	19.6602	19.4238	18.7699	18.0018	17.3808 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9448	0.9183	0.8693	0.7658	0.6188	0.4467	0.3104	0.3675	0.6139	0.8325	0.9215	0.9504	(94)
Useful gains	588.9873	690.7313	783.3772	857.1874	804.7021	594.1915	390.0245	402.5460	561.1332	606.8885	574.0313	561.8548	(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	1865.0483	1809.6879	1640.7635	1358.0867	1035.4592	663.9844	409.3597	431.9044	715.4267	1114.6735	1503.2327	1837.4759	(97)
Space heating kWh	949.3893	751.9389	637.8954	360.6475	171.6833	0.0000	0.0000	0.0000	0.0000	377.7920	669.0250	949.0621	(98a)
Space heating requirement - total per year (kWh/year)												4867.4336	
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	949.3893	751.9389	637.8954	360.6475	171.6833	0.0000	0.0000	0.0000	0.0000	377.7920	669.0250	949.0621	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4867.4336	
Space heating per m2											(98c) / (4) =	64.2990	(99)

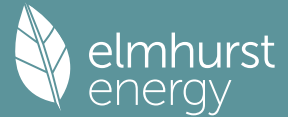
9a. Energy requirements - Individual heating systems, including micro-CHP

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	949.3893	751.9389	637.8954	360.6475	171.6833	0.0000	0.0000	0.0000	0.0000	377.7920	669.0250	949.0621	(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)	1060.7702	840.1552	712.7323	402.9581	191.8249	0.0000	0.0000	0.0000	0.0000	422.1140	747.5140	1060.4046	(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	283.3158	250.6277	266.0294	232.8817	225.1577	202.2020	198.8568	206.9991	209.5825	234.5608	250.5288	280.0485	(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	316.5540	280.0310	297.2396	260.2031	251.5728	225.9240	222.1864	231.2839	234.1704	262.0792	279.9204	312.9034	(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	21.5810	17.3131	15.5885	11.4208	8.8218	7.2075	8.0475	10.4605	13.5871	17.8270	20.1356	22.1808	(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												5438.4733	(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												3174.0681	(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)												174.1711	(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												8827.7124	(238)

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

Energy	Emission factor	Emissions
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Space heating - main system 1	kWh/year	kg CO2/kWh	kg CO2/year
Total CO2 associated with community systems	5438.4733	0.2100	1142.0794 (261)
Water heating (other fuel)			0.0000 (373)
Space and water heating	3174.0681	0.2100	666.5543 (264)
Pumps, fans and electric keep-hot			1808.6337 (265)
Energy for lighting	41.0000	0.1387	5.6872 (267)
Total CO2, kg/year	174.1711	0.1443	25.1383 (268)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			1839.4592 (272)
			24.3000 (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	5438.4733	1.1300	6145.4748 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3174.0681	1.1300	3586.6969 (278)
Space and water heating			9732.1717 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	174.1711	1.5338	267.1494 (282)
Total Primary energy kWh/year			10061.3459 (286)
Dwelling Primary energy Rate (DPER)			132.9100 (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	75.7000 (1b)	x 2.6000 (2b)	= 196.8200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 196.8200 (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) = 0.1524 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4024 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3421 (21)

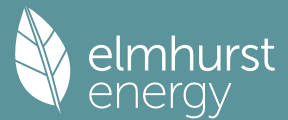
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4361	0.4276	0.4190	0.3763	0.3677	0.3250	0.3250	0.3164	0.3421	0.3677	0.3848	0.4019 (22b)
Effective ac	0.5951	0.5914	0.5878	0.5708	0.5676	0.5528	0.5528	0.5501	0.5585	0.5676	0.5740	0.5808 (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			2.2000	1.0000	2.2000		(26)
TER Opening Type (Uw = 1.20)			13.4900	1.1450	15.4466		(27)
Opening			3.2400	1.8519	6.0000		(27a)
External Wall 1	52.5000	13.5600	38.9400	0.1800	7.0092		(29a)
Wall to corridor	15.0000	2.1300	12.8700	0.1800	2.3166		(29a)
sloping roof	44.7600	3.2400	41.5200	0.1100	4.5672		(30)
Total net area of external elements Aum(A, m2)			112.2600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.5396		(33)
Party Wall 1			37.5000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							137.0692 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.6130 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	43.1526 (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
	38.6523	38.4124	38.1773	37.0730	36.8664	35.9046	35.9046	35.7265	36.2751	36.8664	37.2844	37.7214 (38)

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Heat transfer coeff	81.8049	81.5650	81.3299	80.2256	80.0190	79.0572	79.0572	78.8790	79.4276	80.0190	80.4370	80.8739 (39)
Average = Sum(39)m / 12 =												80.2246
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0806	1.0775	1.0744	1.0598	1.0571	1.0443	1.0443	1.0420	1.0492	1.0571	1.0626	1.0683 (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												2.3762 (42)
Hot water usage for mixer showers												
64.0610	63.0983	61.6954	59.0113	57.0305	54.8215	53.5659	54.9582	56.4843	58.8561	61.5979	63.8155 (42a)	
Hot water usage for baths												
27.6715	27.2606	26.6819	25.6148	24.8158	23.9299	23.4513	24.0260	24.6517	25.5997	26.6887	27.5780 (42b)	
Hot water usage for other uses												
38.9648	37.5479	36.1310	34.7141	33.2972	31.8803	31.8803	33.2972	34.7141	36.1310	37.5479	38.9648 (42c)	
Average daily hot water use (litres/day)												120.1405 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
130.6974	127.9068	124.5083	119.3402	115.1435	110.6317	108.8975	112.2813	115.8501	120.5868	125.8345	130.3584 (44)	
Energy conte	206.9927	182.1376	191.3646	163.3708	155.0053	136.0345	131.7021	139.0277	142.8548	163.6351	179.2743	204.1097 (45)
Energy content (annual)										Total = Sum(45)m =		1995.5092
Distribution loss (46)m = 0.15 x (45)m												
31.0489	27.3206	28.7047	24.5056	23.2508	20.4052	19.7553	20.8542	21.4282	24.5453	26.8911	30.6165 (46)	
Water storage loss:												
Total storage loss												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month												
257.9516	228.1649	242.3235	212.6859	205.9642	185.3496	182.6610	189.9867	192.1698	214.5941	228.5894	255.0686 (62)	
WWHRS	-29.2860	-25.9008	-27.1218	-22.4579	-20.9300	-17.9099	-16.7877	-17.8520	-18.5303	-21.8452	-24.7480	-28.7437 (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	228.6656	202.2642	215.2017	190.2279	185.0342	167.4397	165.8733	172.1346	173.6395	192.7489	203.8414	226.3249 (64)
12Total per year (kWh/year)									Total per year (kWh/year) = Sum(64)m =			2323.3959 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	81.5648	72.0676	76.3685	66.6496	64.2790	57.5602	56.5307	58.9665	59.8280	67.1484	71.9375	80.6062 (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	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.0318	117.3923	106.0318	109.5662	106.0318	109.5662	106.0318	106.0318	109.5662	106.0318	109.5662	106.0318 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.2199	212.4013	206.9042	195.2015	180.4289	166.5448	157.2693	155.0879	160.5850	172.2877	187.0603	200.9444 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811 (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)	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486 (71)
Water heating gains (Table 5)	109.6301	107.2434	102.6458	92.5688	86.3965	79.9448	75.9821	79.2560	83.0944	90.2532	99.9132	108.3417 (72)
Total internal gains	487.5250	498.6803	477.2250	458.9797	434.5004	414.6989	397.9264	399.0189	411.8888	430.2160	458.1829	476.9611 (73)

6. Solar gains												

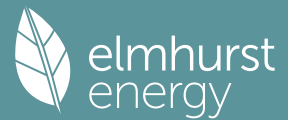
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northeast	7.1000						0.6300		0.7000		0.7700	24.4823 (75)
Southwest	2.1300						0.6300		0.7000		0.7700	23.9512 (79)
Northwest	4.2600						0.6300		0.7000		0.7700	14.6894 (81)
Northwest	3.2400						0.6300		0.7000		1.0000	21.0467 (82)

Solar gains	84.1696	163.8498	279.3733	439.9549	579.3391	613.4719	575.4859	465.4745	333.9444	195.8921	104.5257	69.6414 (83)
Total gains	571.6946	662.5301	756.5982	898.9347	1013.8395	1028.1708	973.4123	864.4934	745.8332	626.1080	562.7086	546.6025 (84)

7. Mean internal temperature (heating season)												

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	35.2334	35.3370	35.4391	35.9270	36.0197	36.4579	36.4579	36.5403	36.2879	36.0197	35.8325	35.6389
alpha	3.3489	3.3558	3.3626	3.3951	3.4013	3.4305	3.4305	3.4360	3.4192	3.4013	3.3888	3.3759
util living area	0.9678	0.9474	0.9058	0.8012	0.6423	0.4692	0.3506	0.4071	0.6435	0.8683	0.9490	0.9718 (86)
MIT	19.1737	19.4584	19.8882	20.4337	20.7896	20.9464	20.9850	20.9752	20.8455	20.3472	19.6808	19.1342 (87)
Th 2	20.0167	20.0193	20.0218	20.0338	20.0361	20.0465	20.0465	20.0485	20.0425	20.0361	20.0315	20.0268 (88)
util rest of house	0.9621	0.9384	0.8897	0.7700	0.5936	0.4062	0.2774	0.3278	0.5768	0.8391	0.9386	0.9668 (89)

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MIT 2	17.8957	18.2546	18.7897	19.4507	19.8466	20.0089	20.0393	20.0356	19.9209	19.3693	18.5476	17.8524 (90)
Living area fraction									FLA = Living area / (4) =			0.3303 (91)
MIT	18.3177	18.6522	19.1525	19.7754	20.1580	20.3185	20.3516	20.3459	20.2263	19.6923	18.9219	18.2757 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3177	18.6522	19.1525	19.7754	20.1580	20.3185	20.3516	20.3459	20.2263	19.6923	18.9219	18.2757 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9488	0.9222	0.8726	0.7608	0.6000	0.4246	0.3011	0.3531	0.5904	0.8270	0.9234	0.9545	(94)
Useful gains	542.4113	610.9918	660.1768	683.9136	608.3258	436.5661	293.0746	305.2309	440.3150	517.7928	519.5783	521.7238	(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	1146.7186	1121.6970	1029.0269	872.4818	676.8025	452.0917	296.5898	311.2505	486.5946	727.5535	950.9167	1138.3558	(97)
Space heating kWh	449.6046	343.1939	274.4245	135.7692	50.9467	0.0000	0.0000	0.0000	0.0000	156.0619	310.5636	458.7742	(98a)
Space heating requirement - total per year (kWh/year)												2179.3387	
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	449.6046	343.1939	274.4245	135.7692	50.9467	0.0000	0.0000	0.0000	0.0000	156.0619	310.5636	458.7742	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2179.3387	
Space heating per m2											(98c) / (4) =	28.7892	(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 %)													92.4000 (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	449.6046	343.1939	274.4245	135.7692	50.9467	0.0000	0.0000	0.0000	0.0000	156.0619	310.5636	458.7742	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	486.5851	371.4220	296.9962	146.9363	55.1371	0.0000	0.0000	0.0000	0.0000	168.8982	336.1078	496.5089	(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	228.6656	202.2642	215.2017	190.2279	185.0342	167.4397	165.8733	172.1346	173.6395	192.7489	203.8414	226.3249	(64)
Efficiency of water heater (217)m	85.8020	85.5043	84.9034	83.6710	82.0128	80.3000	80.3000	80.3000	80.3000	83.9327	85.2807	85.8622	(216)
Fuel for water heating, kWh/month	266.5037	236.5544	253.4665	227.3523	225.6161	208.5176	206.5670	214.3644	216.2385	229.6468	239.0240	263.5910	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	22.0313	17.6743	15.9138	11.6591	9.0058	7.3578	8.2154	10.6787	13.8706	18.1990	20.5557	22.6436	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-25.6531	-37.2821	-55.2273	-64.0585	-70.7728	-66.6746	-65.8525	-61.3266	-53.6309	-43.4989	-28.5947	-22.0498	(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)	-11.2935	-24.0612	-48.3906	-73.5144	-98.0216	-98.7887	-97.6314	-82.2960	-59.8329	-34.6911	-15.1689	-8.9085	(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													2358.5916 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													80.3000
Water heating fuel used													2787.4423 (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)													177.8053 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-1247.2207 (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													4162.6185 (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	2358.5916	0.2100	495.3042 (261)	
Total CO2 associated with community systems			0.0000 (373)	

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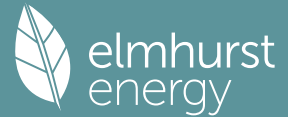


Water heating (other fuel)	2787.4423	0.2100	585.3629 (264)
Space and water heating			1080.6671 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	177.8053	0.1443	25.6628 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-594.6219	0.1339	-79.6486
PV Unit electricity exported	-652.5989	0.1256	-81.9407
Total			-161.5894 (269)
Total CO2, kg/year			956.6698 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6400 (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	2358.5916	1.1300	2665.2085 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2787.4423	1.1300	3149.8098 (278)
Space and water heating			5815.0183 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	177.8053	1.5338	272.7237 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-594.6219	1.4950	-888.9684
PV Unit electricity exported	-652.5989	0.4609	-300.7685
Total			-1189.7368 (283)
Total Primary energy kWh/year			5028.1060 (286)
Target Primary Energy Rate (TPER)			66.4200 (287)

Full SAP Calculation Printout



Property Reference	Flat 4				Issued on Date	11/04/2024
Assessment Reference	Flat 4 - 1 bed MF_Copy		Prop Type Ref	HTA		
Property	Flat 4, 3 New Road, London, N8 8TA					
SAP Rating	79 C	DER	25.56	TER	13.07	
Environmental	80 C	% DER < TER				-95.56
CO ₂ Emissions (t/year)	1.39	DFEE	73.18	TFEE	32.89	
Compliance Check	See BREL	% DFEE < TFEE				-122.49
% DPER < TPER	-103.17	DPER	139.85	TPER	68.83	
Assessor Details	Ms. Ruth Pike				Assessor ID	AU93-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	62.8000 (1b)	x 2.6000 (2b)	= 163.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 163.2800 (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	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.6375 (21)

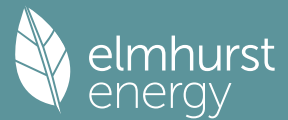
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.8128	0.7969	0.7809	0.7013	0.6853	0.6056	0.6056	0.5897	0.6375	0.6853	0.7172	0.7491 (22b)
Effective ac	0.8303	0.8175	0.8049	0.7459	0.7348	0.6834	0.6834	0.6739	0.7032	0.7348	0.7572	0.7805 (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
Solid Doors			2.2000	3.0000	6.6000		(26)
Windows (Uw = 1.60)			10.5000	1.5038	15.7895		(27)
Opening			4.8000	1.6791	8.0597		(27a)
External Wall 1	55.0000	12.7000	42.3000	0.3000	12.6900	110.0000	4653.0000 (29a)
Wall to corridor	17.5000		17.5000	0.3000	5.2500	110.0000	1925.0000 (29a)
sloping roof	38.8800	4.8000	34.0800	0.2000	6.8160	9.0000	306.7200 (30)
Total net area of external elements Aum(A, m ²)			111.3800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.2052		(33)
Party Wall 1			37.5000	0.0000	0.0000	20.0000	750.0000 (32)
Party Floor			62.8000			30.0000	1884.0000 (32a)
Party Ceiling 1			23.9200			20.0000	478.4000 (32b)
Internal Wall Stud			75.0000			9.0000	675.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10672.1200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							169.9382 (35)
Thermal bridges (Default value 0.200 * total exposed area)							22.2760 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	77.4812 (37)

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

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(38)m	Jan 44.7403	Feb 44.0491	Mar 43.3717	Apr 40.1896	May 39.5942	Jun 36.8227	Jul 36.8227	Aug 36.3095	Sep 37.8903	Oct 39.5942	Nov 40.7986	Dec 42.0578	(38)
Heat transfer coeff	122.2215	121.5303	120.8528	117.6708	117.0754	114.3039	114.3039	113.7907	115.3714	117.0754	118.2798	119.5389	(39)
Average = Sum(39)m / 12 =												117.6679	
HLP	Jan 1.9462	Feb 1.9352	Mar 1.9244	Apr 1.8737	May 1.8643	Jun 1.8201	Jul 1.8201	Aug 1.8120	Sep 1.8371	Oct 1.8643	Nov 1.8834	Dec 1.9035	(40)
HLP (average)												1.8737	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0596 (42)
Hot water usage for mixer showers													
73.4403	72.3366	70.7283	67.6512	65.3804	62.8480	61.4086	63.0047	64.7543	67.4733	70.6165	73.1589	(42a)	
Hot water usage for baths													
25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)	
Hot water usage for other uses													
35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)	
Average daily hot water use (litres/day)												123.7235 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
134.5512	131.7714	128.3332	122.9781	118.6752	114.0309	112.1524	115.5748	119.1975	124.0853	129.5267	134.1839	(44)	
Energy content (annual)	213.0961	187.6408	197.2434	168.3509	159.7596	140.2143	135.6387	143.1057	146.9824	168.3826	184.5345	210.0996	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2055.0486	
31.9644	28.1461	29.5865	25.2526	23.9639	21.0322	20.3458	21.4659	22.0474	25.2574	27.6802	31.5149	(46)	
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	264.0550	233.6682	248.2023	217.6659	210.7185	189.5294	186.5976	194.0646	196.2975	219.3415	233.8496	261.0585	(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	264.0550	233.6682	248.2023	217.6659	210.7185	189.5294	186.5976	194.0646	196.2975	219.3415	233.8496	261.0585	(64)
12Total per year (kWh/year)												2655.0486	(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	83.5942	73.8974	78.3231	68.3054	65.8598	58.9500	57.8396	60.3224	61.2004	68.7269	73.6865	82.5979	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 102.9797	Feb 102.9797	Mar 102.9797	Apr 102.9797	May 102.9797	Jun 102.9797	Jul 102.9797	Aug 102.9797	Sep 102.9797	Oct 102.9797	Nov 102.9797	Dec 102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	90.7638	100.4885	90.7638	93.7892	90.7638	93.7892	90.7638	90.7638	93.7892	90.7638	93.7892	90.7638	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	112.3578	109.9664	105.2731	94.8687	88.5212	81.8750	77.7414	81.0785	85.0006	92.3749	102.3423	111.0186	(72)
Total internal gains	439.9648	449.1654	430.0418	412.6453	390.6270	372.1214	357.0224	358.4922	370.1453	387.5118	413.1501	430.6858	(73)

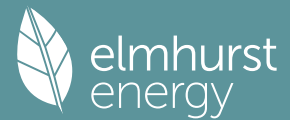
6. Solar gains

[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			
Northeast				5.2500	11.2829	0.6300	0.7700	0.7700	18.1031 (75)			
Southwest				5.2500	36.7938	0.6300	0.7000	0.7700	59.0345 (79)			
Southeast				4.8000	39.9751	0.6300	0.7000	1.0000	76.1574 (82)			
Solar gains	153.2951	277.4011	417.5644	572.5400	685.4443	698.2545	665.9199	580.0660	471.5538	317.3423	186.7044	129.1190 (83)
Total gains	593.2599	726.5665	847.6063	985.1853	1076.0713	1070.3759	1022.9423	938.5582	841.6991	704.8541	599.8545	559.8048 (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	24.2550	24.3929	24.5297	25.1930	25.3211	25.9351	25.9351	26.0520	25.6951	25.3211	25.0633	24.7993	
alpha	2.6170	2.6262	2.6353	2.6795	2.6881	2.7290	2.7290	2.7368	2.7130	2.6881	2.6709	2.6533	
util living area													
	0.9717	0.9521	0.9180	0.8452	0.7331	0.5824	0.4529	0.5015	0.7100	0.8882	0.9559	0.9754	(86)
MIT	18.7806	19.0636	19.4791	20.0245	20.4482	20.7284	20.8293	20.8101	20.5957	20.0225	19.3285	18.7672	(87)
Th 2	19.3694	19.3769	19.3842	19.4188	19.4254	19.4559	19.4559	19.4616	19.4441	19.4254	19.4122	19.3985	(88)
util rest of house													

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MIT 2	0.9644	0.9400	0.8970	0.8052	0.6629	0.4730	0.3094	0.3553	0.6096	0.8496	0.9428	0.9691 (89)
Living area fraction	17.4300	17.7117	18.1191	18.6569	19.0324	19.2719	19.3290	19.3277	19.1793	18.6773	18.0023	17.4378 (90)
MIT	17.9806	18.2628	18.6735	19.2144	19.6096	19.8656	19.9406	19.9320	fLA = Living area / (4) =			0.4076 (91)
Temperature adjustment									19.7567	19.2257	18.5429	17.9797 (92)
adjusted MIT	17.8306	18.1128	18.5235	19.0644	19.4596	19.7156	19.7906	19.7820	19.6067	19.0757	18.3929	-0.1500 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9551	0.9277	0.8828	0.7945	0.6646	0.4931	0.3425	0.3882	0.6217	0.8388	0.9314	0.9606	(94)
Useful gains	566.5957	674.0365	748.2810	782.7063	715.1899	527.8112	350.3242	364.3140	523.2666	591.2613	558.7239	537.7729	(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	1653.7238	1605.7586	1453.0723	1196.0469	908.4528	584.7364	364.6946	384.8384	635.3167	992.2909	1335.7194	1629.2806	(97)
Space heating kWh	808.8233	626.1172	524.3647	297.6052	143.7876	0.0000	0.0000	0.0000	0.0000	298.3660	559.4368	812.0817	(98a)
Space heating requirement - total per year (kWh/year)												4070.5826	
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	808.8233	626.1172	524.3647	297.6052	143.7876	0.0000	0.0000	0.0000	0.0000	298.3660	559.4368	812.0817	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4070.5826	
Space heating per m2											(98c) / (4) =	64.8182	(99)

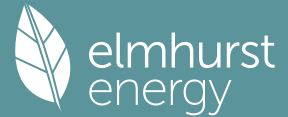
9a. Energy requirements - Individual heating systems, including micro-CHP

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	808.8233	626.1172	524.3647	297.6052	143.7876	0.0000	0.0000	0.0000	0.0000	298.3660	559.4368	812.0817 (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)	903.7132	699.5723	585.8824	332.5198	160.6565	0.0000	0.0000	0.0000	0.0000	333.3699	625.0690	907.3538 (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	264.0550	233.6682	248.2023	217.6659	210.7185	189.5294	186.5976	194.0646	196.2975	219.3415	233.8496	261.0585 (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	295.0336	261.0818	277.3210	243.2022	235.4397	211.7647	208.4889	216.8320	219.3268	245.0743	261.2844	291.6855 (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	18.4735	14.8201	13.3438	9.7763	7.5515	6.1696	6.8887	8.9542	11.6306	15.2600	17.2361	18.9869 (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												4548.1369 (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												2966.5347 (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)													149.0914 (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													7704.7630 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
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Space heating - main system 1	4548.1369	0.2100	955.1088 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2966.5347	0.2100	622.9723 (264)
Space and water heating			1578.0811 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	149.0914	0.1443	21.5185 (268)
Total CO2, kg/year			1605.2867 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			25.5600 (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	4548.1369	1.1300	5139.3947 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2966.5347	1.1300	3352.1843 (278)
Space and water heating			8491.5790 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	149.0914	1.5338	228.6813 (282)
Total Primary energy kWh/year			8782.2851 (286)
Dwelling Primary energy Rate (DPER)			139.8500 (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	62.8000 (1b)	x 2.6000 (2b)	= 163.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 163.2800 (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) = 0.1225 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3725 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3166 (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	0.4037	0.3958	0.3879	0.3483	0.3404	0.3008	0.3008	0.2929	0.3166	0.3404	0.3562	0.3720 (22b)
Effective ac	0.5815	0.5783	0.5752	0.5606	0.5579	0.5452	0.5452	0.5429	0.5501	0.5579	0.5634	0.5692 (25)

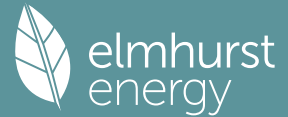
3. Heat losses and heat loss parameter

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			2.2000	1.0000	2.2000		(26)
TER Opening Type (Uw = 1.20)			9.2600	1.1450	10.6031		(27)
Opening			4.2400	1.4151	6.0000		(27a)
External Wall 1	55.0000	11.4600	43.5400	0.1800	7.8372		(29a)
Wall to corridor	17.5000		17.5000	0.1800	3.1500		(29a)
sloping roof	38.8800	4.2400	34.6400	0.1100	3.8104		(30)
Total net area of external elements Aum(A, m2)			111.3800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 33.6007		(33)
Party Wall 1			37.5000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							173.7471 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.5690 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	39.1697 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	31.3316	31.1611	30.9940	30.2091	30.0622	29.3786	29.3786	29.2520	29.6419	30.0622	30.3593	30.6699 (38)
Heat transfer coeff												

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, T_{hi} (C)												
Utilisation factor for gains for living area, $n_{il,m}$ (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	42.9911	43.0953	43.1979	43.6866	43.7793	44.2159	44.2159	44.2977	44.0467	43.7793	43.5922	43.3984
alpha	3.8661	3.8730	3.8799	3.9124	3.9186	3.9477	3.9477	3.9532	3.9364	3.9186	3.9061	3.8932
util living area	0.9687	0.9386	0.8823	0.7634	0.6035	0.4366	0.3190	0.3602	0.5724	0.8301	0.9440	0.9740 (86)
MIT	19.5732	19.8886	20.2714	20.6698	20.8914	20.9765	20.9947	20.9915	20.9341	20.6073	20.0235	19.5181 (87)
T_2	19.9824	19.9846	19.9868	19.9970	19.9989	20.0078	20.0078	20.0094	20.0043	19.9989	19.9950	19.9910 (88)
util rest of house	0.9621	0.9265	0.8604	0.7254	0.5504	0.3727	0.2482	0.2845	0.5015	0.7914	0.9308	0.9684 (89)
MIT 2	18.3491	18.7421	19.2086	19.6755	19.9086	19.9932	20.0056	20.0057	19.9586	19.6226	18.9239	18.2860 (90)
Living area fraction	$f_{LA} = \text{Living area} / (4) =$											0.4076 (91)

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MIT	18.8481	19.2095	19.6418	20.0808	20.3093	20.3940	20.4088	20.4076	20.3563	20.0240	19.3722	18.7883 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8481	19.2095	19.6418	20.0808	20.3093	20.3940	20.4088	20.4076	20.3563	20.0240	19.3722	18.7883 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9526	0.9154	0.8520	0.7288	0.5674	0.3979	0.2770	0.3152	0.5273	0.7924	0.9208	0.9597	(94)
Useful gains	538.1121	625.9432	672.1571	662.7955	560.4110	390.4414	259.8767	272.1901	410.7945	522.5465	523.6318	512.8876	(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	1025.6564	1006.3972	922.0789	775.7089	596.0352	397.1699	261.0875	274.2047	430.5047	652.4417	853.2720	1018.8399	(97)
Space heating kWh	362.7330	255.6650	185.9418	81.2977	26.5044	0.0000	0.0000	0.0000	0.0000	96.6421	237.3410	376.4285	(98a)
Space heating requirement - total per year (kWh/year)												1622.5535	
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	362.7330	255.6650	185.9418	81.2977	26.5044	0.0000	0.0000	0.0000	0.0000	96.6421	237.3410	376.4285	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1622.5535	
Space heating per m2										(98c) / (4) =		25.8368	(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 %)													92.4000 (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	362.7330	255.6650	185.9418	81.2977	26.5044	0.0000	0.0000	0.0000	0.0000	96.6421	237.3410	376.4285	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	392.5682	276.6938	201.2357	87.9845	28.6845	0.0000	0.0000	0.0000	0.0000	104.5910	256.8625	407.3902	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
Efficiency of water heater (217)m	85.5028	85.0259	84.2087	82.8062	81.3406	80.3000	80.3000	80.3000	80.3000	83.0982	84.8477	80.3000	(216)
Fuel for water heating, kWh/month	250.2066	222.6529	239.3896	215.6201	213.8172	196.3236	194.6221	201.8548	203.4036	217.8080	225.1462	247.4170	(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	18.8589	15.1293	13.6223	9.9803	7.7090	6.2984	7.0324	9.1410	11.8733	15.5784	17.5958	19.3831	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-21.4508	-31.2651	-46.4524	-54.0566	-59.8900	-56.5005	-55.8219	-51.9134	-45.2778	-36.5728	-23.9482	-18.4288	(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	-9.1998	-19.6248	-39.5081	-60.0726	-80.1403	-80.7663	-79.8028	-67.2345	-48.8507	-28.2928	-12.3576	-7.2539	(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												1756.0103	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												80.3000	
Water heating fuel used												2628.2615	(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)												152.2023	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1034.6824	(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												3587.7916	(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	1756.0103	0.2100	368.7622	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2628.2615	0.2100	551.9349	(264)
Space and water heating			920.6971	(265)

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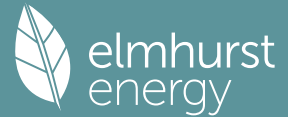


Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	152.2023	0.1443	21.9675 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-501.5783	0.1339	-67.1501
PV Unit electricity exported	-533.1041	0.1255	-66.9263
Total			-134.0765 (269)
Total CO2, kg/year			820.5174 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.0700 (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	1756.0103	1.1300	1984.2916 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2628.2615	1.1300	2969.9355 (278)
Space and water heating			4954.2271 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	152.2023	1.5338	233.4530 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-501.5783	1.4947	-749.7338
PV Unit electricity exported	-533.1041	0.4608	-245.6568
Total			-995.3906 (283)
Total Primary energy kWh/year			4322.3903 (286)
Target Primary Energy Rate (TPER)			68.8300 (287)

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Property Reference	Flat 5			Issued on Date	11/04/2024
Assessment Reference	Flat 5 - 1 bed TF_Copy	Prop Type Ref	HTA		
Property	Flat 5, 3 New Road, London, N8 8TA				
SAP Rating	76 C	DER	30.81	TER	15.33
Environmental	76 C	% DER < TER			-100.98
CO ₂ Emissions (t/year)	1.67	DFEE	94.46	TFEE	42.73
Compliance Check	See BREL	% DFEE < TFEE			-121.08
% DPER < TPER	-107.54	DPER	168.11	TPER	81.00
Assessor Details	Ms. Ruth Pike			Assessor ID	AU93-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	62.6000 (1b)	2.6000 (2b)	162.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	162.7600 (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	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (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) = 0.7500 (21)

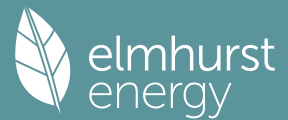
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (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
Solid Doors			2.2000	3.0000	6.6000		(26)
Windows (U _w = 1.60)			10.5000	1.5038	15.7895		(27)
Opening			2.4000	1.6791	4.0299		(27a)
Opening			2.4000	1.6791	4.0299		(27a)
External Wall 1	67.5000	12.7000	54.8000	0.3000	16.4400	110.0000	6028.0000 (29a)
Wall to corridor	15.0000		15.0000	0.3000	4.5000	110.0000	1650.0000 (29a)
sloping roof	62.6000	4.8000	57.8000	0.2000	11.5600	9.0000	520.2000 (30)
Total net area of external elements A _{um} (A, m ²)			145.1000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	62.9492		(33)
Party Floor			62.6000			30.0000	1878.0000 (32d)
Party Ceiling 1			1.0000			20.0000	20.0000 (32b)
Internal Wall Stud			55.0000			9.0000	495.0000 (32c)
Heat capacity C _m = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		10591.2000 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							169.1885 (35)
Thermal bridges (Default value 0.200 * total exposed area)							29.0200 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		91.9692 (37)

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

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(38)m	Jan 51.4124	Feb 50.4588	Mar 49.5241	Apr 45.1339	May 44.3125	Jun 40.4887	Jul 40.4887	Aug 39.7806	Sep 41.9616	Oct 44.3125	Nov 45.9741	Dec 47.7113	(38)
Heat transfer coeff	143.3815	142.4280	141.4933	137.1030	136.2816	132.4579	132.4579	131.7498	133.9307	136.2816	137.9433	139.6805	(39)
Average = Sum(39)m / 12 =												137.0991	
HLP	Jan 2.2904	Feb 2.2752	Mar 2.2603	Apr 2.1901	May 2.1770	Jun 2.1159	Jul 2.1159	Aug 2.1046	Sep 2.1395	Oct 2.1770	Nov 2.2036	Dec 2.2313	(40)
HLP (average)												2.1901	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0541	(42)
Hot water usage for mixer showers														
73.3254	72.2234	70.6177	67.5454	65.2781	62.7497	61.3125	62.9061	64.6530	67.3677	70.5060	73.0444	(42a)		
Hot water usage for baths														
25.3491	24.9726	24.4425	23.4650	22.7330	21.9214	21.4830	22.0095	22.5827	23.4511	24.4487	25.2634	(42b)		
Hot water usage for other uses														
35.6662	34.3692	33.0723	31.7753	30.4783	29.1814	29.1814	30.4783	31.7753	33.0723	34.3692	35.6662	(42c)		
Average daily hot water use (litres/day)												123.5299	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	134.3406	131.5652	128.1324	122.7856	118.4895	113.8525	111.9769	115.3939	119.0109	123.8911	129.3240	133.9739	(44)	
Energy content (annual)	212.7626	187.3471	196.9347	168.0874	159.5096	139.9949	135.4264	142.8818	146.7524	168.1190	184.2457	209.7708	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2051.8324		
31.9144	28.1021	29.5402	25.2131	23.9264	20.9992	20.3140	21.4323	22.0129	25.2179	27.6369	31.4656	(46)		
Water storage loss:														
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)	
Total heat required for water heating calculated for each month	263.7215	233.3745	247.8936	217.4025	210.4685	189.3100	186.3853	193.8407	196.0674	219.0779	233.5607	260.7297	(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	263.7215	233.3745	247.8936	217.4025	210.4685	189.3100	186.3853	193.8407	196.0674	219.0779	233.5607	260.7297	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2651.8324	(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	83.4833	73.7998	78.2205	68.2178	65.7767	58.8771	57.7690	60.2479	61.1239	68.6393	73.5905	82.4885	(65)	

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

Metabolic gains (Table 5), Watts														
(66)m	Jan 102.7056	Feb 102.7056	Mar 102.7056	Apr 102.7056	May 102.7056	Jun 102.7056	Jul 102.7056	Aug 102.7056	Sep 102.7056	Oct 102.7056	Nov 102.7056	Dec 102.7056	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	90.5136	100.2115	90.5136	93.5307	90.5136	93.5307	90.5136	90.5136	93.5307	90.5136	93.5307	90.5136	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.4533	181.3155	176.6229	166.6329	154.0224	142.1702	134.2523	132.3901	137.0827	147.0727	159.6832	171.5354	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	(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)	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	(71)	
Water heating gains (Table 5)	112.2087	109.8211	105.1351	94.7470	88.4095	81.7737	77.6465	80.9784	84.8943	92.2571	102.2090	110.8717	(72)	
Total internal gains	438.9874	448.1598	429.0833	411.7223	389.7572	371.2864	356.2241	357.6938	369.3195	386.6551	412.2346	429.7323	(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	

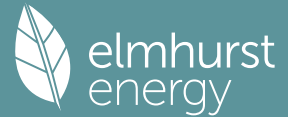
Northeast					10.5000	11.2829		0.6300	0.7000	0.7700		36.2062 (75)	
Southeast					2.4000	39.9751		0.6300	0.7000	1.0000		38.0787 (82)	
Northwest					2.4000	16.3666		0.6300	0.7000	1.0000		15.5902 (82)	

Solar gains	89.8751	175.7825	298.7562	464.4794	603.9323	635.7302	597.9087	488.7658	355.5637	210.1771	111.8313	74.1819 (83)	
Total gains	528.8625	623.9423	727.8395	876.2018	993.6894	1007.0165	954.1327	846.4596	724.8832	596.8322	524.0659	503.9142 (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	20.5187	20.6561	20.7925	21.4583	21.5876	22.2108	22.2108	22.3302	21.9666	21.5876	21.3276	21.0623		
alpha	2.3679	2.3771	2.3862	2.4306	2.4392	2.4807	2.4807	2.4887	2.4644	2.4392	2.4218	2.4042		
util living area	0.9781	0.9666	0.9439	0.8874	0.7896	0.6491	0.5255	0.5873	0.7917	0.9260	0.9682	0.9805	(86)	
MIT	18.3391	18.5854	19.0207	19.6622	20.2090	20.6060	20.7632	20.7249	20.3895	19.6826	18.9399	18.3456	(87)	
Th 2	19.1467	19.1562	19.1655	19.2096	19.2179	19.2572	19.2572	19.2645	19.2420	19.2179	19.2011	19.1836	(88)	
util rest of house														

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MIT 2	0.9720	0.9573	0.9274	0.8525	0.7200	0.5266	0.3486	0.4107	0.6929	0.8955	0.9577	0.9750 (89)
Living area fraction	16.8399	17.0890	17.5220	18.1673	18.6665	19.0131	19.1070	19.1000	18.8591	18.2103	17.4738	16.8716 (90)
MIT	17.6110	17.8587	18.2929	18.9363	19.4599	19.8325	19.9589	19.9358	fLA = Living area / (4) =			0.5144 (91)
Temperature adjustment									19.6463	18.9676	18.2279	17.6298 (92)
adjusted MIT	17.4610	17.7087	18.1429	18.7863	19.3099	19.6825	19.8089	19.7858	19.4963	18.8176	18.0779	-0.1500 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9641	0.9472	0.9152	0.8422	0.7242	0.5603	0.4101	0.4703	0.7103	0.8863	0.9486	0.9679 (94)	
Useful gains	509.8771	591.0192	666.1071	737.9696	719.6627	564.1928	391.3127	398.0936	514.8804	528.9906	497.1191	487.7267 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	1887.0472	1824.3195	1647.3927	1355.4367	1037.0951	673.2135	425.0434	446.0776	722.7304	1119.9085	1514.3316	1854.9307 (97)	
Space heating kWh	1024.6145	828.7779	730.0765	444.5763	236.1697	0.0000	0.0000	0.0000	0.0000	439.6429	732.3930	1017.1998 (98a)	
Space heating requirement - total per year (kWh/year)												5453.4506	
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	1024.6145	828.7779	730.0765	444.5763	236.1697	0.0000	0.0000	0.0000	0.0000	439.6429	732.3930	1017.1998 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												5453.4506	
Space heating per m2												87.1158 (99)	

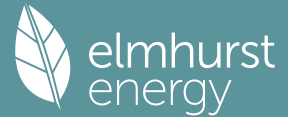
9a. Energy requirements - Individual heating systems, including micro-CHP

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	1024.6145	828.7779	730.0765	444.5763	236.1697	0.0000	0.0000	0.0000	0.0000	439.6429	732.3930	1017.1998 (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)	1144.8207	926.0088	815.7280	496.7333	263.8767	0.0000	0.0000	0.0000	0.0000	491.2211	818.3162	1136.5361 (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	263.7215	233.3745	247.8936	217.4025	210.4685	189.3100	186.3853	193.8407	196.0674	219.0779	233.5607	260.7297 (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	294.6609	260.7537	276.9761	242.9078	235.1604	211.5195	208.2517	216.5817	219.0698	244.7798	260.9617	291.3181 (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	18.4225	14.7792	13.3071	9.7493	7.5307	6.1526	6.8697	8.9295	11.5986	15.2179	17.1886	18.9346 (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												6093.2409 (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												2962.9413 (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)												148.6804 (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												9245.8626 (238)	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
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Space heating - main system 1	6093.2409	0.2100	1279.5806 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2962.9413	0.2100	622.2177 (264)
Space and water heating			1901.7983 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	148.6804	0.1443	21.4592 (268)
Total CO2, kg/year			1928.9446 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			30.8100 (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	6093.2409	1.1300	6885.3622 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2962.9413	1.1300	3348.1236 (278)
Space and water heating			10233.4858 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	148.6804	1.5338	228.0510 (282)
Total Primary energy kWh/year			10523.5616 (286)
Dwelling Primary energy Rate (DPER)			168.1100 (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	62.6000 (1b)	x 2.6000 (2b)	= 162.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 162.7600 (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) = 0.1229 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3729 (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) = 0.3729 (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	0.4754	0.4661	0.4568	0.4102	0.4008	0.3542	0.3542	0.3449	0.3729	0.4008	0.4195	0.4381 (22b)
Effective ac	0.6130	0.6086	0.6043	0.5841	0.5803	0.5627	0.5627	0.5595	0.5695	0.5803	0.5880	0.5960 (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			2.2000	1.0000	2.2000		(26)
TER Opening Type (Uw = 1.20)			9.2300	1.1450	10.5687		(27)
Opening			2.1100	1.4151	2.9858		(27a)
Opening			2.1100	1.4151	2.9858		(27a)
External Wall 1	67.5000	11.4300	56.0700	0.1800	10.0926		(29a)
Wall to corridor	15.0000		15.0000	0.1800	2.7000		(29a)
sloping roof	62.6000	4.2200	58.3800	0.1100	6.4218		(30)
Total net area of external elements Aum(A, m2)			145.1000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.9548		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							169.3482 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							7.2550 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	45.2098 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	32.9254	32.6897	32.4587	31.3735	31.1705	30.2253	30.2253	30.0503	30.5894	31.1705	31.5812	32.0106 (38)
Heat transfer coeff												

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Average = Sum(39)m / 12 =	78.1352	77.8995	77.6685	76.5833	76.3803	75.4351	75.4351	75.2601	75.7992	76.3803	76.7910	77.2204 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2482	1.2444	1.2407	1.2234	1.2201	1.2050	1.2050	1.2022	1.2108	1.2201	1.2267	1.2336 (40)
HLP (average)												1.2234
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0541 (42)
Hot water usage for mixer showers	58.6603	57.7787	56.4941	54.0363	52.2225	50.1997	49.0500	50.3249	51.7224	53.8942	56.4048	58.4355 (42a)
Hot water usage for baths	25.3491	24.9726	24.4425	23.4650	22.7330	21.9214	21.4830	22.0095	22.5827	23.4511	24.4487	25.2634 (42b)
Hot water usage for other uses	35.6662	34.3692	33.0723	31.7753	30.4783	29.1814	29.1814	30.4783	31.7753	33.0723	34.3692	35.6662 (42c)
Average daily hot water use (litres/day)												110.0092 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	119.6755	117.1205	114.0088	109.2766	105.4339	101.3025	99.7144	102.8127	106.0803	110.4175	115.2227	119.3651 (44)
Energy content (annual)	189.5368	166.7781	175.2274	149.5942	141.9342	124.5633	120.5960	127.3036	130.8077	149.8356	164.1559	186.8968 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1827.2294
	28.4305	25.0167	26.2841	22.4391	21.2901	18.6845	18.0894	19.0955	19.6211	22.4753	24.6234	28.0345 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.8134	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	240.4957	212.8055	226.1863	198.9092	192.8931	173.8784	171.4093	178.2625	180.1227	200.7945	213.4710	237.8557 (62)
WWHRS	-26.8170	-23.7172	-24.8353	-20.5646	-19.1655	-16.4000	-15.3724	-16.3470	-16.9681	-20.0035	-22.6616	-26.3204 (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	213.6786	189.0883	201.3510	178.3446	173.7277	157.4783	156.0369	161.9155	163.1546	180.7910	190.8094	211.5353 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64a)m = 2177.9112 (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	75.7607	66.9606	71.0028	62.0688	59.9329	53.7461	52.8015	55.0682	55.8223	62.5601	66.9106	74.8829 (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	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	90.5136	100.2115	90.5136	93.5307	90.5136	93.5307	90.5136	90.5136	93.5307	90.5136	93.5307	90.5136 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	179.4533	181.3155	176.6229	166.6329	154.0224	142.1702	134.2523	132.3901	137.0827	147.0727	159.6832	171.5354 (68)
Pumps, fans	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706 (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)	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645 (71)
Total internal gains	101.8289	99.6437	95.4339	86.2067	80.5549	74.6473	70.9698	74.0164	77.5310	84.0861	92.9314	100.6491 (72)
	428.6075	437.9824	419.3821	403.1820	381.9026	364.1600	349.5473	350.7318	361.9561	378.4841	402.9571	419.5098 (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

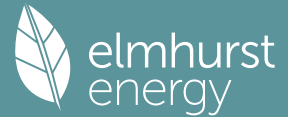
Northeast					9.2300	11.2829	0.6300	0.7000				0.7700	31.8270 (75)
Southeast					2.1100	39.9751	0.6300	0.7000				1.0000	33.4775 (82)
Northwest					2.1100	16.3666	0.6300	0.7000				1.0000	13.7063 (82)

Solar gains	79.0109	154.5334	262.6407	408.3289	530.9222	558.8756	525.6266	429.6788	312.5805	184.7700	98.3129	65.2147	(83)
Total gains	507.6184	592.5157	682.0228	811.5109	912.8248	923.0355	875.1739	780.4106	674.5366	563.2541	501.2700	484.7245	(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	37.6882	37.8023	37.9147	38.4520	38.5542	39.0372	39.0372	39.1280	38.8497	38.5542	38.3480	38.1347
alpha	3.5125	3.5202	3.5276	3.5635	3.5703	3.6025	3.6025	3.6085	3.5900	3.5703	3.5565	3.5423
util living area												
	0.9775	0.9610	0.9250	0.8295	0.6748	0.4976	0.3720	0.4302	0.6739	0.8924	0.9627	0.9806 (86)
MIT	19.1848	19.4615	19.8862	20.4275	20.7868	20.9467	20.9856	20.9762	20.8450	20.3408	19.6805	19.1484 (87)
Th 2	19.8817	19.8846	19.8876	19.9013	19.9039	19.9160	19.9160	19.9182	19.9113	19.9039	19.8987	19.8933 (88)
util rest of house												
	0.9725	0.9525	0.9088	0.7953	0.6180	0.4220	0.2836	0.3347	0.5959	0.8618	0.9531	0.9763 (89)
MIT 2	17.7967	18.1464	18.6756	19.3301	19.7228	19.8825	19.9102	19.9078	19.7993	19.2508	18.4364	17.7582 (90)
Living area fraction									fLA = Living area /	(4) =		0.5144 (91)

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MIT	18.5107	18.8229	19.2983	19.8946	20.2701	20.4299	20.4634	20.4574	20.3372	19.8114	19.0763	18.4733 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5107	18.8229	19.2983	19.8946	20.2701	20.4299	20.4634	20.4574	20.3372	19.8114	19.0763	18.4733 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9642	0.9422	0.8984	0.7950	0.6379	0.4586	0.3287	0.3831	0.6281	0.8588	0.9439	0.9687	(94)
Useful gains	489.4594	558.2858	612.7578	645.1807	582.2763	423.3056	287.7112	298.9820	423.6909	483.7000	473.1570	469.5672	(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	1110.3553	1084.5845	994.0247	842.0016	654.5847	439.7802	291.4356	305.3570	472.7744	703.5714	919.6757	1102.1911	(97)
Space heating kWh	461.9466	353.6727	283.6626	141.7110	53.7974	0.0000	0.0000	0.0000	0.0000	163.5843	321.4934	470.6722	(98a)
Space heating requirement - total per year (kWh/year)												2250.5402	
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	461.9466	353.6727	283.6626	141.7110	53.7974	0.0000	0.0000	0.0000	0.0000	163.5843	321.4934	470.6722	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2250.5402	
Space heating per m2										(98c) / (4) =		35.9511	(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 %)												92.4000	(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	461.9466	353.6727	283.6626	141.7110	53.7974	0.0000	0.0000	0.0000	0.0000	163.5843	321.4934	470.6722	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	499.9422	382.7627	306.9941	153.3669	58.2223	0.0000	0.0000	0.0000	0.0000	177.0393	347.9366	509.3854	(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	213.6786	189.0883	201.3510	178.3446	173.7277	157.4783	156.0369	161.9155	163.1546	180.7910	190.8094	211.5353	(64)
Efficiency of water heater	85.9875	85.7023	85.1156	83.8934	82.1797	80.3000	80.3000	80.3000	80.3000	84.1677	85.4899	86.0427	(216)
Fuel for water heating, kWh/month	248.4998	220.6337	236.5616	212.5849	211.3997	196.1125	194.3175	201.6382	203.1813	214.7985	223.1954	245.8494	(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	18.8069	15.0876	13.5847	9.9528	7.6878	6.2810	7.0131	9.1158	11.8406	15.5355	17.5473	19.3296	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.3850	-31.1706	-46.3140	-53.8982	-59.7171	-56.3387	-55.6624	-51.7640	-45.1456	-36.4637	-23.8754	-18.3722	(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)	-9.1679	-19.5572	-39.3727	-59.8675	-79.8672	-80.4910	-79.5304	-67.0045	-48.6831	-28.1953	-12.3149	-7.2287	(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												2435.6495	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												80.3000	
Water heating fuel used												2608.7725	(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)												151.7828	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1031.3873	(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												4250.8175	(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	2435.6495	0.2100	511.4864	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2608.7725	0.2100	547.8422	(264)
Space and water heating			1059.3286	(265)

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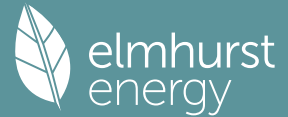
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	151.7828	0.1443	21.9069 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-500.1069	0.1339	-66.9526
PV Unit electricity exported	-531.2804	0.1255	-66.6972
Total			-133.6498 (269)
Total CO2, kg/year			959.5150 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.3300 (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	2435.6495	1.1300	2752.2840 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2608.7725	1.1300	2947.9129 (278)
Space and water heating			5700.1969 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	151.7828	1.5338	232.8095 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-500.1069	1.4947	-747.5323
PV Unit electricity exported	-531.2804	0.4608	-244.8160
Total			-992.3483 (283)
Total Primary energy kWh/year			5070.7589 (286)
Target Primary Energy Rate (TPER)			81.0000 (287)

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Property Reference	Flat 1			Issued on Date	11/04/2024
Assessment Reference	Plot 1_Copy	Prop Type Ref	HTA		
Property	Flat 1, 3 New Road, London, N8 8TA				
SAP Rating	79 C	DER	26.52	TER	16.18
Environmental	81 B	% DER < TER			-63.91
CO ₂ Emissions (t/year)	1.2	DFEE	75.38	TFEE	41.40
Compliance Check	See BREL	% DFEE < TFEE			-82.06
% DPER < TPER	-69.27	DPER	145.15	TPER	85.75
Assessor Details	Ms. Ruth Pike			Assessor ID	AU93-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	52.2000 (1b)	2.6000 (2b)	135.7200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.2000		135.7200 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 135.7200 (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	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.6375 (21)

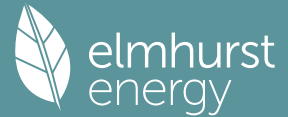
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.8128	0.7969	0.7809	0.7013	0.6853	0.6056	0.6056	0.5897	0.6375	0.6853	0.7172	0.7491 (22b)
Effective ac	0.8303	0.8175	0.8049	0.7459	0.7348	0.6834	0.6834	0.6739	0.7032	0.7348	0.7572	0.7805 (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
Solid Doors			2.2000	1.3000	2.8600		(26)
Windows (Uw = 1.60)			10.0800	1.5038	15.1579		(27)
Ground Floor			52.2000	0.0900	4.6980	75.0000	3915.0000 (28a)
External Wall 1	42.5000	7.2400	35.2600	0.1700	5.9942	110.0000	3878.6000 (29a)
Wall to corridor	17.5000	5.0400	12.4600	0.1800	2.2428	110.0000	1370.6000 (29a)
Total net area of external elements Aum(A, m ²)			112.2000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.9529		(33)
Party Wall 1			30.0000	0.0000	0.0000	20.0000	600.0000 (32)
Party Ceiling 1			52.2000			20.0000	1044.0000 (32b)
Internal Wall Stud			50.0000			9.0000	450.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		11258.2000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							215.6743 (35)
Thermal bridges (Default value 0.200 * total exposed area)							22.4400 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		53.3929 (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
	37.1886	36.6141	36.0510	33.4060	32.9111	30.6074	30.6074	30.1808	31.4948	32.9111	33.9122	34.9588 (38)

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Heat transfer coeff
90.5815 90.0070 89.4439 86.7989 86.3040 84.0003 84.0003 83.5737 84.8877 86.3040 87.3051 88.3517 (39)
Average = Sum(39)m / 12 = 86.7965

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.7353	1.7243	1.7135	1.6628	1.6533	1.6092	1.6092	1.6010	1.6262	1.6533	1.6725	1.6926 (40)
HLP (average)												1.6628
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7550 (42)

Hot water usage for mixer showers 67.0557 66.0480 64.5796 61.7700 59.6966 57.3843 56.0700 57.5274 59.1249 61.6075 64.4775 66.7988 (42a)

Hot water usage for baths 23.1922 22.8477 22.3627 21.4684 20.7987 20.0562 19.6551 20.1367 20.6611 21.4557 22.3684 23.1138 (42b)

Hot water usage for other uses 32.6027 31.4171 30.2316 29.0460 27.8605 26.6749 26.6749 27.8605 29.0460 30.2316 31.4171 32.6027 (42c)

Average daily hot water use (litres/day) 112.9647 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	122.8506	120.3129	117.1738	112.2844	108.3557	104.1154	102.4000	105.5245	108.8320	113.2948	118.2630	122.5152 (44)
Energy conte	194.5653	171.3239	180.0918	153.7117	145.8676	128.0220	123.8439	130.6614	134.2008	153.7399	168.4873	191.8293 (45)
Energy content (annual)										Total = Sum(45)m =		1876.3450
Distribution loss (46)m = 0.15 x (45)m	29.1848	25.6986	27.0138	23.0568	21.8801	19.2033	18.5766	19.5992	20.1301	23.0610	25.2731	28.7744 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	245.5242	217.3513	231.0507	203.0267	196.8265	177.3371	174.8029	181.6203	183.5158	204.6988	217.8024	242.7882 (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	245.5242	217.3513	231.0507	203.0267	196.8265	177.3371	174.8029	181.6203	183.5158	204.6988	217.8024	242.7882 (64)
12Total per year (kWh/year)												2476.3450 (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)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	77.4327	68.4721	72.6203	63.4379	61.2407	54.8961	53.9178	56.1846	56.9505	63.8583	68.3508	76.5230 (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	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.0008	86.3580	78.0008	80.6008	78.0008	80.6008	78.0008	78.0008	80.6008	78.0008	80.6008	78.0008 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	152.9446	154.5317	150.5323	142.0180	131.2703	121.1690	114.4206	112.8335	116.8330	125.3472	136.0949	146.1963 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749 (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)	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988 (71)
Water heating gains (Table 5)	104.0762	101.8929	97.6079	88.1082	82.3128	76.2446	72.4702	75.5170	79.0979	85.8310	94.9317	102.8534 (72)
Total internal gains	387.3461	395.1072	378.4655	363.0516	343.9084	327.3389	314.2162	315.6759	325.8563	341.5035	363.9520	379.3751 (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						
Northeast	5.0400	11.2829	0.6300	0.7000	0.7700	17.3790 (75)						
Northwest	5.0400	11.2829	0.6300	0.7000	0.7700	17.3790 (81)						
Solar gains	34.7580	70.7509	127.4706	209.3434	281.3986	300.0007	280.6445	223.7330	155.3249	86.4632	43.7345	28.3851 (83)
Total gains	422.1041	465.8581	505.9361	572.3950	625.3070	627.3395	594.8606	539.4089	481.1812	427.9668	407.6865	407.7602 (84)

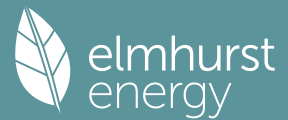
7. Mean internal temperature (heating season)

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	34.5245	34.7448	34.9636	36.0290	36.2356	37.2294	37.2294	37.4194	36.8402	36.2356	35.8201	35.3958
alpha	3.3016	3.3163	3.3309	3.4019	3.4157	3.4820	3.4820	3.4946	3.4560	3.4157	3.3880	3.3597
util living area	0.9893	0.9841	0.9730	0.9380	0.8590	0.7135	0.5704	0.6325	0.8450	0.9567	0.9834	0.9905 (86)
MIT	19.2168	19.3754	19.6609	20.1067	20.4940	20.7694	20.8637	20.8434	20.6288	20.1451	19.6406	19.2280 (87)
Th 2	19.5157	19.5235	19.5312	19.5676	19.5745	19.6066	19.6066	19.6126	19.5942	19.5745	19.5606	19.5462 (88)
util rest of house	0.9860	0.9791	0.9639	0.9155	0.8046	0.6045	0.4119	0.4749	0.7633	0.9364	0.9772	0.9876 (89)
MIT 2	17.4910	17.6979	18.0649	18.6449	19.1040	19.4093	19.4778	19.4745	19.2796	18.7074	18.0629	17.5263 (90)
Living area fraction									fLA = Living area / (4) =			0.4923 (91)

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MIT	18.3407	18.5238	18.8507	19.3646	19.7883	20.0790	20.1602	20.1485	19.9439	19.4152	18.8396	18.3641 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.1907	18.3738	18.7007	19.2146	19.6383	19.9290	20.0102	19.9985	19.7939	19.2652	18.6896	18.2141 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9818	0.9738	0.9570	0.9085	0.8075	0.6326	0.4612	0.5230	0.7773	0.9305	0.9720	0.9838	(94)
Useful gains	414.4164	453.6455	484.1879	520.0117	504.9260	396.8563	274.3358	282.1166	374.0309	398.2358	396.2853	401.1577	(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	1258.2387	1212.7348	1091.2786	895.2967	685.1110	447.6347	286.4549	300.7376	483.3416	747.8452	1011.8347	1238.1737	(97)
Space heating kWh	627.8038	510.1080	451.6755	270.2051	134.0576	0.0000	0.0000	0.0000	0.0000	260.1093	443.1956	622.7399	(98a)
Space heating requirement - total per year (kWh/year)												3319.8949	
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	627.8038	510.1080	451.6755	270.2051	134.0576	0.0000	0.0000	0.0000	0.0000	260.1093	443.1956	622.7399	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3319.8949	
Space heating per m2											(98c) / (4) =	63.5995	(99)

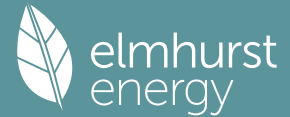
9a. Energy requirements - Individual heating systems, including micro-CHP

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	627.8038	510.1080	451.6755	270.2051	134.0576	0.0000	0.0000	0.0000	0.0000	260.1093	443.1956	622.7399	(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)	701.4568	569.9531	504.6653	301.9052	149.7851	0.0000	0.0000	0.0000	0.0000	290.6250	495.1906	695.7988	(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	245.5242	217.3513	231.0507	203.0267	196.8265	177.3371	174.8029	181.6203	183.5158	204.6988	217.8024	242.7882	(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	274.3287	242.8506	258.1572	226.8455	219.9179	198.1420	195.3104	202.9277	205.0456	228.7138	243.3547	271.2717	(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	15.8758	12.7361	11.4675	8.4016	6.4896	5.3021	5.9200	7.6951	9.9952	13.1142	14.8124	16.3170	(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													3709.3798 (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													2766.8659 (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)													128.1265 (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													6645.3722 (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	3709.3798	0.2100	778.9698	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2766.8659	0.2100	581.0418	(264)

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Space and water heating			1360.0116 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	128.1265	0.1443	18.4926 (268)
Total CO ₂ , kg/year			1384.1914 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			26.5200 (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	3709.3798	1.1300	4191.5992 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	2766.8659	1.1300	3126.5585 (278)
Space and water heating			7318.1577 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	128.1265	1.5338	196.5246 (282)
Total Primary energy kWh/year			7576.7071 (286)
Dwelling Primary energy Rate (DPER)			145.1500 (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	52.2000 (1b)	x 2.6000 (2b)	= 135.7200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.2000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 135.7200 (5)

2. Ventilation rate

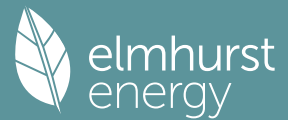
		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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) =	0.1474 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3974	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3378 (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	0.4306	0.4222	0.4138	0.3715	0.3631	0.3209	0.3209	0.3124	0.3378	0.3631	0.3800	0.3969 (22b)
Effective ac	0.5927	0.5891	0.5856	0.5690	0.5659	0.5515	0.5515	0.5488	0.5570	0.5659	0.5722	0.5788 (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			2.2000	1.0000	2.2000		(26)					
TER Opening Type (Uw = 1.20)			10.0800	1.1450	11.5420		(27)					
Ground Floor			52.2000	0.1300	6.7860		(28a)					
External Wall 1	42.5000	7.2400	35.2600	0.1800	6.3468		(29a)					
Wall to corridor	17.5000	5.0400	12.4600	0.1800	2.2428		(29a)					
Total net area of external elements Aum(A, m2)			112.2000				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =		29.1176		(33)					
Party Wall 1			30.0000	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							225.6743 (35)					
Thermal bridges (User defined value 0.050 * total exposed area)							5.6100 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	34.7276 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 26.5468	Feb 26.3855	Mar 26.2274	Apr 25.4850	May 25.3461	Jun 24.6994	Jul 24.6994	Aug 24.5797	Sep 24.9485	Oct 25.3461	Nov 25.6271	Dec 25.9209 (38)
Heat transfer coeff	61.2744	61.1131	60.9550	60.2126	60.0737	59.4270	59.4270	59.3072	59.6761	60.0737	60.3547	60.6485 (39)
Average = Sum(39)m / 12 =												60.2119
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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HLP	1.1738	1.1707	1.1677	1.1535	1.1508	1.1384	1.1384	1.1362	1.1432	1.1508	1.1562	1.1618 (40)
HLP (average)												1.1535
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7550 (42)
Hot water usage for mixer showers	53.6446	52.8384	51.6637	49.4160	47.7573	45.9075	44.8560	46.0219	47.2999	49.2860	51.5820	53.4391 (42a)
Hot water usage for baths	23.1922	22.8477	22.3627	21.4684	20.7987	20.0562	19.6551	20.1367	20.6611	21.4557	22.3684	23.1138 (42b)
Hot water usage for other uses	32.6027	31.4171	30.2316	29.0460	27.8605	26.6749	26.6749	27.8605	29.0460	30.2316	31.4171	32.6027 (42c)
Average daily hot water use (litres/day)												100.6001 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	109.4394	107.1033	104.2579	99.9304	96.4164	92.6385	91.1860	94.0191	97.0070	100.9733	105.3675	109.1555 (44)
Energy conte	173.3253	152.5136	160.2405	136.7997	129.7950	113.9099	110.2816	116.4152	119.6194	137.0198	150.1153	170.9111 (45)
Energy content (annual)												Total = Sum(45)m = 1670.9464
Distribution loss (46)m = 0.15 x (45)m	25.9988	22.8770	24.0361	20.5200	19.4693	17.0865	16.5422	17.4623	17.9429	20.5530	22.5173	25.6367 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	50.9589	46.0274	50.9589	49.2807	49.1328	45.6848	46.4674	47.9111	47.8391	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	224.2842	198.5410	211.1994	186.0804	178.9278	159.5946	156.7490	164.3263	167.4585	187.9787	199.4304	221.8700 (62)
WWHRS	-24.5241	-21.6893	-22.7118	-18.8062	-17.5267	-14.9978	-14.0580	-14.9493	-15.5173	-18.2931	-20.7239	-24.0699 (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	199.7601	176.8517	188.4877	167.2741	161.4010	144.5969	142.6910	149.3770	151.9412	169.6855	178.7065	197.8001 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2028.5729 (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	70.3704	62.2176	66.0197	57.8061	55.4400	49.2962	48.2855	50.6858	51.7332	58.2988	62.2421	69.5677 (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	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485 (66)
Lighting gains (calculated in Appendix L9 or L9a), also see Table 5	78.0008	86.3580	78.0008	80.6008	78.0008	80.6008	78.0008	78.0008	80.6008	78.0008	80.6008	78.0008 (67)
Appliances gains (calculated in Appendix L13 or L13a), also see Table 5	152.9446	154.5317	150.5323	142.0180	131.2703	121.1690	114.4206	112.8335	116.8330	125.3472	136.0949	146.1963 (68)
Cooking gains (calculated in Appendix L15 or L15a), also see Table 5	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988 (71)
Water heating gains (Table 5)	94.5838	92.5858	88.7362	80.2862	74.5162	68.4670	64.8998	68.1261	71.8517	78.3586	86.4474	93.5049 (72)
Total internal gains	377.8538	385.8000	369.5938	355.2296	336.1118	319.5613	306.6458	308.2850	318.6100	334.0312	355.4677	370.0266 (73)

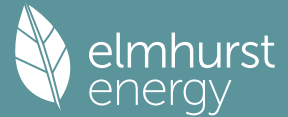
6. Solar gains

[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
Northeast					5.0400	11.2829	0.6300	0.7000			0.7700	17.3790 (75)
Northwest					5.0400	11.2829	0.6300	0.7000			0.7700	17.3790 (81)
Solar gains	34.7580	70.7509	127.4706	209.3434	281.3986	300.0007	280.6445	223.7330	155.3249	86.4632	43.7345	28.3851 (83)
Total gains	412.6118	456.5509	497.0644	564.5730	617.5104	619.5619	587.2903	532.0180	473.9350	420.4944	399.2023	398.4117 (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	53.4037	53.5446	53.6835	54.3454	54.4711	55.0638	55.0638	55.1750	54.8340	54.4711	54.2175	53.9548
alpha	4.5602	4.5696	4.5789	4.6230	4.6314	4.6709	4.6709	4.6783	4.6556	4.6314	4.6145	4.5970
util living area	0.9905	0.9837	0.9673	0.9091	0.7789	0.5880	0.4395	0.5016	0.7609	0.9415	0.9827	0.9918 (86)
MIT	19.6391	19.8151	20.1065	20.5213	20.8272	20.9642	20.9925	20.9867	20.8860	20.4909	20.0076	19.6156 (87)
Th 2	19.9410	19.9435	19.9459	19.9574	19.9595	19.9696	19.9696	19.9714	19.9657	19.9595	19.9552	19.9506 (88)
util rest of house	0.9877	0.9790	0.9575	0.8826	0.7226	0.5035	0.3395	0.3949	0.6811	0.9185	0.9768	0.9895 (89)
MIT 2	18.3758	18.6005	18.9683	19.4796	19.8169	19.9491	19.9671	19.9665	19.8879	19.4570	18.8548	18.3528 (90)
Living area fraction	18.9978	19.1985	19.5287	19.9925	20.3143	20.4489	20.4719	20.4688	20.3793	19.9660	19.4224	18.9745 (92)
MIT	18.9978	19.1985	19.5287	19.9925	20.3143	20.4489	20.4719	20.4688	20.3793	19.9660	19.4224	18.9745 (93)
Temperature adjustment												0.0000
adjusted MIT	18.9978	19.1985	19.5287	19.9925	20.3143	20.4489	20.4719	20.4688	20.3793	19.9660	19.4224	18.9745 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9844	0.9747	0.9528	0.8837	0.7430	0.5438	0.3888	0.4474	0.7152	0.9186	0.9729	0.9865	(94)
Useful gains	406.1665	445.0167	473.5876	498.8849	458.8287	336.9245	228.3309	238.0055	338.9712	386.2836	388.4003	393.0234	(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	900.5955	873.8234	794.1643	667.9060	517.4929	347.5825	230.0982	241.3067	374.7231	562.6519	743.7135	896.0509	(97)
Space heating kWh	367.8552	288.1581	238.5091	121.6952	43.6462	0.0000	0.0000	0.0000	0.0000	131.2180	255.8255	374.2525	(98a)
Space heating requirement - total per year (kWh/year)												1821.1597	
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	367.8552	288.1581	238.5091	121.6952	43.6462	0.0000	0.0000	0.0000	0.0000	131.2180	255.8255	374.2525	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1821.1597	
Space heating per m2										(98c) / (4) =		34.8881	(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 %)													92.4000	(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	367.8552	288.1581	238.5091	121.6952	43.6462	0.0000	0.0000	0.0000	0.0000	131.2180	255.8255	374.2525	(98)	
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)	
Space heating fuel (main heating system)	398.1117	311.8594	258.1267	131.7047	47.2362	0.0000	0.0000	0.0000	0.0000	142.0108	276.8674	405.0351	(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	199.7601	176.8517	188.4877	167.2741	161.4010	144.5969	142.6910	149.3770	151.9412	169.6855	178.7065	197.8001	(64)	
Efficiency of water heater (217)m	85.6710	85.4207	84.8869	83.7103	81.9883	80.3000	80.3000	80.3000	80.3000	83.8367	85.1495	85.7254	(216)	
Fuel for water heating, kWh/month	233.1713	207.0362	222.0457	199.8250	196.8587	180.0708	177.6973	186.0237	189.2170	202.4001	209.8737	230.7367	(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	16.2070	13.0019	11.7067	8.5769	6.6250	5.4127	6.0436	7.8556	10.2037	13.3878	15.1215	16.6575	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-17.9494	-26.2250	-39.0618	-45.5829	-50.6257	-47.8224	-47.2661	-43.9068	-38.2063	-30.7503	-20.0676	-15.4149	(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	-7.5276	-16.0752	-32.3894	-49.2824	-65.7689	-66.2751	-65.4666	-55.1302	-40.0342	-23.1666	-10.1102	-5.9328	(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												1970.9520	(211)	
Space heating fuel - main system 2												0.0000	(213)	
Space heating fuel - secondary												0.0000	(215)	
Efficiency of water heater												80.3000		
Water heating fuel used												2434.9562	(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)												130.7999	(232)	
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation												-860.0386	(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												3762.6695	(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	1970.9520	0.2100	413.8999 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2434.9562	0.2100	511.3408 (264)
Space and water heating			925.2407 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	130.7999	0.1443	18.8785 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-422.8793	0.1338	-56.5880

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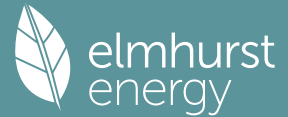


PV Unit electricity exported	-437.1593	0.1255	-54.8756
Total			-111.4636 (269)
Total CO2, kg/year			844.5849 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.1800 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1970.9520	1.1300	2227.1758 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2434.9562	1.1300	2751.5005 (278)
Space and water heating			4978.6762 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	130.7999	1.5338	200.6253 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-422.8793	1.4945	-632.0005
PV Unit electricity exported	-437.1593	0.4608	-201.4239
Total			-833.4244 (283)
Total Primary energy kWh/year			4475.9779 (286)
Target Primary Energy Rate (TPER)			85.7500 (287)

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Property Reference	Flat 2			Issued on Date	11/04/2024
Assessment Reference	Flat 2_Copy	Prop Type Ref	HTA		
Property	Flat 2, 3 New Road, London, N8 8TA				
SAP Rating	80 C	DER	23.00	TER	13.21
Environmental	82 B	% DER < TER			-74.11
CO ₂ Emissions (t/year)	1.39	DFEE	66.59	TFEE	35.49
Compliance Check	See BREL	% DFEE < TFEE			-87.61
% DPER < TPER	-81.18	DPER	125.96	TPER	69.52
Assessor Details	Ms. Ruth Pike			Assessor ID	AU93-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	70.0000 (1b)	2.6000 (2b)	182.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		182.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	182.0000 (5)

2. Ventilation rate

	m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7500	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.6375 (21)

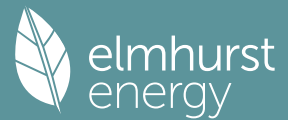
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.8128	0.7969	0.7809	0.7013	0.6853	0.6056	0.6056	0.5897	0.6375	0.6853	0.7172	0.7491 (22b)
Effective ac	0.8303	0.8175	0.8049	0.7459	0.7348	0.6834	0.6834	0.6739	0.7032	0.7348	0.7572	0.7805 (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
Solid Doors			2.2000	1.3000	2.8600		(26)
Windows (Uw = 1.60)			14.8800	1.5038	22.3759		(27)
Ground Floor			70.0000	0.0900	6.3000	75.0000	5250.0000 (28a)
External Wall 1	47.5000	12.0400	35.4600	0.1700	6.0282	110.0000	3900.6000 (29a)
Wall to corridor	25.0000	5.0400	19.9600	0.1800	3.5928	110.0000	2195.6000 (29a)
Total net area of external elements Aum(A, m ²)			142.5000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.1569		(33)
Party Wall 1			30.0000	0.0000	0.0000	20.0000	600.0000 (32)
Party Ceiling 1			70.0000			20.0000	1400.0000 (32b)
Internal Wall Stud			75.0000			9.0000	675.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		14021.2000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							200.3029 (35)
Thermal bridges (Default value 0.200 * total exposed area)							28.5000 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		69.6569 (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
	49.8697	49.0993	48.3442	44.7973	44.1337	41.0445	41.0445	40.4724	42.2344	44.1337	45.4762	46.8797 (38)

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Heat transfer coeff	119.5267	118.7563	118.0011	114.4542	113.7906	110.7014	110.7014	110.1293	111.8913	113.7906	115.1331	116.5366 (39)
Average = Sum(39)m / 12 =												114.4511
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.7075	1.6965	1.6857	1.6351	1.6256	1.5814	1.5814	1.5733	1.5984	1.6256	1.6448	1.6648 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2461 (42)
Hot water usage for mixer showers													
77.3497	76.1873	74.4934	71.2525	68.8608	66.1936	64.6776	66.3586	68.2013	71.0651	74.3756	77.0534	(42a)	
Hot water usage for baths													
26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432	(42b)	
Hot water usage for other uses													
37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326	(42c)	
Average daily hot water use (litres/day)												130.3115 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	141.7158	138.7879	135.1665	129.5263	124.9942	120.1026	118.1242	121.7289	125.5446	130.6927	136.4238	141.3291 (44)	
Energy content (annual)	224.4432	197.6322	207.7459	177.3150	168.2662	147.6801	142.8610	150.7258	154.8090	177.3488	194.3607	221.2872 (45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2164.4751	
33.6665	29.6448	31.1619	26.5972	25.2399	22.1520	21.4291	22.6089	23.2214	26.6023	29.1541	33.1931	(46)	
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (61)	
Total heat required for water heating calculated for each month													
275.4022	243.6596	258.7048	226.6300	219.2251	196.9952	193.8199	201.6847	204.1241	228.3077	243.6758	272.2461	(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	275.4022	243.6596	258.7048	226.6300	219.2251	196.9952	193.8199	201.6847	204.1241	228.3077	243.6758	272.2461 (64)	
12Total per year (kWh/year)												2764.4751 (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)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)	
Heat gains from water heating, kWh/month													
87.3671	77.2195	81.8152	71.2860	68.6882	61.4324	60.2410	62.8561	63.8028	71.7082	76.9537	86.3177	(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
112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
99.7072	110.3901	99.7072	103.0308	99.7072	103.0308	99.7072	99.7072	103.0308	99.7072	103.0308	99.7072	99.7072 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918	188.5918 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306 (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)												
-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450 (71)
Water heating gains (Table 5)												
117.4289	114.9100	109.9667	99.0083	92.3229	85.3228	80.9691	84.4839	88.6150	96.3820	106.8801	116.0184	116.0184 (72)
Total internal gains	474.1250	484.3364	463.5510	444.9328	421.0594	401.3522	384.9697	386.4372	399.0510	417.4777	445.1639	464.0093 (73)

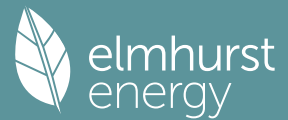
6. Solar gains

[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							
Northeast	5.0400	11.2829	0.6300	0.7000	0.7700	17.3790 (75)						
Southeast	9.8400	36.7938	0.6300	0.7000	0.7700	110.6476 (77)						
Solar gains	128.0266	223.8492	321.6133	424.1951	498.5921	505.3051	482.8739	425.7929	356.8899	251.5353	154.3976	108.8838 (83)
Total gains	602.1516	708.1856	785.1643	869.1279	919.6515	906.6573	867.8436	812.2301	755.9408	669.0130	599.5615	572.8932 (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	32.5850	32.7964	33.0063	34.0291	34.2276	35.1827	35.1827	35.3655	34.8086	34.2276	33.8285	33.4211
alpha	3.1723	3.1864	3.2004	3.2686	3.2818	3.3455	3.3455	3.3577	3.3206	3.2818	3.2552	3.2281
util living area	0.9843	0.9730	0.9535	0.9059	0.8171	0.6676	0.5224	0.5686	0.7766	0.9268	0.9740	0.9865 (86)
MIT	19.1963	19.4131	19.7286	20.1689	20.5272	20.7794	20.8660	20.8524	20.6775	20.2101	19.6543	19.1970 (87)
Th 2	19.5354	19.5433	19.5511	19.5877	19.5946	19.6270	19.6270	19.6330	19.6145	19.5946	19.5807	19.5662 (88)
util rest of house	0.9798	0.9653	0.9397	0.8766	0.7574	0.5612	0.3761	0.4225	0.6854	0.8976	0.9653	0.9827 (89)
MIT 2	17.4900	17.7691	18.1706	18.7367	19.1544	19.4326	19.4951	19.4947	19.3379	18.8036	18.1038	17.5120 (90)
Living area fraction	fLA = Living area / (4) =											0.3886 (91)

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MIT	18.1530	18.4079	18.7760	19.2932	19.6878	19.9559	20.0278	20.0223	19.8584	19.3501	18.7063	18.1668 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.0030	18.2579	18.6260	19.1432	19.5378	19.8059	19.8778	19.8723	19.7084	19.2001	18.5563	18.0168 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9731	0.9561	0.9281	0.8652	0.7546	0.5765	0.4046	0.4502	0.6926	0.8870	0.9566	0.9768	(94)
Useful gains	585.9790	677.1125	728.7189	751.9519	693.9369	522.7111	351.1727	365.6409	523.5796	593.4338	573.5364	559.5921	(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	1637.8751	1586.3329	1430.8793	1172.3787	891.8676	576.3046	362.8551	382.3994	627.5342	978.6152	1318.9940	1610.1575	(97)
Space heating kWh	782.6107	610.9961	522.4074	302.7073	147.2605	0.0000	0.0000	0.0000	0.0000	286.5749	536.7295	781.6207	(98a)
Space heating requirement - total per year (kWh/year)												3970.9070	
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	782.6107	610.9961	522.4074	302.7073	147.2605	0.0000	0.0000	0.0000	0.0000	286.5749	536.7295	781.6207	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3970.9070	
Space heating per m2										(98c) / (4) =		56.7272	(99)

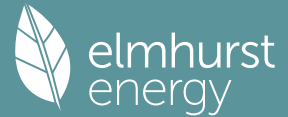
9a. Energy requirements - Individual heating systems, including micro-CHP

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	782.6107	610.9961	522.4074	302.7073	147.2605	0.0000	0.0000	0.0000	0.0000	286.5749	536.7295	781.6207	(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)	874.4254	682.6772	583.6954	338.2204	164.5368	0.0000	0.0000	0.0000	0.0000	320.1955	599.6977	873.3192	(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	275.4022	243.6596	258.7048	226.6300	219.2251	196.9952	193.8199	201.6847	204.1241	228.3077	243.6758	272.2461	(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	307.7119	272.2453	289.0556	253.2179	244.9442	220.1064	216.5585	225.3460	228.0716	255.0924	272.2634	304.1856	(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	20.2937	16.2804	14.6587	10.7396	8.2956	6.7775	7.5675	9.8365	12.7767	16.7637	18.9345	20.8578	(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													4436.7676 (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													3088.7990 (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)													163.7821 (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													7730.3487 (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	4436.7676	0.2100	931.7212	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3088.7990	0.2100	648.6478	(264)

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Space and water heating			1580.3690 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	163.7821	0.1443	23.6388 (268)
Total CO ₂ , kg/year			1609.6950 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			23.0000 (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	4436.7676	1.1300	5013.5474 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	3088.7990	1.1300	3490.3428 (278)
Space and water heating			8503.8903 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	163.7821	1.5338	251.2144 (282)
Total Primary energy kWh/year			8817.1295 (286)
Dwelling Primary energy Rate (DPER)			125.9600 (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	70.0000 (1b)	x 2.6000 (2b)	= 182.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 182.0000 (5)

2. Ventilation rate

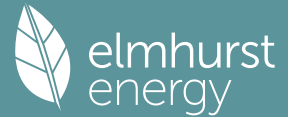
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) = 0.1099 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3599 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3059 (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	0.3900	0.3824	0.3747	0.3365	0.3288	0.2906	0.2906	0.2830	0.3059	0.3288	0.3441	0.3594 (22b)
Effective ac	0.5761	0.5731	0.5702	0.5566	0.5541	0.5422	0.5422	0.5400	0.5468	0.5541	0.5592	0.5646 (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			2.2000	1.0000	2.2000		(26)					
TER Opening Type (Uw = 1.20)			14.8800	1.1450	17.0382		(27)					
Ground Floor			70.0000	0.1300	9.1000		(28a)					
External Wall 1	47.5000	12.0400	35.4600	0.1800	6.3828		(29a)					
Wall to corridor	25.0000	5.0400	19.9600	0.1800	3.5928		(29a)					
Total net area of external elements Aum(A, m2)			142.5000				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =		38.3138		(33)					
Party Wall 1			30.0000	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							210.3029 (35)					
Thermal bridges (User defined value 0.050 * total exposed area)							7.1250 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	45.4388 (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	34.5983	34.4209	34.2470	33.4303	33.2775	32.5662	32.5662	32.4345	32.8402	33.2775	33.5866	33.9098 (38)
Average = Sum(39)m / 12 =	80.0371	79.8597	79.6858	78.8691	78.7163	78.0049	78.0049	77.8732	78.2789	78.7163	79.0254	79.3486 (39)
												78.8683
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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HLP	1.1434	1.1409	1.1384	1.1267	1.1245	1.1144	1.1144	1.1125	1.1183	1.1245	1.1289	1.1336 (40)
HLP (average)												1.1267
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2461 (42)
Hot water usage for mixer showers												
61.8798	60.9498	59.5947	57.0020	55.0887	52.9549	51.7420	53.0869	54.5611	56.8521	59.5005	61.6427	(42a)
Hot water usage for baths												
26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432	(42b)
Hot water usage for other uses												
37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326	(42c)
Average daily hot water use (litres/day)												116.0487 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use												
126.2459	123.5505	120.2678	115.2758	111.2220	106.8639	105.1887	108.4572	111.9043	116.4797	121.5487	125.9184	(44)
Energy conte	199.9426	175.9342	184.8472	157.8067	149.7262	131.4016	127.2166	137.9892	158.0618	173.1684	197.1578	(45)
Energy content (annual)									Total =	Sum(45)m =	1927.5450	
Distribution loss (46)m = 0.15 x (45)m												
29.9914	26.3901	27.7271	23.6710	22.4589	19.7102	19.0825	20.1439	20.6984	23.7093	25.9753	29.5737	(46)
Water storage loss:												
Total storage loss												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month												
250.9015	221.9616	235.8061	207.1218	200.6851	180.7166	178.1755	185.2515	187.3043	209.0207	222.4834	248.1167	(62)
WWHRS	-28.2888	-25.0189	-26.1983	-21.6933	-20.2173	-17.3001	-16.2161	-17.2442	-17.8994	-21.1014	-23.9053	-27.7650 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(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												
222.6127	196.9427	209.6077	185.4285	180.4678	163.4165	161.9594	168.0073	169.4049	187.9193	198.5781	220.3518	(64)
12Total per year (kWh/year)									Total per year (kWh/year) =	Sum(64)m =	2264.6969	(64)
Electric shower(s)												2265 (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) =												0.0000 (64a)
Heat gains from water heating, kWh/month												
79.2207	70.0050	74.2014	64.7995	62.5237	56.0198	55.0392	57.3920	58.2102	65.2953	69.9072	78.2947	(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
112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
99.7072	110.3901	99.7072	103.0308	99.7072	103.0308	99.7072	99.7072	103.0308	99.7072	103.0308	99.7072	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	(69)
Pumps, fans	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)												
-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	(71)
Water heating gains (Table 5)												
106.4794	104.1741	99.7331	89.9993	84.0372	77.8053	73.9775	77.1398	80.8475	87.7625	97.0934	105.2348	(72)
Total internal gains												
463.1755	473.6005	453.3173	435.9238	412.7737	393.8347	377.9781	379.0931	391.2835	408.8582	435.3772	453.2257	(73)

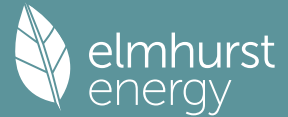
6. Solar gains

[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					
Northeast			5.0400	11.2829	0.6300	0.7000	0.7700	17.3790 (75)				
Southeast			9.8400	36.7938	0.6300	0.7000	0.7700	110.6476 (77)				
Solar gains	128.0266	223.8492	321.6133	424.1951	498.5921	505.3051	482.8739	425.7929	356.8899	251.5353	154.3976	108.8838 (83)
Total gains	591.2021	697.4497	774.9307	860.1189	911.3658	899.1397	860.8520	804.8859	748.1733	660.3935	589.7748	562.1095 (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	51.0916	51.2051	51.3168	51.8482	51.9489	52.4226	52.4226	52.5113	52.2391	51.9489	51.7457	51.5349
alpha	4.4061	4.4137	4.4211	4.4565	4.4633	4.4948	4.4948	4.5008	4.4826	4.4633	4.4497	4.4357
util living area												
0.9845	0.9681	0.9364	0.8565	0.7181	0.5370	0.3948	0.4385	0.6660	0.8927	0.9699	0.9873	(86)
MIT	19.6767	19.9287	20.2455	20.6170	20.8633	20.9710	20.9941	20.9907	20.9262	20.5966	20.0740	19.6328 (87)
Th 2	19.9656	19.9676	19.9696	19.9791	19.9809	19.9891	19.9891	19.9907	19.9859	19.9809	19.9773	19.9735 (88)
util rest of house												
0.9804	0.9601	0.9206	0.8231	0.6609	0.4592	0.3060	0.3454	0.5869	0.8595	0.9609	0.9840	(89)
MIT 2	18.4484	18.7660	19.1588	19.6047	19.8690	19.9722	19.9871	19.9871	19.9369	19.5949	18.9595	18.3985 (90)
Living area fraction									fLA =	Living area / (4) =	0.3886	(91)
MIT	18.9257	19.2178	19.5810	19.9980	20.2554	20.3603	20.3784	20.3771	20.3213	19.9841	19.3926	18.8781 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9257	19.2178	19.5810	19.9980	20.2554	20.3603	20.3784	20.3771	20.3213	19.9841	19.3926	18.8781 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9750	0.9527	0.9135	0.8238	0.6771	0.4884	0.3405	0.3816	0.6143	0.8596	0.9543	0.9792	(94)
Useful gains	576.4082	664.4887	707.8879	708.5676	617.0901	439.1641	293.1611	307.1051	459.5887	567.6600	562.8474	550.3985	(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	1170.5997	1143.4158	1042.3721	875.2911	673.4455	449.3354	294.7324	309.7079	486.9986	738.6850	971.4264	1164.6860	(97)
Space heating kWh	442.0785	321.8391	248.8563	120.0409	41.9284	0.0000	0.0000	0.0000	0.0000	127.2426	294.1769	457.0299	(98a)
Space heating requirement - total per year (kWh/year)												2053.1926	
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	442.0785	321.8391	248.8563	120.0409	41.9284	0.0000	0.0000	0.0000	0.0000	127.2426	294.1769	457.0299	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2053.1926	
Space heating per m2										(98c) / (4) =		29.3313	(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 %)													92.4000	(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	442.0785	321.8391	248.8563	120.0409	41.9284	0.0000	0.0000	0.0000	0.0000	127.2426	294.1769	457.0299	(98)	
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)	
Space heating fuel (main heating system)	478.4399	348.3107	269.3250	129.9144	45.3770	0.0000	0.0000	0.0000	0.0000	137.7084	318.3733	494.6211	(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	222.6127	196.9427	209.6077	185.4285	180.4678	163.4165	161.9594	168.0073	169.4049	187.9193	198.5781	220.3518	(64)	
Efficiency of water heater (217)m	85.8217	85.4268	84.7502	83.4733	81.7917	80.3000	80.3000	80.3000	80.3000	83.5637	85.2218	85.9071	(216)	
Fuel for water heating, kWh/month	259.3897	230.5398	247.3241	222.1413	220.6431	203.5075	201.6929	209.2246	210.9650	224.8815	233.0133	256.5001	(219)	
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	20.7172	16.6201	14.9646	10.9637	8.4687	6.9190	7.7254	10.0418	13.0432	17.1134	19.3296	21.2930	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-23.8077	-34.6460	-51.3918	-59.6971	-66.0363	-62.2499	-61.4906	-57.2292	-49.9884	-40.4697	-26.5566	-20.4591	(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	-10.3568	-22.0783	-44.4240	-67.5170	-90.0484	-90.7545	-89.6834	-75.5790	-54.9319	-31.8327	-13.9117	-8.1681	(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												2222.0699	(211)	
Space heating fuel - main system 2												0.0000	(213)	
Space heating fuel - secondary												0.0000	(215)	
Efficiency of water heater												80.3000		
Water heating fuel used												2719.8229	(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)												167.1996	(232)	
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation												-1153.3085	(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												4041.7838	(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	2222.0699	0.2100	466.6347	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2719.8229	0.2100	571.1628	(264)
Space and water heating			1037.7975	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	167.1996	0.1443	24.1321	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-554.0225	0.1339	-74.1929	

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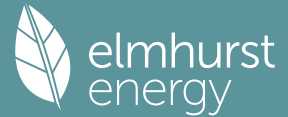


PV Unit electricity exported	-599.2860	0.1256	-75.2407
Total			-149.4336 (269)
Total CO2, kg/year			924.4252 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.2100 (273)

----- 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	2222.0699	1.1300	2510.9390 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2719.8229	1.1300	3073.3998 (278)
Space and water heating			5584.3388 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	167.1996	1.5338	256.4563 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-554.0225	1.4949	-828.2060
PV Unit electricity exported	-599.2860	0.4608	-276.1754
Total			-1104.3813 (283)
Total Primary energy kWh/year			4866.5145 (286)
Target Primary Energy Rate (TPER)			69.5200 (287)

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Property Reference	Flat 3				Issued on Date	11/04/2024
Assessment Reference	Flat 3 - 2 bed MF_Copy		Prop Type Ref	HTA		
Property	Flat 3, 3 New Road, London, N8 8TA					
SAP Rating	80 C	DER	22.23	TER	12.64	
Environmental	82 B	% DER < TER				-75.87
CO ₂ Emissions (t/year)	1.47	DFEE	67.15	TFEE	35.26	
Compliance Check	See BREL	% DFEE < TFEE				-90.44
% DPER < TPER	-83.33	DPER	121.77	TPER	66.42	
Assessor Details	Ms. Ruth Pike				Assessor ID	AU93-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	75.7000 (1b)	2.6000 (2b)	196.8200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.7000		196.8200 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	196.8200 (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	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.6375 (21)

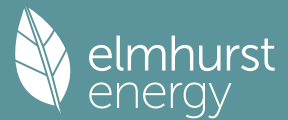
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.8128	0.7969	0.7809	0.7013	0.6853	0.6056	0.6056	0.5897	0.6375	0.6853	0.7172	0.7491 (22b)
Effective ac	0.8303	0.8175	0.8049	0.7459	0.7348	0.6834	0.6834	0.6739	0.7032	0.7348	0.7572	0.7805 (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
Solid Doors			2.2000	1.3000	2.8600		(26)
Windows (Uw = 1.60)			19.9500	1.5038	30.0000		(27)
Opening			4.8000	1.5038	7.2180		(27a)
External Wall 1	52.5000	19.0000	33.5000	0.1700	5.6950	110.0000	3685.0000 (29a)
Wall to corridor	15.0000	3.1500	11.8500	0.1800	2.1330	110.0000	1303.5000 (29a)
sloping roof	44.7600	4.8000	39.9600	0.2000	7.9920	9.0000	359.6400 (30)
Total net area of external elements Aum(A, m ²)			112.2600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.8980		(33)
Party Wall 1			37.5000	0.0000	0.0000	20.0000	750.0000 (32)
Party Floor			75.7000			30.0000	2271.0000 (32a)
Party Ceiling 1			38.4000			20.0000	768.0000 (32b)
Internal Wall Stud			95.0000			9.0000	855.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		9992.1400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							131.9966 (35)
Thermal bridges (Default value 0.200 * total exposed area)							22.4520 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		78.3500 (37)

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

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(38)m	Jan 53.9306	Feb 53.0974	Mar 52.2808	Apr 48.4451	May 47.7274	Jun 44.3866	Jul 44.3866	Aug 43.7680	Sep 45.6735	Oct 47.7274	Nov 49.1792	Dec 50.6970	(38)
Heat transfer coeff	132.2806	131.4475	130.6308	126.7951	126.0775	122.7367	122.7367	122.1180	124.0235	126.0775	127.5293	129.0471	(39)
Average = Sum(39)m / 12 =												126.7917	
HLP	Jan 1.7474	Feb 1.7364	Mar 1.7256	Apr 1.6750	May 1.6655	Jun 1.6214	Jul 1.6214	Aug 1.6132	Sep 1.6384	Oct 1.6655	Nov 1.6847	Dec 1.7047	(40)
HLP (average)												1.6749	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3762	(42)
Hot water usage for mixer showers	80.0762	78.8729	77.1193	73.7641	71.2881	68.5269	66.9574	68.6977	70.6054	73.5701	76.9973	79.7694	(42a)	
Hot water usage for baths	27.6715	27.2606	26.6819	25.6148	24.8158	23.9299	23.4513	24.0260	24.6517	25.5997	26.6887	27.5780	(42b)	
Hot water usage for other uses	38.9648	37.5479	36.1310	34.7141	33.2972	31.8803	31.8803	33.2972	34.7141	36.1310	37.5479	38.9648	(42c)	
Average daily hot water use (litres/day)												134.9061	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	146.7126	143.6814	139.9322	134.0930	129.4011	124.3370	122.2890	126.0209	129.9712	135.3008	141.2340	146.3123	(44)	
Energy content (annual)	232.3569	204.6003	215.0705	183.5667	174.1988	152.8869	147.8979	156.0402	160.2675	183.6019	201.2137	229.0896	(45)	
Distribution loss (46)m = 0.15 x (45)m	34.8535	30.6900	32.2606	27.5350	26.1298	22.9330	22.1847	23.4060	24.0401	27.5403	30.1821	34.3634	(46)	
Water storage loss:														
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)	
Total heat required for water heating calculated for each month	283.3158	250.6277	266.0294	232.8817	225.1577	202.2020	198.8568	206.9991	209.5825	234.5608	250.5288	280.0485	(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	283.3158	250.6277	266.0294	232.8817	225.1577	202.2020	198.8568	206.9991	209.5825	234.5608	250.5288	280.0485	(64)	
12Total per year (kWh/year)													(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)	
													(64a)	
Heat gains from water heating, kWh/month	89.9984	79.5365	84.2507	73.3647	70.6608	63.1637	61.9158	64.6231	65.6177	73.7874	79.2323	88.9120	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 118.8107	Feb 118.8107	Mar 118.8107	Apr 118.8107	May 118.8107	Jun 118.8107	Jul 118.8107	Aug 118.8107	Sep 118.8107	Oct 118.8107	Nov 118.8107	Dec 118.8107	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.0318	117.3923	106.0318	109.5662	106.0318	109.5662	106.0318	106.0318	109.5662	106.0318	109.5662	106.0318	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.2199	212.4013	206.9042	195.2015	180.4289	166.5448	157.2693	155.0879	160.5850	172.2877	187.0603	200.9444	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	(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)	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	(71)
Water heating gains (Table 5)	120.9656	118.3578	113.2401	101.8954	94.9742	87.7273	83.2202	86.8590	91.1357	99.1766	110.0449	119.5054	(72)
Total internal gains	498.8605	509.7947	487.8193	468.3063	443.0781	422.4815	405.1645	406.6219	419.9301	439.1393	468.3146	488.1248	(73)

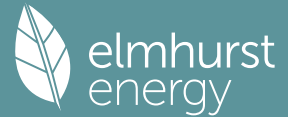
6. Solar gains

[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			
-----									-----			
Northeast				10.5000	11.2829	0.6300	0.7000	0.7700	36.2062 (75)			
Southwest				3.1500	36.7938	0.6300	0.7000	0.7700	35.4207 (79)			
Northwest				6.3000	11.2829	0.6300	0.7000	0.7700	21.7237 (81)			
Northwest				4.8000	16.3666	0.6300	0.7000	1.0000	31.1803 (82)			
-----									-----			
Solar gains	124.5310	242.4261	413.3660	650.9894	857.2509	907.7648	851.5534	688.7570	494.1182	289.8387	154.6495	103.0355 (83)
Total gains	623.3915	752.2208	901.1854	1119.2956	1300.3290	1330.2463	1256.7178	1095.3789	914.0483	728.9780	622.9641	591.1604 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains from living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	20.9826	21.1156	21.2476	21.8904	22.0150	22.6142	22.6142	22.7288	22.3796	22.0150	21.7644	21.5084
alpha	2.3988	2.4077	2.4165	2.4594	2.4677	2.5076	2.5076	2.5153	2.4920	2.4677	2.4510	2.4339
util living area	0.9650	0.9450	0.9054	0.8125	0.6740	0.5139	0.3986	0.4613	0.6898	0.8800	0.9486	0.9689 (86)
MIT	18.5520	18.8386	19.3086	19.9572	20.4398	20.7262	20.8199	20.7942	20.5430	19.8893	19.1424	18.5469 (87)
Th 2	19.5070	19.5148	19.5225	19.5588	19.5657	19.5977	19.5977	19.6037	19.5853	19.5657	19.5518	19.5375 (88)

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util rest of house	0.9577	0.9336	0.8857	0.7744	0.6104	0.4229	0.2831	0.3395	0.6026	0.8461	0.9361	0.9624 (89)
MIT 2	16.7232	17.0881	17.6785	18.4851	19.0324	19.3441	19.4181	19.4105	19.1813	18.4356	17.5011	16.7358 (90)
Living area fraction									FLA = Living area / (4) =			0.3303 (91)
MIT	17.3271	17.6662	18.2168	18.9713	19.4972	19.8005	19.8810	19.8675	19.6310	18.9157	18.0432	17.3339 (92)
Temperature adjustment												-0.1500
adjusted MIT	17.1771	17.5162	18.0668	18.8213	19.3472	19.6505	19.7310	19.7175	19.4810	18.7657	17.8932	17.1839 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9412	0.9126	0.8604	0.7512	0.5995	0.4266	0.2947	0.3502	0.5951	0.8215	0.9161	0.9473	(94)
Useful gains	586.7359	686.5134	775.3366	840.7665	779.5816	567.5041	370.4023	383.5528	543.9869	598.8912	570.7201	559.9837	(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	1703.3956	1658.3676	1510.9843	1257.9680	964.1373	619.8861	384.2905	405.1237	667.3750	1029.5114	1376.4442	1675.5381	(97)
Space heating kWh	830.7948	653.0860	547.3219	300.3851	137.3095	0.0000	0.0000	0.0000	0.0000	320.3814	580.1214	829.9725	(98a)
Space heating requirement - total per year (kWh/year)												4199.3725	
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	830.7948	653.0860	547.3219	300.3851	137.3095	0.0000	0.0000	0.0000	0.0000	320.3814	580.1214	829.9725	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4199.3725	
Space heating per m2										(98c) / (4) =		55.4739	(99)

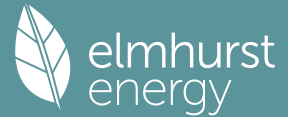
9a. Energy requirements - Individual heating systems, including micro-CHP

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	830.7948	653.0860	547.3219	300.3851	137.3095	0.0000	0.0000	0.0000	0.0000	320.3814	580.1214	829.9725	(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)	928.2624	729.7050	611.5328	335.6258	153.4184	0.0000	0.0000	0.0000	0.0000	357.9681	648.1803	927.3436	(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	283.3158	250.6277	266.0294	232.8817	225.1577	202.2020	198.8568	206.9991	209.5825	234.5608	250.5288	280.0485	(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	316.5540	280.0310	297.2396	260.2031	251.5728	225.9240	222.1864	231.2839	234.1704	262.0792	279.9204	312.9034	(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	21.5810	17.3131	15.5885	11.4208	8.8218	7.2075	8.0475	10.4605	13.5871	17.8270	20.1356	22.1808	(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												4692.0363	(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												3174.0681	(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)												174.1711	(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												8081.2754	(238)

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

Energy	Emission factor	Emissions
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Space heating - main system 1	kWh/year	kg CO2/kWh	kg CO2/year
Total CO2 associated with community systems	4692.0363	0.2100	985.3276 (261)
Water heating (other fuel)			0.0000 (273)
Space and water heating	3174.0681	0.2100	666.5543 (264)
Pumps, fans and electric keep-hot			1651.8819 (265)
Energy for lighting	41.0000	0.1387	5.6872 (267)
Total CO2, kg/year	174.1711	0.1443	25.1383 (268)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			1682.7074 (272)
			22.2300 (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	4692.0363	1.1300	5302.0010 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3174.0681	1.1300	3586.6969 (278)
Space and water heating			8888.6980 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	174.1711	1.5338	267.1494 (282)
Total Primary energy kWh/year			9217.8721 (286)
Dwelling Primary energy Rate (DPER)			121.7700 (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	75.7000 (1b)	x 2.6000 (2b)	= 196.8200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 196.8200 (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) = 0.1524 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4024 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3421 (21)

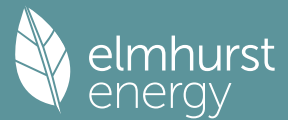
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4361	0.4276	0.4190	0.3763	0.3677	0.3250	0.3250	0.3164	0.3421	0.3677	0.3848	0.4019 (22b)
Effective ac	0.5951	0.5914	0.5878	0.5708	0.5676	0.5528	0.5528	0.5501	0.5585	0.5676	0.5740	0.5808 (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			2.2000	1.0000	2.2000		(26)
TER Opening Type (Uw = 1.20)			13.4900	1.1450	15.4466		(27)
Opening			3.2400	1.8519	6.0000		(27a)
External Wall 1	52.5000	13.5600	38.9400	0.1800	7.0092		(29a)
Wall to corridor	15.0000	2.1300	12.8700	0.1800	2.3166		(29a)
sloping roof	44.7600	3.2400	41.5200	0.1100	4.5672		(30)
Total net area of external elements Aum(A, m2)			112.2600				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.5396		(33)
Party Wall 1			37.5000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							137.0692 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.6130 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	43.1526 (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
	38.6523	38.4124	38.1773	37.0730	36.8664	35.9046	35.9046	35.7265	36.2751	36.8664	37.2844	37.7214 (38)

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Heat transfer coeff
81.8049 81.5650 81.3299 80.2256 80.0190 79.0572 79.0572 78.8790 79.4276 80.0190 80.4370 80.8739 (39)
Average = Sum(39)m / 12 = 80.2246

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0806	1.0775	1.0744	1.0598	1.0571	1.0443	1.0443	1.0420	1.0492	1.0571	1.0626	1.0683 (40)
HLP (average)												1.0598
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3762 (42)

Hot water usage for mixer showers 64.0610 63.0983 61.6954 59.0113 57.0305 54.8215 53.5659 54.9582 56.4843 58.8561 61.5979 63.8155 (42a)

Hot water usage for baths 27.6715 27.2606 26.6819 25.6148 24.8158 23.9299 23.4513 24.0260 24.6517 25.5997 26.6887 27.5780 (42b)

Hot water usage for other uses 38.9648 37.5479 36.1310 34.7141 33.2972 31.8803 31.8803 33.2972 34.7141 36.1310 37.5479 38.9648 (42c)

Average daily hot water use (litres/day) 120.1405 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	130.6974	127.9068	124.5083	119.3402	115.1435	110.6317	108.8975	112.2813	115.8501	120.5868	125.8345	130.3584 (44)
Energy conte	206.9927	182.1376	191.3646	163.3708	155.0053	136.0345	131.7021	139.0277	142.8548	163.6351	179.2743	204.1097 (45)
Energy content (annual)												1995.5092
Distribution loss (46)m = 0.15 x (45)m	31.0489	27.3206	28.7047	24.5056	23.2508	20.4052	19.7553	20.8542	21.4282	24.5453	26.8911	30.6165 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	257.9516	228.1649	242.3235	212.6859	205.9642	185.3496	182.6610	189.9867	192.1698	214.5941	228.5894	255.0686 (62)
WWHRS	-29.2860	-25.9008	-27.1218	-22.4579	-20.9300	-17.9099	-16.7877	-17.8520	-18.5303	-21.8452	-24.7480	-28.7437 (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	228.6656	202.2642	215.2017	190.2279	185.0342	167.4397	165.8733	172.1346	173.6395	192.7489	203.8414	226.3249 (64)
12Total per year (kWh/year)												2323.3959 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower (s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	81.5648	72.0676	76.3685	66.6496	64.2790	57.5602	56.5307	58.9665	59.8280	67.1484	71.9375	80.6062 (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	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.0318	117.3923	106.0318	109.5662	106.0318	109.5662	106.0318	106.0318	109.5662	106.0318	109.5662	106.0318 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.2199	212.4013	206.9042	195.2015	180.4289	166.5448	157.2693	155.0879	160.5850	172.2877	187.0603	200.9444 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811 (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)	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486 (71)
Water heating gains (Table 5)	109.6301	107.2434	102.6458	92.5688	86.3965	79.9448	75.9821	79.2560	83.0944	90.2532	99.9132	108.3417 (72)
Total internal gains	487.5250	498.6803	477.2250	458.9797	434.5004	414.6989	397.9264	399.0189	411.8888	430.2160	458.1829	476.9611 (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						
Northeast	7.1000	11.2829	0.6300	0.7000	0.7700	24.4823 (75)						
Southwest	2.1300	36.7938	0.6300	0.7000	0.7700	23.9512 (79)						
Northwest	4.2600	11.2829	0.6300	0.7000	0.7700	14.6894 (81)						
Northwest	3.2400	16.3666	0.6300	0.7000	1.0000	21.0467 (82)						
Solar gains	84.1696	163.8498	279.3733	439.9549	579.3391	613.4719	575.4859	465.4745	333.9444	195.8921	104.5257	69.6414 (83)
Total gains	571.6946	662.5301	756.5982	898.9347	1013.8395	1028.1708	973.4123	864.4934	745.8332	626.1080	562.7086	546.6025 (84)

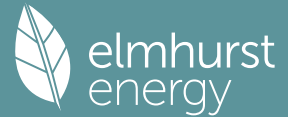
7. Mean internal temperature (heating season)

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	35.2334	35.3370	35.4391	35.9270	36.0197	36.4579	36.4579	36.5403	36.2879	36.0197	35.8325	35.6389
alpha	3.3489	3.3558	3.3626	3.3951	3.4013	3.4305	3.4305	3.4360	3.4192	3.4013	3.3888	3.3759
util living area	0.9678	0.9474	0.9058	0.8012	0.6423	0.4692	0.3506	0.4071	0.6435	0.8683	0.9490	0.9718 (86)
MIT	19.1737	19.4584	19.8882	20.4337	20.7896	20.9464	20.9850	20.9752	20.8455	20.3472	19.6808	19.1342 (87)
Th 2	20.0167	20.0193	20.0218	20.0338	20.0363	20.0465	20.0465	20.0485	20.0425	20.0361	20.0315	20.0268 (88)
util rest of house	0.9621	0.9384	0.8897	0.7700	0.5936	0.4062	0.2774	0.3278	0.5768	0.8391	0.9386	0.9668 (89)

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MIT 2	17.8957	18.2546	18.7897	19.4507	19.8466	20.0089	20.0393	20.0356	19.9209	19.3693	18.5476	17.8524 (90)
Living area fraction									FLA = Living area / (4) =			0.3303 (91)
MIT	18.3177	18.6522	19.1525	19.7754	20.1580	20.3185	20.3516	20.3459	20.2263	19.6923	18.9219	18.2757 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3177	18.6522	19.1525	19.7754	20.1580	20.3185	20.3516	20.3459	20.2263	19.6923	18.9219	18.2757 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9488	0.9222	0.8726	0.7608	0.6000	0.4246	0.3011	0.3531	0.5904	0.8270	0.9234	0.9545 (94)	
Useful gains	542.4113	610.9918	660.1768	683.9136	608.3258	436.5661	293.0746	305.2309	440.3150	517.7928	519.5783	521.7238 (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	1146.7186	1121.6970	1029.0269	872.4818	676.8025	452.0917	296.5898	311.2505	486.5946	727.5535	950.9167	1138.3558 (97)	
Space heating kWh	449.6046	343.1939	274.4245	135.7692	50.9467	0.0000	0.0000	0.0000	0.0000	156.0619	310.5636	458.7742 (98a)	
Space heating requirement - total per year (kWh/year)												2179.3387	
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	449.6046	343.1939	274.4245	135.7692	50.9467	0.0000	0.0000	0.0000	0.0000	156.0619	310.5636	458.7742 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2179.3387	
Space heating per m2										(98c) / (4) =		28.7892 (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 %)													92.4000 (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	449.6046	343.1939	274.4245	135.7692	50.9467	0.0000	0.0000	0.0000	0.0000	156.0619	310.5636	458.7742 (98)	
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000 (210)	
Space heating fuel (main heating system)	486.5851	371.4220	296.9962	146.9363	55.1371	0.0000	0.0000	0.0000	0.0000	168.8982	336.1078	496.5089 (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	228.6656	202.2642	215.2017	190.2279	185.0342	167.4397	165.8733	172.1346	173.6395	192.7489	203.8414	226.3249 (64)	
Efficiency of water heater (217)m	85.8020	85.5043	84.9034	83.6710	82.0128	80.3000	80.3000	80.3000	80.3000	83.9327	85.2807	80.3000 (216)	
Fuel for water heating, kWh/month	266.5037	236.5544	253.4665	227.3523	225.6161	208.5176	206.5670	214.3644	216.2385	229.6468	239.0240	263.5910 (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	22.0313	17.6743	15.9138	11.6591	9.0058	7.3578	8.2154	10.6787	13.8706	18.1990	20.5557	22.6436 (232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-25.6531	-37.2821	-55.2273	-64.0585	-70.7728	-66.6746	-65.8525	-61.3266	-53.6309	-43.4989	-28.5947	-22.0498 (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	-11.2935	-24.0612	-48.3906	-73.5144	-98.0216	-98.7887	-97.6314	-82.2960	-59.8329	-34.6911	-15.1689	-8.9085 (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													2358.5916 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													80.3000
Water heating fuel used													2787.4423 (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)													177.8053 (232)

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

PV generation													-1247.2207 (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													4162.6185 (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	2358.5916	0.2100	495.3042 (261)	
Total CO2 associated with community systems			0.0000 (373)	

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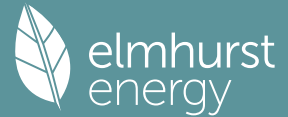


Water heating (other fuel)	2787.4423	0.2100	585.3629 (264)
Space and water heating			1080.6671 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	177.8053	0.1443	25.6628 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-594.6219	0.1339	-79.6486
PV Unit electricity exported	-652.5989	0.1256	-81.9407
Total			-161.5894 (269)
Total CO2, kg/year			956.6698 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.6400 (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	2358.5916	1.1300	2665.2085 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2787.4423	1.1300	3149.8098 (278)
Space and water heating			5815.0183 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	177.8053	1.5338	272.7237 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-594.6219	1.4950	-888.9684
PV Unit electricity exported	-652.5989	0.4609	-300.7685
Total			-1189.7368 (283)
Total Primary energy kWh/year			5028.1060 (286)
Target Primary Energy Rate (TPER)			66.4200 (287)

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Property Reference	Flat 4				Issued on Date	11/04/2024
Assessment Reference	Flat 4 - 1 bed MF		Prop Type Ref	HTA		
Property	Flat 4, 3 New Road, London, N8 8TA					
SAP Rating	80 C	DER	22.91	TER	13.07	
Environmental	83 B	% DER < TER				-75.29
CO ₂ Emissions (t/year)	1.25	DFEE	64.45	TFEE	32.89	
Compliance Check	See BREL	% DFEE < TFEE				-95.95
% DPER < TPER	-82.46	DPER	125.59	TPER	68.83	
Assessor Details	Ms. Ruth Pike				Assessor ID	AU93-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	62.8000 (1b)	2.6000 (2b)	163.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000		163.2800 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	163.2800 (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	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.6375 (21)

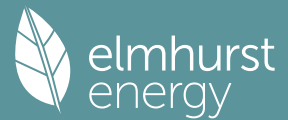
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.8128	0.7969	0.7809	0.7013	0.6853	0.6056	0.6056	0.5897	0.6375	0.6853	0.7172	0.7491 (22b)
Effective ac	0.8303	0.8175	0.8049	0.7459	0.7348	0.6834	0.6834	0.6739	0.7032	0.7348	0.7572	0.7805 (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
Solid Doors			2.2000	1.3000	2.8600		(26)
Windows (Uw = 1.60)			10.5000	1.5038	15.7895		(27)
Opening			4.8000	1.5038	7.2180		(27a)
External Wall 1	55.0000	12.7000	42.3000	0.1700	7.1910	110.0000	4653.0000 (29a)
Wall to corridor	17.5000		17.5000	0.1800	3.1500	110.0000	1925.0000 (29a)
sloping roof	38.8800	4.8000	34.0800	0.2000	6.8160	9.0000	306.7200 (30)
Total net area of external elements Aum(A, m ²)			111.3800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.0245		(33)
Party Wall 1			37.5000	0.0000	0.0000	20.0000	750.0000 (32)
Party Floor			62.8000			30.0000	1884.0000 (32a)
Party Ceiling 1			23.9200			20.0000	478.4000 (32b)
Internal Wall Stud			75.0000			9.0000	675.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		10672.1200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							169.9382 (35)
Thermal bridges (Default value 0.200 * total exposed area)							22.2760 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		65.3005 (37)

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

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(38)m	Jan 44.7403	Feb 44.0491	Mar 43.3717	Apr 40.1896	May 39.5942	Jun 36.8227	Jul 36.8227	Aug 36.3095	Sep 37.8903	Oct 39.5942	Nov 40.7986	Dec 42.0578	(38)
Heat transfer coeff	110.0408	109.3496	108.6722	105.4901	104.8947	102.1233	102.1233	101.6100	103.1908	104.8947	106.0991	107.3583	(39)
Average = Sum(39)m / 12 =												105.4872	
HLP	Jan 1.7522	Feb 1.7412	Mar 1.7304	Apr 1.6798	May 1.6703	Jun 1.6262	Jul 1.6262	Aug 1.6180	Sep 1.6432	Oct 1.6703	Nov 1.6895	Dec 1.7095	(40)
HLP (average)												1.6797	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0596	(42)
Hot water usage for mixer showers														
73.4403	72.3366	70.7283	67.6512	65.3804	62.8480	61.4086	63.0047	64.7543	67.4733	70.6165	73.1589	73.1589	(42a)	
Hot water usage for baths														
25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	25.3028	(42b)	
Hot water usage for other uses														
35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	35.7223	(42c)	
Average daily hot water use (litres/day)												123.7235	(43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
134.5512	131.7714	128.3332	122.9781	118.6752	114.0309	112.1524	115.5748	119.1975	124.0853	129.5267	134.1839	134.1839	(44)	
Energy content (annual)	213.0961	187.6408	197.2434	168.3509	159.7596	140.2143	135.6387	143.1057	146.9824	168.3826	184.5345	210.0996	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =	2055.0486	2055.0486		
31.9644	28.1461	29.5865	25.2526	23.9639	21.0322	20.3458	21.4659	22.0474	25.2574	27.6802	31.5149	31.5149	(46)	
Water storage loss:														
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)	
Total heat required for water heating calculated for each month														
264.0550	233.6682	248.2023	217.6659	210.7185	189.5294	186.5976	194.0646	196.2975	219.3415	233.8496	261.0585	261.0585	(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	264.0550	233.6682	248.2023	217.6659	210.7185	189.5294	186.5976	194.0646	196.2975	219.3415	233.8496	261.0585	(64)	
12Total per year (kWh/year)												2655.0486	(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	83.5942	73.8974	78.3231	68.3054	65.8598	58.9500	57.8396	60.3224	61.2004	68.7269	73.6865	82.5979	(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	
102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
90.7638	100.4885	90.7638	93.7892	90.7638	93.7892	90.7638	90.7638	93.7892	90.7638	93.7892	90.7638	90.7638	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)													
-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)													
112.3578	109.9664	105.2731	94.8687	88.5212	81.8750	77.7414	81.0785	85.0006	92.3749	102.3423	111.0186	111.0186	(72)
Total internal gains	439.9648	449.1654	430.0418	412.6453	390.6270	372.1214	357.0224	358.4922	370.1453	387.5118	413.1501	430.6858	(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				

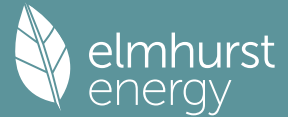
Northeast			5.2500	11.2829	0.6300	0.7000	0.7700	18.1031 (75)				
Southwest			5.2500	36.7938	0.6300	0.7000	0.7700	59.0345 (79)				
Southeast			4.8000	39.9751	0.6300	0.7000	1.0000	76.1574 (82)				

Solar gains	153.2951	277.4011	417.5644	572.5400	685.4443	698.2545	665.9199	580.0660	471.5538	317.3423	186.7044	129.1190 (83)
Total gains	593.2599	726.5665	847.6063	985.1853	1076.0713	1070.3759	1022.9423	938.5582	841.6991	704.8541	599.8545	559.8048 (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	26.9398	27.1101	27.2791	28.1020	28.2615	29.0284	29.0284	29.1751	28.7281	28.2615	27.9406	27.6129
alpha	2.7960	2.8073	2.8186	2.8735	2.8841	2.9352	2.9352	2.9450	2.9152	2.8841	2.8627	2.8409
util living area	0.9709	0.9493	0.9112	0.8288	0.7051	0.5454	0.4163	0.4637	0.6794	0.8770	0.9534	0.9749 (86)
MIT	19.0046	19.2865	19.6848	20.1951	20.5638	20.7882	20.8594	20.8463	20.6803	20.1745	19.5251	18.9947 (87)
Th 2	19.5036	19.5114	19.5191	19.5554	19.5622	19.5942	19.5942	19.6002	19.5818	19.5622	19.5484	19.5340 (88)
util rest of house												

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MIT 2	0.9637	0.9372	0.8898	0.7885	0.6374	0.4466	0.2928	0.3363	0.5844	0.8380	0.9402	0.9687 (89)
Living area fraction	17.2507	17.6087	18.1066	18.7421	19.1547	19.3969	19.4477	19.4476	19.3018	18.7437	17.9398	17.2588 (90)
MIT	17.9657	18.2927	18.7500	19.3344	19.7291	19.9640	20.0232	20.0178	fLA = Living area / (4) =			0.4076 (91)
Temperature adjustment									19.8637	19.3270	18.5860	17.9664 (92)
adjusted MIT	17.8157	18.1427	18.6000	19.1844	19.5791	19.8140	19.8732	19.8678	19.7137	19.1770	18.4360	-0.1500 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9525	0.9225	0.8732	0.7764	0.6383	0.4631	0.3184	0.3621	0.5943	0.8251	0.9266	0.9586	(94)
Useful gains	565.0982	670.2663	740.1407	764.9401	686.8154	495.6480	325.7221	339.8089	500.2021	581.5699	555.8165	536.6238	(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	1487.2759	1448.0833	1314.9279	1084.9015	826.4777	532.4737	334.2691	352.3621	579.2869	899.6782	1202.7410	1461.8339	(97)
Space heating kWh	686.1002	522.6930	427.6417	230.3722	103.9088	0.0000	0.0000	0.0000	0.0000	236.6726	465.7857	688.3563	(98a)
Space heating requirement - total per year (kWh/year)												3361.5305	
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	686.1002	522.6930	427.6417	230.3722	103.9088	0.0000	0.0000	0.0000	0.0000	236.6726	465.7857	688.3563	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3361.5305	
Space heating per m2											(98c) / (4) =	53.5276	(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	686.1002	522.6930	427.6417	230.3722	103.9088	0.0000	0.0000	0.0000	0.0000	236.6726	465.7857	688.3563 (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)	766.5924	584.0146	477.8119	257.3991	116.0992	0.0000	0.0000	0.0000	0.0000	264.4387	520.4309	769.1132 (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	264.0550	233.6682	248.2023	217.6659	210.7185	189.5294	186.5976	194.0646	196.2975	219.3415	233.8496	261.0585 (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	295.0336	261.0818	277.3210	243.2022	235.4397	211.7647	208.4889	216.8320	219.3268	245.0743	261.2844	291.6855 (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	3.3699	3.4822	3.3699	3.4822	3.4822 (231)
Lighting	18.4735	14.8201	13.3438	9.7763	7.5515	6.1696	6.8887	8.9542	11.6306	15.2600	17.2361	18.9869 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												3755.9000 (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												2966.5347 (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)												149.0914 (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												6912.5261 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
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Space heating - main system 1	3755.9000	0.2100	788.7390 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2966.5347	0.2100	622.9723 (264)
Space and water heating			1411.7113 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	149.0914	0.1443	21.5185 (268)
Total CO2, kg/year			1438.9170 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			22.9100 (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	3755.9000	1.1300	4244.1670 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2966.5347	1.1300	3352.1843 (278)
Space and water heating			7596.3512 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	149.0914	1.5338	228.6813 (282)
Total Primary energy kWh/year			7887.0573 (286)
Dwelling Primary energy Rate (DPER)			125.5900 (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	62.8000 (1b)	x 2.6000 (2b)	= 163.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 163.2800 (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) = 0.1225 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3725 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3166 (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	0.4037	0.3958	0.3879	0.3483	0.3404	0.3008	0.3008	0.2929	0.3166	0.3404	0.3562	0.3720 (22b)
Effective ac	0.5815	0.5783	0.5752	0.5606	0.5579	0.5452	0.5452	0.5429	0.5501	0.5579	0.5634	0.5692 (25)

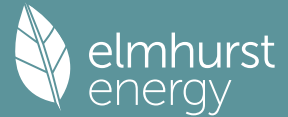
3. Heat losses and heat loss parameter

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			2.2000	1.0000	2.2000		(26)
TER Opening Type (Uw = 1.20)			9.2600	1.1450	10.6031		(27)
Opening			4.2400	1.4151	6.0000		(27a)
External Wall 1	55.0000	11.4600	43.5400	0.1800	7.8372		(29a)
Wall to corridor	17.5000		17.5000	0.1800	3.1500		(29a)
sloping roof	38.8800	4.2400	34.6400	0.1100	3.8104		(30)
Total net area of external elements Aum(A, m2)			111.3800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.6007		(33)
Party Wall 1			37.5000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							173.7471 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.5690 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	39.1697 (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	31.3316	31.1611	30.9940	30.2091	30.0622	29.3786	29.3786	29.2520	29.6419	30.0622	30.3593	30.6699 (38)
Heat transfer coeff												

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, T_{hi} (C)												
Utilisation factor for gains for living area, $n_{il,m}$ (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	42.9911	43.0953	43.1979	43.6866	43.7793	44.2159	44.2159	44.2977	44.0467	43.7793	43.5922	43.3984
alpha	3.8661	3.8730	3.8799	3.9124	3.9186	3.9477	3.9477	3.9532	3.9364	3.9186	3.9061	3.8932
util living area	0.9687	0.9386	0.8823	0.7634	0.6035	0.4366	0.3190	0.3602	0.5724	0.8301	0.9440	0.9740 (86)
MIT	19.5732	19.8886	20.2714	20.6698	20.8914	20.9765	20.9947	20.9915	20.9341	20.6073	20.0235	19.5181 (87)
T_2	19.9824	19.9846	19.9868	19.9970	19.9989	20.0078	20.0078	20.0094	20.0043	19.9989	19.9950	19.9910 (88)
util rest of house	0.9621	0.9265	0.8604	0.7254	0.5504	0.3727	0.2482	0.2845	0.5015	0.7914	0.9308	0.9684 (89)
MIT 2	18.3491	18.7421	19.2086	19.6755	19.9086	19.9932	20.0056	20.0057	19.9586	19.6226	18.9239	18.2860 (90)
Living area fraction	$f_{LA} = \text{Living area} / (4) =$											0.4076 (91)

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MIT	18.8481	19.2095	19.6418	20.0808	20.3093	20.3940	20.4088	20.4076	20.3563	20.0240	19.3722	18.7883 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8481	19.2095	19.6418	20.0808	20.3093	20.3940	20.4088	20.4076	20.3563	20.0240	19.3722	18.7883 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9526	0.9154	0.8520	0.7288	0.5674	0.3979	0.2770	0.3152	0.5273	0.7924	0.9208	0.9597	(94)
Useful gains	538.1121	625.9432	672.1571	662.7955	560.4110	390.4414	259.8767	272.1901	410.7945	522.5465	523.6318	512.8876	(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	1025.6564	1006.3972	922.0789	775.7089	596.0352	397.1699	261.0875	274.2047	430.5047	652.4417	853.2720	1018.8399	(97)
Space heating kWh	362.7330	255.6650	185.9418	81.2977	26.5044	0.0000	0.0000	0.0000	0.0000	96.6421	237.3410	376.4285	(98a)
Space heating requirement - total per year (kWh/year)												1622.5535	
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	362.7330	255.6650	185.9418	81.2977	26.5044	0.0000	0.0000	0.0000	0.0000	96.6421	237.3410	376.4285	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1622.5535	
Space heating per m2										(98c) / (4) =		25.8368	(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 %)													92.4000 (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	362.7330	255.6650	185.9418	81.2977	26.5044	0.0000	0.0000	0.0000	0.0000	96.6421	237.3410	376.4285	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	392.5682	276.6938	201.2357	87.9845	28.6845	0.0000	0.0000	0.0000	0.0000	104.5910	256.8625	407.3902	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
Efficiency of water heater (217)m	85.5028	85.0259	84.2087	82.8062	81.3406	80.3000	80.3000	80.3000	80.3000	83.0982	84.8477	80.3000	(216)
Fuel for water heating, kWh/month	250.2066	222.6529	239.3896	215.6201	213.8172	196.3236	194.6221	201.8548	203.4036	217.8080	225.1462	247.4170	(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	18.8589	15.1293	13.6223	9.9803	7.7090	6.2984	7.0324	9.1410	11.8733	15.5784	17.5958	19.3831	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-21.4508	-31.2651	-46.4524	-54.0566	-59.8900	-56.5005	-55.8219	-51.9134	-45.2778	-36.5728	-23.9482	-18.4288	(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	-9.1998	-19.6248	-39.5081	-60.0726	-80.1403	-80.7663	-79.8028	-67.2345	-48.8507	-28.2928	-12.3576	-7.2539	(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												1756.0103	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												80.3000	
Water heating fuel used												2628.2615	(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)												152.2023	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1034.6824	(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												3587.7916	(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	1756.0103	0.2100	368.7622	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2628.2615	0.2100	551.9349	(264)
Space and water heating			920.6971	(265)

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Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	152.2023	0.1443	21.9675 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-501.5783	0.1339	-67.1501
PV Unit electricity exported	-533.1041	0.1255	-66.9263
Total			-134.0765 (269)
Total CO2, kg/year			820.5174 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.0700 (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	1756.0103	1.1300	1984.2916 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2628.2615	1.1300	2969.9355 (278)
Space and water heating			4954.2271 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	152.2023	1.5338	233.4530 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-501.5783	1.4947	-749.7338
PV Unit electricity exported	-533.1041	0.4608	-245.6568
Total			-995.3906 (283)
Total Primary energy kWh/year			4322.3903 (286)
Target Primary Energy Rate (TPER)			68.8300 (287)

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Property Reference	Flat 5			Issued on Date	11/04/2024
Assessment Reference	Flat 5 - 1 bed TF_Copy	Prop Type Ref	HTA		
Property	Flat 5, 3 New Road, London, N8 8TA				
SAP Rating	78 C	DER	27.80	TER	15.33
Environmental	79 C	% DER < TER			-81.34
CO ₂ Emissions (t/year)	1.51	DFEE	84.98	TFEE	42.73
Compliance Check	See BREL	% DFEE < TFEE			-98.88
% DPER < TPER	-87.50	DPER	151.87	TPER	81.00
Assessor Details	Ms. Ruth Pike			Assessor ID	AU93-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	62.6000 (1b)	2.6000 (2b)	162.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	162.7600 (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	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (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) = 0.7500 (21)

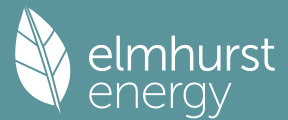
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (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
Solid Doors			2.2000	1.3000	2.8600		(26)
Windows (U _w = 1.60)			10.5000	1.5038	15.7895		(27)
Opening			2.4000	1.5038	3.6090		(27a)
Opening			2.4000	1.5038	3.6090		(27a)
External Wall 1	67.5000	12.7000	54.8000	0.1700	9.3160	110.0000	6028.0000 (29a)
Wall to corridor	15.0000		15.0000	0.1800	2.7000	110.0000	1650.0000 (29a)
sloping roof	62.6000	4.8000	57.8000	0.2000	11.5600	9.0000	520.2000 (30)
Total net area of external elements A _{um} (A, m ²)			145.1000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	49.4435		(33)
Party Floor			62.6000			30.0000	1878.0000 (32d)
Party Ceiling 1			1.0000			20.0000	20.0000 (32b)
Internal Wall Stud			55.0000			9.0000	495.0000 (32c)
Heat capacity C _m = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		10591.2000 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							169.1885 (35)
Thermal bridges (Default value 0.200 * total exposed area)							29.0200 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		78.4635 (37)

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

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(38)m	Jan 51.4124	Feb 50.4588	Mar 49.5241	Apr 45.1339	May 44.3125	Jun 40.4887	Jul 40.4887	Aug 39.7806	Sep 41.9616	Oct 44.3125	Nov 45.9741	Dec 47.7113	(38)
Heat transfer coeff	129.8759	128.9223	127.9876	123.5974	122.7760	118.9522	118.9522	118.2441	120.4251	122.7760	124.4377	126.1749	(39)
Average = Sum(39)m / 12 =												123.5934	
HLP	Jan 2.0747	Feb 2.0595	Mar 2.0445	Apr 1.9744	May 1.9613	Jun 1.9002	Jul 1.9002	Aug 1.8889	Sep 1.9237	Oct 1.9613	Nov 1.9878	Dec 2.0156	(40)
HLP (average)												1.9743	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0541	(42)
Hot water usage for mixer showers														
73.3254	72.2234	70.6177	67.5454	65.2781	62.7497	61.3125	62.9061	64.6530	67.3677	70.5060	73.0444	(42a)		
Hot water usage for baths														
25.3491	24.9726	24.4425	23.4650	22.7330	21.9214	21.4830	22.0095	22.5827	23.4511	24.4487	25.2634	(42b)		
Hot water usage for other uses														
35.6662	34.3692	33.0723	31.7753	30.4783	29.1814	29.1814	30.4783	31.7753	33.0723	34.3692	35.6662	(42c)		
Average daily hot water use (litres/day)												123.5299	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	134.3406	131.5652	128.1324	122.7856	118.4895	113.8525	111.9769	115.3939	119.0109	123.8911	129.3240	133.9739	(44)	
Energy content (annual)	212.7626	187.3471	196.9347	168.0874	159.5096	139.9949	135.4264	142.8818	146.7524	168.1190	184.2457	209.7708	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2051.8324		
31.9144	28.1021	29.5402	25.2131	23.9264	20.9992	20.3140	21.4323	22.0129	25.2179	27.6369	31.4656	(46)		
Water storage loss:														
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)	
Total heat required for water heating calculated for each month														
263.7215	233.3745	247.8936	217.4025	210.4685	189.3100	186.3853	193.8407	196.0674	219.0779	233.5607	260.7297	(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	263.7215	233.3745	247.8936	217.4025	210.4685	189.3100	186.3853	193.8407	196.0674	219.0779	233.5607	260.7297	(64)	
12Total per year (kWh/year)												2651.8324	(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)	
												2652	(64)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)	
												0.0000	(64a)	
Heat gains from water heating, kWh/month														
83.4833	73.7998	78.2205	68.2178	65.7767	58.8771	57.7690	60.2479	61.1239	68.6393	73.5905	82.4885	(65)		

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

Metabolic gains (Table 5), Watts														
(66)m	Jan 102.7056	Feb 102.7056	Mar 102.7056	Apr 102.7056	May 102.7056	Jun 102.7056	Jul 102.7056	Aug 102.7056	Sep 102.7056	Oct 102.7056	Nov 102.7056	Dec 102.7056	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
90.5136	100.2115	90.5136	93.5307	90.5136	93.5307	90.5136	90.5136	93.5307	93.5307	90.5136	93.5307	90.5136	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
179.4533	181.3155	176.6229	166.6329	154.0224	142.1702	134.2523	132.3901	137.0827	147.0727	159.6832	171.5354	(68)		
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	(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)														
-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	(71)	
Water heating gains (Table 5)														
112.2087	109.8211	105.1351	94.7470	88.4095	81.7737	77.6465	80.9784	84.8943	92.2571	102.2090	110.8717	(72)		
Total internal gains	438.9874	448.1598	429.0833	411.7223	389.7572	371.2864	356.2241	357.6938	369.3195	386.6551	412.2346	429.7323	(73)	

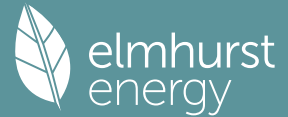
6. Solar gains

[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			
Northeast				10.5000	11.2829	0.6300	0.7000	0.7700	36.2062 (75)			
Southeast				2.4000	39.9751	0.6300	0.7000	1.0000	38.0787 (82)			
Northwest				2.4000	16.3666	0.6300	0.7000	1.0000	15.5902 (82)			
Solar gains	89.8751	175.7825	298.7562	464.4794	603.9323	635.7302	597.9087	488.7658	355.5637	210.1771	111.8313	74.1819 (83)
Total gains	528.8625	623.9423	727.8395	876.2018	993.6894	1007.0165	954.1327	846.4596	724.8832	596.8322	524.0659	503.9142 (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	22.6524	22.8199	22.9866	23.8031	23.9623	24.7326	24.7326	24.8807	24.4301	23.9623	23.6424	23.3168		
alpha	2.5102	2.5213	2.5324	2.5869	2.5975	2.6488	2.6488	2.6587	2.6287	2.5975	2.5762	2.5545		
util living area	0.9780	0.9657	0.9410	0.8782	0.7701	0.6185	0.4917	0.5542	0.7719	0.9210	0.9674	0.9805	(86)	
MIT	18.5544	18.8000	19.2220	19.8394	20.3402	20.6826	20.8054	20.7755	20.4898	19.8354	19.1307	18.5658	(87)	
Th 2	19.2840	19.2940	19.3038	19.3505	19.3593	19.4007	19.4007	19.4084	19.3847	19.3593	19.3415	19.3230	(88)	
util rest of house														

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MIT 2	0.9720	0.9566	0.9245	0.8431	0.7018	0.5045	0.3349	0.3949	0.6758	0.8904	0.9571	0.9753 (89)
Living area fraction	16.5426	16.8588	17.3947	18.1802	18.7593	19.1346	19.2268	19.2204	18.9625	18.2033	17.3120	16.5813 (90)
MIT	17.5774	17.8573	18.3346	19.0337	19.5725	19.9309	20.0388	20.0203	fLA = Living area / (4) =			0.5144 (91)
Temperature adjustment									19.7481	19.0428	18.2475	17.6021 (92)
adjusted MIT	17.4274	17.7073	18.1846	18.8837	19.4225	19.7809	19.8888	19.8703	19.5981	18.8928	18.0975	-0.1500 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9629	0.9447	0.9101	0.8309	0.7049	0.5344	0.3863	0.4456	0.6909	0.8789	0.9462	0.9669	(94)
Useful gains	509.2205	589.4483	662.3851	728.0446	700.4350	538.1294	368.5778	377.1588	500.7950	524.5763	495.8775	487.2362	(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	1704.9361	1651.1455	1495.4855	1233.9554	948.1346	616.2764	391.2109	410.3433	662.1094	1018.1601	1368.5038	1672.0793	(97)
Space heating kWh	889.6124	713.4605	619.8267	364.2558	184.2885	0.0000	0.0000	0.0000	0.0000	367.2264	628.2909	881.5233	(98a)
Space heating requirement - total per year (kWh/year)												4648.4844	
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	889.6124	713.4605	619.8267	364.2558	184.2885	0.0000	0.0000	0.0000	0.0000	367.2264	628.2909	881.5233	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4648.4844	
Space heating per m2												(98c) / (4) =	74.2569 (99)

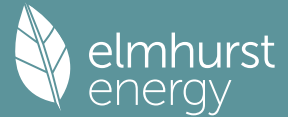
9a. Energy requirements - Individual heating systems, including micro-CHP

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	889.6124	713.4605	619.8267	364.2558	184.2885	0.0000	0.0000	0.0000	0.0000	367.2264	628.2909	881.5233	(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)	993.9803	797.1626	692.5438	406.9897	205.9090	0.0000	0.0000	0.0000	0.0000	410.3088	702.0010	984.9422	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	263.7215	233.3745	247.8936	217.4025	210.4685	189.3100	186.3853	193.8407	196.0674	219.0779	233.5607	260.7297	(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	294.6609	260.7537	276.9761	242.9078	235.1604	211.5195	208.2517	216.5817	219.0698	244.7798	260.9617	291.3181	(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	18.4225	14.7792	13.3071	9.7493	7.5307	6.1526	6.8697	8.9295	11.5986	15.2179	17.1886	18.9346	(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												5193.8373	(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												2962.9413	(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)												148.6804	(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												8346.4590	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
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Space heating - main system 1	5193.8373	0.2100	1090.7058 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2962.9413	0.2100	622.2177 (264)
Space and water heating			1712.9235 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	148.6804	0.1443	21.4592 (268)
Total CO2, kg/year			1740.0699 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			27.8000 (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	5193.8373	1.1300	5869.0362 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2962.9413	1.1300	3348.1236 (278)
Space and water heating			9217.1598 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	148.6804	1.5338	228.0510 (282)
Total Primary energy kWh/year			9507.2356 (286)
Dwelling Primary energy Rate (DPER)			151.8700 (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	62.6000 (1b)	x 2.6000 (2b)	= 162.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 162.7600 (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) = 0.1229 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3729 (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) = 0.3729 (21)

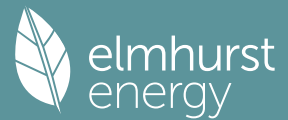
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4754	0.4661	0.4568	0.4102	0.4008	0.3542	0.3542	0.3449	0.3729	0.4008	0.4195	0.4381 (22b)
Effective ac	0.6130	0.6086	0.6043	0.5841	0.5803	0.5627	0.5627	0.5595	0.5695	0.5803	0.5880	0.5960 (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			2.2000	1.0000	2.2000		(26)
TER Opening Type (Uw = 1.20)			9.2300	1.1450	10.5687		(27)
Opening			2.1100	1.4151	2.9858		(27a)
Opening			2.1100	1.4151	2.9858		(27a)
External Wall 1	67.5000	11.4300	56.0700	0.1800	10.0926		(29a)
Wall to corridor	15.0000		15.0000	0.1800	2.7000		(29a)
sloping roof	62.6000	4.2200	58.3800	0.1100	6.4218		(30)
Total net area of external elements Aum(A, m2)			145.1000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.9548		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							169.3482 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							7.2550 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	45.2098 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	32.9254	32.6897	32.4587	31.3735	31.1705	30.2253	30.2253	30.0503	30.5894	31.1705	31.5812	32.0106 (38)
Heat transfer coeff												

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Average = Sum(39)m / 12 =	78.1352	77.8995	77.6685	76.5833	76.3803	75.4351	75.4351	75.2601	75.7992	76.3803	76.7910	77.2204 (39)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2482	1.2444	1.2407	1.2234	1.2201	1.2050	1.2050	1.2022	1.2108	1.2201	1.2267	1.2336 (40)
HLP (average)												1.2234
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0541 (42)
Hot water usage for mixer showers												
58.6603	57.7787	56.4941	54.0363	52.2225	50.1997	49.0500	50.3249	51.7224	53.8942	56.4048	58.4355 (42a)	
Hot water usage for baths												
25.3491	24.9726	24.4425	23.4650	22.7330	21.9214	21.4830	22.0095	22.5827	23.4511	24.4487	25.2634 (42b)	
Hot water usage for other uses												
35.6662	34.3692	33.0723	31.7753	30.4783	29.1814	29.1814	30.4783	31.7753	33.0723	34.3692	35.6662 (42c)	
Average daily hot water use (litres/day)												110.0092 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
119.6755	117.1205	114.0088	109.2766	105.4339	101.3025	99.7144	102.8127	106.0803	110.4175	115.2227	119.3651 (44)	
Energy conte	189.5368	166.7781	175.2274	149.5942	141.9342	124.5633	120.5960	127.3036	130.8077	149.8356	164.1559	186.8968 (45)
Energy content (annual)										Total = Sum(45)m =		1827.2294
Distribution loss (46)m = 0.15 x (45)m												
28.4305	25.0167	26.2841	22.4391	21.2901	18.6845	18.0894	19.0955	19.6211	22.4753	24.6234	28.0345 (46)	
Water storage loss:												
Total storage loss												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.8134	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month												
240.4957	212.8055	226.1863	198.9092	192.8931	173.8784	171.4093	178.2625	180.1227	200.7945	213.4710	237.8557 (62)	
WWHRS	-26.8170	-23.7172	-24.8353	-20.5646	-19.1655	-16.4000	-15.3724	-16.3470	-16.9681	-20.0035	-22.6616	-26.3204 (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												
213.6786	189.0883	201.3510	178.3446	173.7277	157.4783	156.0369	161.9155	163.1546	180.7910	190.8094	211.5353 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2177.9112 (64)
Electric shower(s)												2178 (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												
75.7607	66.9606	71.0028	62.0688	59.9329	53.7461	52.8015	55.0682	55.8223	62.5601	66.9106	74.8829 (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	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056	102.7056 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	90.5136	100.2115	90.5136	93.5307	90.5136	93.5307	90.5136	90.5136	93.5307	90.5136	93.5307	90.5136 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	179.4533	181.3155	176.6229	166.6329	154.0224	142.1702	134.2523	132.3901	137.0827	147.0727	159.6832	171.5354 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706 (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)												
	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645 (71)
Water heating gains (Table 5)												
	101.8289	99.6437	95.4339	86.2067	80.5549	74.6473	70.9698	74.0164	77.5310	84.0861	92.9314	100.6491 (72)
Total internal gains												
	428.6075	437.9824	419.3821	403.1820	381.9026	364.1600	349.5473	350.7318	361.9561	378.4841	402.9571	419.5098 (73)

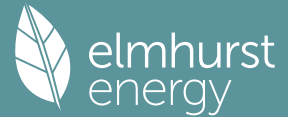
6. Solar gains

[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			
Northeast				9.2300	11.2829	0.6300	0.7000	0.7700	31.8270 (75)			
Southeast				2.1100	39.9751	0.6300	0.7000	1.0000	33.4775 (82)			
Northwest				2.1100	16.3666	0.6300	0.7000	1.0000	13.7063 (82)			
Solar gains	79.0109	154.5334	262.6407	408.3289	530.9222	558.8756	525.6266	429.6788	312.5805	184.7700	98.3129	65.2147 (83)
Total gains	507.6184	592.5157	682.0228	811.5109	912.8248	923.0355	875.1739	780.4106	674.5366	563.2541	501.2700	484.7245 (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	37.6882	37.8023	37.9147	38.4520	38.5542	39.0372	39.0372	39.1280	38.8497	38.5542	38.3480	38.1347
alpha	3.5125	3.5202	3.5276	3.5635	3.5703	3.6025	3.6025	3.6085	3.5900	3.5703	3.5565	3.5423
util living area	0.9775	0.9610	0.9250	0.8295	0.6748	0.4976	0.3720	0.4302	0.6739	0.8924	0.9627	0.9806 (86)
MIT	19.1848	19.4615	19.8862	20.4275	20.7868	20.9467	20.9856	20.9762	20.8450	20.3408	19.6805	19.1484 (87)
Th 2	19.8817	19.8846	19.8876	19.9013	19.9039	19.9160	19.9160	19.9182	19.9113	19.9039	19.8987	19.8933 (88)
util rest of house	0.9725	0.9525	0.9088	0.7953	0.6180	0.4220	0.2836	0.3347	0.5959	0.8618	0.9531	0.9763 (89)
MIT 2	17.7967	18.1464	18.6756	19.3301	19.7228	19.8825	19.9102	19.9078	19.7993	19.2508	18.4364	17.7582 (90)
Living area fraction									fLA = Living area / (4) =			0.5144 (91)

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MIT	18.5107	18.8229	19.2983	19.8946	20.2701	20.4299	20.4634	20.4574	20.3372	19.8114	19.0763	18.4733 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5107	18.8229	19.2983	19.8946	20.2701	20.4299	20.4634	20.4574	20.3372	19.8114	19.0763	18.4733 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9642	0.9422	0.8984	0.7950	0.6379	0.4586	0.3287	0.3831	0.6281	0.8588	0.9439	0.9687	(94)
Useful gains	489.4594	558.2858	612.7578	645.1807	582.2763	423.3056	287.7112	298.9820	423.6909	483.7000	473.1570	469.5672	(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	1110.3553	1084.5845	994.0247	842.0016	654.5847	439.7802	291.4356	305.3570	472.7744	703.5714	919.6757	1102.1911	(97)
Space heating kWh	461.9466	353.6727	283.6626	141.7110	53.7974	0.0000	0.0000	0.0000	0.0000	163.5843	321.4934	470.6722	(98a)
Space heating requirement - total per year (kWh/year)												2250.5402	
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	461.9466	353.6727	283.6626	141.7110	53.7974	0.0000	0.0000	0.0000	0.0000	163.5843	321.4934	470.6722	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2250.5402	
Space heating per m2										(98c) / (4) =		35.9511	(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 %)												92.4000	(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	461.9466	353.6727	283.6626	141.7110	53.7974	0.0000	0.0000	0.0000	0.0000	163.5843	321.4934	470.6722	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	499.9422	382.7627	306.9941	153.3669	58.2223	0.0000	0.0000	0.0000	0.0000	177.0393	347.9366	509.3854	(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	213.6786	189.0883	201.3510	178.3446	173.7277	157.4783	156.0369	161.9155	163.1546	180.7910	190.8094	211.5353	(64)
Efficiency of water heater	85.9875	85.7023	85.1156	83.8934	82.1797	80.3000	80.3000	80.3000	80.3000	84.1677	85.4899	86.0427	(216)
Fuel for water heating, kWh/month	248.4998	220.6337	236.5616	212.5849	211.3997	196.1125	194.3175	201.6382	203.1813	214.7985	223.1954	245.8494	(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	18.8069	15.0876	13.5847	9.9528	7.6878	6.2810	7.0131	9.1158	11.8406	15.5355	17.5473	19.3296	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.3850	-31.1706	-46.3140	-53.8982	-59.7171	-56.3387	-55.6624	-51.7640	-45.1456	-36.4637	-23.8754	-18.3722	(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)	-9.1679	-19.5572	-39.3727	-59.8675	-79.8672	-80.4910	-79.5304	-67.0045	-48.6831	-28.1953	-12.3149	-7.2287	(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												2435.6495	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												80.3000	
Water heating fuel used												2608.7725	(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)												151.7828	(232)
Energy saving/generation technologies (Appendices M, N and Q)													
PV generation												-1031.3873	(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												4250.8175	(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	2435.6495	0.2100	511.4864	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2608.7725	0.2100	547.8422	(264)
Space and water heating			1059.3286	(265)

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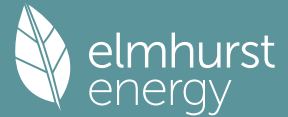
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	151.7828	0.1443	21.9069 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-500.1069	0.1339	-66.9526
PV Unit electricity exported	-531.2804	0.1255	-66.6972
Total			-133.6498 (269)
Total CO2, kg/year			959.5150 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.3300 (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	2435.6495	1.1300	2752.2840 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2608.7725	1.1300	2947.9129 (278)
Space and water heating			5700.1969 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	151.7828	1.5338	232.8095 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-500.1069	1.4947	-747.5323
PV Unit electricity exported	-531.2804	0.4608	-244.8160
Total			-992.3483 (283)
Total Primary energy kWh/year			5070.7589 (286)
Target Primary Energy Rate (TPER)			81.0000 (287)

BE GREEN

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Property Reference	Flat 1 - 1 Bed GF flat			Issued on Date	11/04/2024
Assessment Reference	Flat 1	Prop Type Ref	HTA		
Property	Flat 1, 3 New Road, London, N8 8TA				
SAP Rating	78 C	DER	6.57	TER	15.90
Environmental	95 A	% DER < TER			58.68
CO ₂ Emissions (t/year)	0.3	DFEE	75.38	TFEE	41.40
Compliance Check	See BREL	% DFEE < TFEE			-82.06
% DPER < TPER	18.75	DPER	68.43	TPER	84.22
Assessor Details	Ms. Ruth Pike			Assessor ID	AU93-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	52.2000 (1b)	2.6000 (2b)	135.7200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.2000		135.7200 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	135.7200 (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	No	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7500	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.6375 (21)

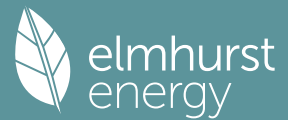
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.8128	0.7969	0.7809	0.7013	0.6853	0.6056	0.6056	0.5897	0.6375	0.6853	0.7172	0.7491 (22b)
Effective ac	0.8303	0.8175	0.8049	0.7459	0.7348	0.6834	0.6834	0.6739	0.7032	0.7348	0.7572	0.7805 (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
Solid Doors			2.2000	1.3000	2.8600		(26)
Windows (Uw = 1.60)			10.0800	1.5038	15.1579		(27)
Ground Floor			52.2000	0.0900	4.6980	75.0000	3915.0000 (28a)
External Wall 1	42.5000	7.2400	35.2600	0.1700	5.9942	110.0000	3878.6000 (29a)
Wall to corridor	17.5000	5.0400	12.4600	0.1800	2.2428	110.0000	1370.6000 (29a)
Total net area of external elements Aum(A, m ²)			112.2000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.9529		(33)
Party Wall 1			30.0000	0.0000	0.0000	20.0000	600.0000 (32)
Party Ceiling 1			52.2000			20.0000	1044.0000 (32b)
Internal Wall Stud			50.0000			9.0000	450.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		11258.2000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							215.6743 (35)
Thermal bridges (Default value 0.200 * total exposed area)							22.4400 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		53.3929 (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
	37.1886	36.6141	36.0510	33.4060	32.9111	30.6074	30.6074	30.1808	31.4948	32.9111	33.9122	34.9588 (38)

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Heat transfer coeff
90.5815 90.0070 89.4439 86.7989 86.3040 84.0003 84.0003 83.5737 84.8877 86.3040 87.3051 88.3517 (39)
Average = Sum(39)m / 12 = 86.7965

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.7353	1.7243	1.7135	1.6628	1.6533	1.6092	1.6092	1.6010	1.6262	1.6533	1.6725	1.6926	(40)
HLP (average)												1.6628	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7550 (42)
Hot water usage for mixer showers 66.7988 (42a)
Hot water usage for baths 23.1138 (42b)
Hot water usage for other uses 32.6027 (42c)
Average daily hot water use (litres/day) 112.9647 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	122.8506	120.3129	117.1738	112.2844	108.3557	104.1154	102.4000	105.5245	108.8320	113.2948	118.2630	122.5152	(44)
Energy conte	194.5653	171.3239	180.0918	153.7117	145.8676	128.0220	123.8439	130.6614	134.2008	153.7399	168.4873	191.8293	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m	29.1848	25.6986	27.0138	23.0568	21.8801	19.2033	18.5766	19.5992	20.1301	23.0610	25.2731	28.7744	(46)
Water storage loss:													
Store volume												250.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8400	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9936	(55)
Total storage loss	30.8016	27.8208	30.8016	29.8080	30.8016	29.8080	30.8016	30.8016	29.8080	30.8016	29.8080	30.8016	(56)
If cylinder contains dedicated solar storage	30.8016	27.8208	30.8016	29.8080	30.8016	29.8080	30.8016	30.8016	29.8080	30.8016	29.8080	30.8016	(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	248.6293	220.1559	234.1558	206.0317	199.9316	180.3420	177.9079	184.7254	186.5208	207.8039	220.8073	245.8933	(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	248.6293	220.1559	234.1558	206.0317	199.9316	180.3420	177.9079	184.7254	186.5208	207.8039	220.8073	245.8933	(64)
12Total per year (kWh/year)												2512.9050	(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	107.9442	96.0308	103.1317	92.9651	91.7522	84.4233	84.4293	86.6961	86.4778	94.3697	97.8780	107.0344	(65)

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

Metabolic gains (Table 5), Watts
(66)m 87.7485 87.7485 87.7485 87.7485 87.7485 87.7485 87.7485 87.7485 87.7485 87.7485 87.7485 87.7485 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 78.0008 86.3580 78.0008 80.6008 78.0008 80.6008 78.0008 78.0008 80.6008 78.0008 80.6008 78.0008 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 152.9446 154.5317 150.5323 142.0180 131.2703 121.1690 114.4206 112.8335 116.8330 125.3472 136.0949 146.1963 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 31.7749 31.7749 31.7749 31.7749 31.7749 31.7749 31.7749 31.7749 31.7749 31.7749 31.7749 31.7749 (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) -70.1988 -70.1988 -70.1988 -70.1988 -70.1988 -70.1988 -70.1988 -70.1988 -70.1988 -70.1988 -70.1988 -70.1988 (71)
Water heating gains (Table 5) 145.0862 142.9030 138.6179 129.1182 123.3228 117.2546 113.4803 116.5270 120.1080 126.8410 135.9417 143.8635 (72)
Total internal gains 425.3562 433.1172 416.4756 401.0616 381.9185 368.3489 355.2262 356.6859 366.8663 379.5136 401.9620 417.3851 (73)

6. Solar gains

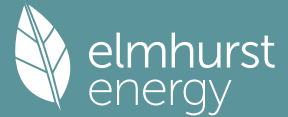
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W							
Northeast	5.0400	11.2829	0.6300	0.7000	0.7700	17.3790	(75)						
Northwest	5.0400	11.2829	0.6300	0.7000	0.7700	17.3790	(81)						
Solar gains	34.7580	70.7509	127.4706	209.3434	281.3986	300.0007	280.6445	223.7330	155.3249	86.4632	43.7345	28.3851	(83)
Total gains	460.1142	503.8681	543.9462	610.4050	663.3171	668.3496	635.8707	580.4190	522.1913	465.9768	445.6966	445.7702	(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	34.5245	34.7448	34.9636	36.0290	36.2356	37.2294	37.2294	37.4194	36.8402	36.2356	35.8201	35.3958	
alpha	3.3016	3.3163	3.3309	3.4019	3.4157	3.4820	3.4820	3.4946	3.4560	3.4157	3.3880	3.3597	
util living area	0.9862	0.9802	0.9671	0.9272	0.8410	0.6860	0.5409	0.5995	0.8179	0.9458	0.9785	0.9876	(86)
Living	19.2727	19.4301	19.7133	20.1521	20.5263	20.7866	20.8710	20.8541	20.6611	20.1941	19.6955	19.2846	
Non living	17.5616	17.7666	18.1295	18.6979	19.1365	19.4211	19.4805	19.4790	19.3076	18.7649	18.1315	17.5980	

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24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.1164	19.4301	19.7133	20.1521	20.5263	20.7866	20.8710	20.8541	20.6611	20.1941	19.6955	19.5245 (87)
Th 2	19.5157	19.5235	19.5312	19.5676	19.5745	19.6066	19.6066	19.6126	19.5942	19.5745	19.5606	19.5462 (88)
util rest of house												
	0.9820	0.9740	0.9563	0.9017	0.7828	0.5761	0.3874	0.4452	0.7299	0.9214	0.9707	0.9839 (89)
MIT 2	18.7366	17.7666	18.1295	18.6979	19.1365	19.4211	19.4805	19.4790	19.3076	18.7649	18.1315	17.9490 (90)
Living area fraction									FLA = Living area / (4) =			0.4923 (91)
MIT	19.4159	18.5856	18.9092	19.4139	19.8208	20.0934	20.1651	20.1560	19.9740	19.4686	18.9015	18.7247 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4159	18.5856	18.9092	19.4139	19.8208	20.0934	20.1651	20.1560	19.9740	19.4686	18.9015	18.7247 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9817	0.9689	0.9503	0.8984	0.7943	0.6178	0.4522	0.5099	0.7574	0.9191	0.9660	0.9811 (94)
Useful gains	451.6938	488.1770	516.9315	548.3886	526.8970	412.8885	287.5492	295.9498	395.4828	428.3000	430.5244	437.3504 (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	1369.2241	1231.8027	1109.9308	912.5938	700.8543	461.4456	299.4701	313.9069	498.6295	765.3947	1030.3327	1283.2833 (97)
Space heating kWh	682.6425	499.7164	441.1915	262.2278	129.4243	0.0000	0.0000	0.0000	0.0000	250.7984	431.8620	629.3741 (98a)
Space heating requirement - total per year (kWh/year)												3327.2369
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	682.6425	499.7164	441.1915	262.2278	129.4243	0.0000	0.0000	0.0000	0.0000	250.7984	431.8620	629.3741 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3327.2369
Space heating per m2										(98c) / (4) =		63.7402 (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 %)	258.2864 (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	682.6425	499.7164	441.1915	262.2278	129.4243	0.0000	0.0000	0.0000	0.0000	250.7984	431.8620	629.3741 (98)
Space heating efficiency (main heating system 1)	258.2864	258.2864	258.2864	258.2864	258.2864	0.0000	0.0000	0.0000	0.0000	258.2864	258.2864	258.2864 (210)
Space heating fuel (main heating system)	264.2968	193.4738	170.8148	101.5260	50.1088	0.0000	0.0000	0.0000	0.0000	97.1009	167.2028	243.6730 (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	248.6293	220.1559	234.1558	206.0317	199.9316	180.3420	177.9079	184.7254	186.5208	207.8039	220.8073	245.8933 (64)
Efficiency of water heater (217)m	283.3089	283.3089	283.3089	283.3089	283.3089	283.3089	283.3089	283.3089	283.3089	283.3089	283.3089	283.3089 (216)
Fuel for water heating, kWh/month	87.7591	77.7088	82.6503	72.7233	70.5702	63.6556	62.7965	65.2028	65.8365	73.3489	77.9387	86.7933 (219)

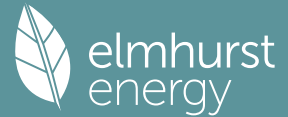
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	15.8758	12.7361	11.4675	8.4016	6.4896	5.3021	5.9200	7.6951	9.9952	13.1142	14.8124	16.3170 (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												1288.1969 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												283.3089
Water heating fuel used												886.9841 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												128.1265 (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												2303.3074 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1288.1969	0.1548	199.4755 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	886.9841	0.1409	124.9337 (264)
Space and water heating			324.4092 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	128.1265	0.1443	18.4926 (268)
Total CO2, kg/year			342.9018 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.5700 (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	1288.1969	1.5733	2026.6846 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	886.9841	1.5208	1348.9416 (278)
Space and water heating			3375.6262 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	128.1265	1.5338	196.5246 (282)
Total Primary energy kWh/year			3572.1509 (286)
Dwelling Primary energy Rate (DPER)			68.4300 (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	52.2000	2.6000	135.7200
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	52.2000		
Dwelling volume			

2. Ventilation rate

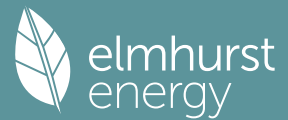
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1474 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3974 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3378 (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
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
Adj infilt rate	0.4306	0.4222	0.4138	0.3715	0.3631	0.3209	0.3209	0.3124	0.3378	0.3631	0.3800	0.3969
Effective ac	0.5927	0.5891	0.5856	0.5690	0.5659	0.5515	0.5515	0.5488	0.5570	0.5659	0.5722	0.5788

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			2.2000	1.0000	2.2000		(26)
TER Opening Type (Uw = 1.20)			10.0800	1.1450	11.5420		(27)
Ground Floor			52.2000	0.1300	6.7860		(28a)
External Wall 1	42.5000	7.2400	35.2600	0.1800	6.3468		(29a)
Wall to corridor	17.5000	5.0400	12.4600	0.1800	2.2428		(29a)
Total net area of external elements Aum(A, m2)			112.2000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	29.1176	(33)
Party Wall 1			30.0000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							225.6743 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							5.6100 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	34.7276 (37)

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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	26.5468	26.3855	26.2274	25.4850	25.3461	24.6994	24.6994	24.5797	24.9485	25.3461	25.6271	25.9209 (38)
Average = Sum(39)m / 12 =	61.2744	61.1131	60.9550	60.2126	60.0737	59.4270	59.4270	59.3072	59.6761	60.0737	60.3547	60.6485 (39)
												60.2119
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1738	1.1707	1.1677	1.1535	1.1508	1.1384	1.1384	1.1362	1.1432	1.1508	1.1562	1.1618 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

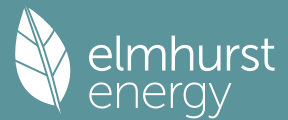
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.7550 (42)
Hot water usage for mixer showers	53.6446	52.8384	51.6637	49.4160	47.7573	45.9075	44.8560	46.0219	47.2999	49.2860	51.5820	53.4391 (42a)
Hot water usage for baths	23.1922	22.8477	22.3627	21.4684	20.7987	20.0562	19.6551	20.1367	20.6611	21.4557	22.3684	23.1138 (42b)
Hot water usage for other uses	32.6027	31.4171	30.2316	29.0460	27.8605	26.6749	26.6749	27.8605	29.0460	30.2316	31.4171	32.6027 (42c)
Average daily hot water use (litres/day)												100.6001 (43)
Daily hot water use	109.4394	107.1033	104.2579	99.9304	96.4164	92.6385	91.1860	94.0191	97.0070	100.9733	105.3675	109.1555 (44)
Energy conte	173.3253	152.5136	160.2405	136.7997	129.7950	113.9099	110.2816	116.4152	119.6194	137.0198	150.1153	170.9111 (45)
Energy content (annual)										Total = Sum(45)m =		1670.9464
Distribution loss (46)m = 0.15 x (45)m	25.9988	22.8770	24.0361	20.5200	19.4693	17.0865	16.5422	17.4623	17.9429	20.5530	22.5173	25.6367 (46)
Water storage loss:												
Store volume												250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8903 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.0208 (55)
Total storage loss	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (56)
If cylinder contains dedicated solar storage	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (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	228.2321	202.1068	215.1473	189.9353	184.7018	167.0455	165.1884	171.3220	172.7550	191.9266	203.2510	225.8179 (62)
WWHRS	-24.5241	-21.6893	-22.7118	-18.8062	-17.5267	-14.9978	-14.0580	-14.9493	-15.5173	-18.2931	-20.7239	-24.0699 (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	203.7080	180.4176	192.4355	171.1290	167.1751	152.0477	151.1304	156.3728	157.2377	173.6334	182.5270	201.7480 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2089.5622 (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	101.5561	90.3854	97.2054	87.9944	87.0823	80.3835	80.5941	82.6335	82.2819	89.4845	92.4218	100.7534 (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	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485	87.7485 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	78.0008	86.3580	78.0008	80.6008	78.0008	80.6008	78.0008	78.0008	80.6008	78.0008	80.6008	78.0008 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	152.9446	154.5317	150.5323	142.0180	131.2703	121.1690	114.4206	112.8335	116.8330	125.3472	136.0949	146.1963 (68)
Pumps, fans	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749	31.7749 (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)	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988	-70.1988 (71)
Total internal gains	136.5001	134.5020	130.6524	122.2144	117.0461	111.6438	108.3253	111.0665	114.2805	120.2749	128.3637	135.4212 (72)
	419.7701	427.7163	411.5101	397.1578	378.6417	362.7381	350.0713	351.2254	361.0388	375.9474	397.3840	411.9428 (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
Northeast				5.0400	11.2829		0.6300		0.7000	0.7700		17.3790 (75)
Northwest				5.0400	11.2829		0.6300		0.7000	0.7700		17.3790 (81)
Solar gains	34.7580	70.7509	127.4706	209.3434	281.3986	300.0007	280.6445	223.7330	155.3249	86.4632	43.7345	28.3851 (83)
Total gains	454.5281	498.4672	538.9807	606.5012	660.0403	662.7387	630.7158	574.9584	516.3637	462.4106	441.1185	440.3280 (84)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	53.4037	53.5446	53.6835	54.3454	54.4711	55.0638	55.0638	55.1750	54.8340	54.4711	54.2175	53.9548
util living area	4.5602	4.5696	4.5789	4.6230	4.6314	4.6709	4.6709	4.6783	4.6556	4.6314	4.6145	4.5970
	0.9861	0.9774	0.9567	0.8884	0.7478	0.5548	0.4106	0.4668	0.7194	0.9210	0.9749	0.9879 (86)

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MIT	19.7266	19.8995	20.1837	20.5782	20.8552	20.9718	20.9944	20.9901	20.9103	20.5576	20.0915	19.7040 (87)
Th 2	19.9410	19.9435	19.9459	19.9574	19.9595	19.9696	19.9696	19.9714	19.9657	19.9595	19.9552	19.9506 (88)
util rest of house	0.9822	0.9711	0.9444	0.8582	0.6895	0.4731	0.3165	0.3662	0.6377	0.8924	0.9667	0.9845 (89)
MIT 2	18.4864	18.7059	19.0624	19.5429	19.8422	19.9537	19.9677	19.9678	19.9064	19.5325	18.9589	18.4646 (90)
Living area fraction									fLA = Living area / (4) =			0.4923 (91)
MIT	19.0970	19.2936	19.6145	20.0526	20.3410	20.4550	20.4732	20.4711	20.4006	20.0372	19.5165	19.0748 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0970	19.2936	19.6145	20.0526	20.3410	20.4550	20.4732	20.4711	20.4006	20.0372	19.5165	19.0748 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9781	0.9662	0.9397	0.8613	0.7120	0.5124	0.3628	0.4157	0.6739	0.8949	0.9624	0.9807	(94)
Useful gains	444.5912	481.6390	506.4959	522.3841	469.9508	339.5767	228.8487	239.0112	348.0032	413.8094	424.5425	431.8374	(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	906.6761	879.6353	799.3925	671.5291	519.0943	347.9423	230.1714	241.4467	375.9969	566.9286	749.3941	902.1354	(97)
Space heating kWh	343.7912	267.4535	217.9151	107.3844	36.5628	0.0000	0.0000	0.0000	0.0000	113.9206	233.8931	349.9017	(98a)
Space heating requirement - total per year (kWh/year)												1670.8225	
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	343.7912	267.4535	217.9151	107.3844	36.5628	0.0000	0.0000	0.0000	0.0000	113.9206	233.8931	349.9017	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1670.8225	
Space heating per m2										(98c) / (4) =		32.0081	(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	343.7912	267.4535	217.9151	107.3844	36.5628	0.0000	0.0000	0.0000	0.0000	113.9206	233.8931	349.9017	(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)	372.4715	289.7654	236.0944	116.3428	39.6130	0.0000	0.0000	0.0000	0.0000	123.4243	253.4054	379.0918	(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	203.7080	180.4176	192.4355	171.1290	167.1751	152.0477	151.1304	156.3728	157.2377	173.6334	182.5270	201.7480	(64)
Efficiency of water heater (217)m	85.2238	84.9409	84.3393	83.0452	81.2783	79.8000	79.8000	79.8000	79.8000	83.1382	84.6170	79.8000	(216)
Fuel for water heating, kWh/month	239.0272	212.4035	228.1682	206.0674	205.6822	190.5360	189.3864	195.9558	197.0398	208.8491	215.7098	236.5646	(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	16.2070	13.0019	11.7067	8.5769	6.6250	5.4127	6.0436	7.8556	10.2037	13.3878	15.1215	16.6575	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.9494	-26.2250	-39.0618	-45.5829	-50.6257	-47.8224	-47.2661	-43.9068	-38.2063	-30.7503	-20.0676	-15.4149	(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	-7.5276	-16.0752	-32.3894	-49.2824	-65.7689	-66.2751	-65.4666	-55.1302	-40.0342	-23.1666	-10.1102	-5.9328	(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												1810.2086	(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												2525.3900	(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)												130.7999	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-860.0386	(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												3692.3599	(238)

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

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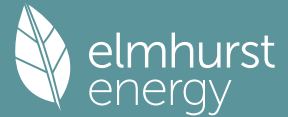


	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1810.2086	0.2100	380.1438 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2525.3900	0.2100	530.3319 (264)
Space and water heating			910.4757 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	130.7999	0.1443	18.8785 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-422.8793	0.1338	-56.5880
PV Unit electricity exported	-437.1593	0.1255	-54.8756
Total			-111.4636 (269)
Total CO2, kg/year			829.8199 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.9000 (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	1810.2086	1.1300	2045.5357 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2525.3900	1.1300	2853.6907 (278)
Space and water heating			4899.2264 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	130.7999	1.5338	200.6253 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-422.8793	1.4945	-632.0005
PV Unit electricity exported	-437.1593	0.4608	-201.4239
Total			-833.4244 (283)
Total Primary energy kWh/year			4396.5281 (286)
Target Primary Energy Rate (TPER)			84.2200 (287)

Full SAP Calculation Printout



Property Reference	Flat 2 - 2 bed GF flat				Issued on Date	11/04/2024
Assessment Reference	Flat 2		Prop Type Ref	HTA		
Property	Flat 1, 3 New Road, London, N8 8 TA					
SAP Rating	78 C	DER	5.80	TER	13.00	
Environmental	95 A	% DER < TER				55.38
CO ₂ Emissions (t/year)	0.35	DFEE	66.59	TFEE	35.49	
Compliance Check	See BREL	% DFEE < TFEE				-87.61
% DPER < TPER	11.90	DPER	60.30	TPER	68.44	
Assessor Details	Ms. Ruth Pike				Assessor ID	AU93-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		
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	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.6375 (21)

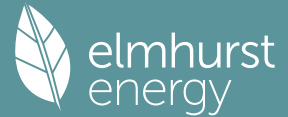
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.8128	0.7969	0.7809	0.7013	0.6853	0.6056	0.6056	0.5897	0.6375	0.6853	0.7172	0.7491 (22b)
Effective ac	0.8303	0.8175	0.8049	0.7459	0.7348	0.6834	0.6834	0.6739	0.7032	0.7348	0.7572	0.7805 (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
Solid Doors			2.2000	1.3000	2.8600		(26)
Windows (Uw = 1.60)			14.8800	1.5038	22.3759		(27)
Ground Floor			70.0000	0.0900	6.3000	75.0000	5250.0000 (28a)
External Wall 1	47.5000	12.0400	35.4600	0.1700	6.0282	110.0000	3900.6000 (29a)
Wall to corridor	25.0000	5.0400	19.9600	0.1800	3.5928	110.0000	2195.6000 (29a)
Total net area of external elements Aum(A, m ²)			142.5000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.1569		(33)
Party Wall 1			30.0000	0.0000	0.0000	20.0000	600.0000 (32)
Party Ceiling 1			70.0000			20.0000	1400.0000 (32b)
Internal Wall Stud			75.0000			9.0000	675.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		14021.2000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							200.3029 (35)
Thermal bridges (Default value 0.200 * total exposed area)							28.5000 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		69.6569 (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
	49.8697	49.0993	48.3442	44.7973	44.1337	41.0445	41.0445	40.4724	42.2344	44.1337	45.4762	46.8797 (38)

Full SAP Calculation Printout



Heat transfer coeff	119.5267	118.7563	118.0011	114.4542	113.7906	110.7014	110.7014	110.1293	111.8913	113.7906	115.1331	116.5366 (39)
Average = Sum(39)m / 12 =												114.4511
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.7075	1.6965	1.6857	1.6351	1.6256	1.5814	1.5814	1.5733	1.5984	1.6256	1.6448	1.6648 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2461 (42)
Hot water usage for mixer showers												
77.3497	76.1873	74.4934	71.2525	68.8608	66.1936	64.6776	66.3586	68.2013	71.0651	74.3756	77.0534 (42a)	
Hot water usage for baths												
26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432 (42b)	
Hot water usage for other uses												
37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326 (42c)	
Average daily hot water use (litres/day)												130.3115 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
141.7158	138.7879	135.1665	129.5263	124.9942	120.1026	118.1242	121.7289	125.5446	130.6927	136.4238	141.3291 (44)	
Energy content	224.4432	197.6322	207.7459	177.3150	168.2662	147.6801	142.8610	150.7258	154.8090	177.3488	194.3607	221.2872 (45)
Energy content (annual)										Total = Sum(45)m =		2164.4751
Distribution loss (46)m = 0.15 x (45)m												
33.6665	29.6448	31.1619	26.5972	25.2399	22.1520	21.4291	22.6089	23.2214	26.6023	29.1541	33.1931 (46)	
Water storage loss:												
Store volume												250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8400 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9936 (55)
Total storage loss												
30.8016	27.8208	30.8016	29.8080	30.8016	29.8080	30.8016	30.8016	29.8080	30.8016	29.8080	30.8016 (56)	
If cylinder contains dedicated solar storage												
30.8016	27.8208	30.8016	29.8080	30.8016	29.8080	30.8016	30.8016	29.8080	30.8016	29.8080	30.8016 (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												
278.5072	246.4642	261.8099	229.6350	222.3302	200.0001	196.9250	204.7898	207.1290	231.4128	246.6807	275.3512 (62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h												
278.5072	246.4642	261.8099	229.6350	222.3302	200.0001	196.9250	204.7898	207.1290	231.4128	246.6807	275.3512 (64)	
12Total per year (kWh/year)									Total per year (kWh/year) = Sum(64)m =			2801.0351 (64)
Electric shower(s)												2801 (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												
117.8786	104.7783	112.3267	100.8132	99.1997	90.9596	90.7525	93.3675	93.3300	102.2197	106.4809	116.8292 (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
112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
99.7072	110.3901	99.7072	103.0308	99.7072	103.0308	99.7072	99.7072	99.7072	103.0308	99.7072	103.0308	99.7072 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918	188.5918 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450 (71)
Water heating gains (Table 5)												
158.4390	155.9201	150.9768	140.0184	133.3329	126.3328	121.9791	125.4940	129.6250	137.3920	147.8902	157.0285	157.0285 (72)
Total internal gains												
512.1351	522.3465	501.5610	482.9429	459.0694	442.3622	425.9797	427.4472	440.0610	455.4878	483.1740	502.0194	502.0194 (73)

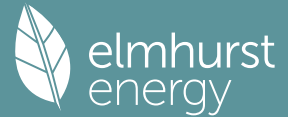
6. Solar gains

[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
Northeast					5.0400	11.2829	0.6300	0.7000			0.7700			17.3790 (75)
Southeast					9.8400	36.7938	0.6300	0.7000			0.7700			110.6476 (77)
Solar gains	128.0266	223.8492	321.6133	424.1951	498.5921	505.3051	482.8739	425.7929	356.8899	251.5353	154.3976	108.8838 (83)		
Total gains	640.1617	746.1957	823.1744	907.1380	957.6615	947.6673	908.8536	853.2401	796.9509	707.0231	637.5716	610.9032 (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	32.5850	32.7964	33.0063	34.0291	34.2276	35.1827	35.1827	35.3655	34.8086	34.2276	33.8285	33.4211
alpha	3.1723	3.1864	3.2004	3.2686	3.2818	3.3455	3.3455	3.3577	3.3206	3.2818	3.2552	3.2281
util living area												
	0.9814	0.9690	0.9477	0.8964	0.8032	0.6482	0.5029	0.5470	0.7562	0.9166	0.9693	0.9839 (86)
Living	19.2396	19.4545	19.7670	20.2008	20.5491	20.7906	20.8706	20.8586	20.6969	20.2447	19.6962	19.2410
Non living	17.5444	17.8206	18.2172	18.7730	19.1757	19.4402	19.4968	19.4973	19.3536	18.8430	18.1556	17.5676

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24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.0994	19.4545	19.7670	20.2008	20.5491	20.7906	20.8706	20.8586	20.6969	20.2447	19.6962	19.4870 (87)
Th 2	19.5354	19.5433	19.5511	19.5877	19.5946	19.6270	19.6270	19.6330	19.6145	19.5946	19.5807	19.5662 (88)
util rest of house												
	0.9762	0.9603	0.9324	0.8651	0.7414	0.5419	0.3603	0.4041	0.6625	0.8845	0.9592	0.9793 (89)
MIT 2	18.7417	17.8206	18.2172	18.7730	19.1757	19.4402	19.4968	19.4973	19.3536	18.8430	18.1556	17.9277 (90)
Living area fraction												
MIT	19.2693	18.4555	18.8194	19.3278	19.7093	19.9650	20.0306	20.0263	19.8756	19.3877	18.7542	18.5336 (91)
Temperature adjustment												0.0000
adjusted MIT	19.2693	18.4555	18.8194	19.3278	19.7093	19.9650	20.0306	20.0263	19.8756	19.3877	18.7542	18.5336 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9750	0.9518	0.9226	0.8582	0.7471	0.5703	0.4044	0.4479	0.6826	0.8786	0.9514	0.9750 (94)
Useful gains	624.1691	710.2112	759.4862	778.4668	715.4993	540.4569	367.5627	382.1242	543.9674	621.1645	606.5750	595.6169 (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	1789.2288	1609.8005	1453.7041	1193.5015	911.3884	593.9075	379.7693	399.3567	646.2385	999.9522	1341.7880	1670.3901 (97)
Space heating kWh	866.8044	604.5240	516.4981	298.8250	145.7415	0.0000	0.0000	0.0000	0.0000	281.8181	529.3534	799.6312 (98a)
Space heating requirement - total per year (kWh/year)												4043.1958
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	866.8044	604.5240	516.4981	298.8250	145.7415	0.0000	0.0000	0.0000	0.0000	281.8181	529.3534	799.6312 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4043.1958
Space heating per m2										(98c) / (4) =		57.7599 (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 %)	259.1419 (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	866.8044	604.5240	516.4981	298.8250	145.7415	0.0000	0.0000	0.0000	0.0000	281.8181	529.3534	799.6312 (98)
Space heating efficiency (main heating system 1)	259.1419	259.1419	259.1419	259.1419	259.1419	0.0000	0.0000	0.0000	0.0000	259.1419	259.1419	259.1419 (210)
Space heating fuel (main heating system)	334.4903	233.2792	199.3110	115.3133	56.2401	0.0000	0.0000	0.0000	0.0000	108.7505	204.2717	308.5689 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)

Water heating												
Water heating requirement	278.5072	246.4642	261.8099	229.6350	222.3302	200.0001	196.9250	204.7898	207.1290	231.4128	246.6807	275.3512 (64)
Efficiency of water heater (217)m	281.6311	281.6311	281.6311	281.6311	281.6311	281.6311	281.6311	281.6311	281.6311	281.6311	281.6311	281.6311 (216)
Fuel for water heating, kWh/month	98.8908	87.5131	92.9620	81.5375	78.9438	71.0149	69.9230	72.7156	73.5462	82.1688	87.5900	97.7702 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	20.2937	16.2804	14.6587	10.7396	8.2956	6.7775	7.5675	9.8365	12.7767	16.7637	18.9345	20.8578 (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												1560.2249 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												281.6311
Water heating fuel used												994.5760 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	163.7821 (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	2718.5830 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1560.2249	0.1552	242.1865 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	994.5760	0.1409	140.1626 (264)
Space and water heating			382.3490 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	163.7821	0.1443	23.6388 (268)
Total CO2, kg/year			405.9879 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.8000 (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	1560.2249	1.5746	2456.8057 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	994.5760	1.5211	1512.8478 (278)
Space and water heating			3969.6535 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	163.7821	1.5338	251.2144 (282)
Total Primary energy kWh/year			4220.8679 (286)
Dwelling Primary energy Rate (DPER)			60.3000 (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	70.0000		
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0000		182.0000 (1b) - (3b)
Dwelling volume			182.0000 (4)

2. Ventilation rate

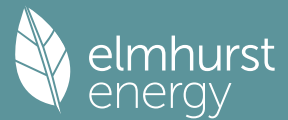
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1099 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3599 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3059 (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	0.3900	0.3824	0.3747	0.3365	0.3288	0.2906	0.2906	0.2830	0.3059	0.3288	0.3441	0.3594 (22b)
Effective ac	0.5761	0.5731	0.5702	0.5566	0.5541	0.5422	0.5422	0.5400	0.5468	0.5541	0.5592	0.5646 (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			2.2000	1.0000	2.2000		(26)
TER Opening Type (Uw = 1.20)			14.8800	1.1450	17.0382		(27)
Ground Floor			70.0000	0.1300	9.1000		(28a)
External Wall 1	47.5000	12.0400	35.4600	0.1800	6.3828		(29a)
Wall to corridor	25.0000	5.0400	19.9600	0.1800	3.5928		(29a)
Total net area of external elements Aum(A, m2)			142.5000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	38.3138	(33)
Party Wall 1			30.0000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							210.3029 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							7.1250 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	45.4388 (37)

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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	34.5983	34.4209	34.2470	33.4303	33.2775	32.5662	32.5662	32.4345	32.8402	33.2775	33.5866	33.9098 (38)
Average = Sum(39)m / 12 =	80.0371	79.8597	79.6858	78.8691	78.7163	78.0049	78.0049	77.8732	78.2789	78.7163	79.0254	79.3486 (39)
												78.8683
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1434	1.1409	1.1384	1.1267	1.1245	1.1144	1.1144	1.1125	1.1183	1.1245	1.1289	1.1336 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

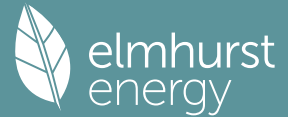
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.2461 (42)
Hot water usage for mixer showers	61.8798	60.9498	59.5947	57.0020	55.0887	52.9549	51.7420	53.0869	54.5611	56.8521	59.5005	61.6427 (42a)
Hot water usage for baths	26.7336	26.3365	25.7774	24.7465	23.9746	23.1187	22.6564	23.2116	23.8161	24.7319	25.7840	26.6432 (42b)
Hot water usage for other uses	37.6326	36.2641	34.8957	33.5272	32.1587	30.7903	30.7903	32.1587	33.5272	34.8957	36.2641	37.6326 (42c)
Average daily hot water use (litres/day)												116.0487 (43)
Daily hot water use	126.2459	123.5505	120.2678	115.2758	111.2220	106.8639	105.1887	108.4572	111.9043	116.4797	121.5487	125.9184 (44)
Energy conte	199.9426	175.9342	184.8472	157.8067	149.7262	131.4016	127.2166	134.2926	137.9892	158.0618	173.1684	197.1578 (45)
Energy content (annual)										Total = Sum(45)m =		1927.5450
Distribution loss (46)m = 0.15 x (45)m	29.9914	26.3901	27.7271	23.6710	22.4589	19.7102	19.0825	20.1439	20.6984	23.7093	25.9753	29.5737 (46)
Water storage loss:												
Store volume												250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8903 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.0208 (55)
Total storage loss	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (56)
If cylinder contains dedicated solar storage	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (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	254.8494	225.5275	239.7539	210.9423	204.6330	184.5372	182.1234	189.1994	191.1248	212.9686	226.3040	252.0646 (62)
WWHRS	-28.2888	-25.0189	-26.1983	-21.6933	-20.2173	-17.3001	-16.2161	-17.2442	-17.8994	-21.1014	-23.9053	-27.7650 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	226.5606	200.5086	213.5556	189.2491	184.4157	167.2371	165.9073	171.9552	173.2255	191.8672	202.3987	224.2996 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2311.1800 (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	110.4064	98.1727	105.3871	94.9792	93.7094	86.1995	86.2250	88.5777	88.3899	96.4810	100.0870	109.4804 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062	112.3062 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	99.7072	110.3901	99.7072	103.0308	99.7072	103.0308	99.7072	99.7072	103.0308	99.7072	103.0308	99.7072 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	197.2971	199.3444	194.1852	183.2019	169.3374	156.3068	147.6015	145.5542	150.7134	161.6967	175.5612	188.5918 (68)
Pumps, fans	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306	34.2306 (69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Water heating gains (Table 5)	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450	-89.8450 (71)
Total internal gains	148.3956	146.0903	141.6493	131.9156	125.9535	119.7215	115.8938	119.0561	122.7637	129.6787	139.0097	147.1511 (72)
	505.0918	515.5167	495.2336	477.8401	454.6900	435.7509	419.8943	421.0093	433.1998	450.7745	477.2935	495.1420 (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							
Northeast	5.0400	11.2829	0.6300	0.7000	0.7700	17.3790 (75)						
Southeast	9.8400	36.7938	0.6300	0.7000	0.7700	110.6476 (77)						
Solar gains	128.0266	223.8492	321.6133	424.1951	498.5921	505.3051	482.8739	425.7929	356.8899	251.5353	154.3976	108.8838 (83)
Total gains	633.1184	739.3660	816.8470	902.0352	953.2821	941.0560	902.7682	846.8022	790.0896	702.3098	631.6910	604.0258 (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	51.0916	51.2051	51.3168	51.8482	51.9489	52.4226	52.4226	52.5113	52.2391	51.9489	51.7457	51.5349
alpha	4.4061	4.4137	4.4211	4.4565	4.4633	4.4948	4.4948	4.5008	4.4826	4.4633	4.4497	4.4357
util living area	0.9801	0.9611	0.9254	0.8390	0.6961	0.5156	0.3771	0.4179	0.6387	0.8736	0.9619	0.9834 (86)

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MIT	19.7442	19.9909	20.2986	20.6524	20.8795	20.9753	20.9951	20.9923	20.9375	20.6389	20.1367	19.7014 (87)
Th 2	19.9656	19.9676	19.9696	19.9791	19.9809	19.9891	19.9891	19.9907	19.9859	19.9809	19.9773	19.9735 (88)
util rest of house	0.9750	0.9516	0.9075	0.8035	0.6385	0.4400	0.2920	0.3287	0.5603	0.8368	0.9509	0.9792 (89)
MIT 2	18.5332	18.8426	19.2217	19.6426	19.8833	19.9749	19.9874	19.9878	19.9451	19.6404	19.0362	18.4850 (90)
Living area fraction									fLA = Living area / (4) =			0.3886 (91)
MIT	19.0038	19.2888	19.6401	20.0350	20.2704	20.3636	20.3790	20.3781	20.3307	20.0284	19.4638	18.9576 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0038	19.2888	19.6401	20.0350	20.2704	20.3636	20.3790	20.3781	20.3307	20.0284	19.4638	18.9576 (93)

8. Space heating requirement

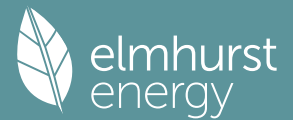
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9688	0.9439	0.9008	0.8056	0.6556	0.4686	0.3251	0.3633	0.5881	0.8388	0.9440	0.9736	(94)
Useful gains	613.3779	697.9013	735.8492	726.7117	624.9760	440.9546	293.4799	307.6530	464.6150	589.0723	596.3449	588.0721	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1176.8459	1149.0815	1047.0802	878.2066	674.6271	449.5909	294.7797	309.7882	487.7324	742.1660	977.0545	1170.9953	(97)
Space heating kWh	419.2202	303.1931	231.5559	109.0763	36.9404	0.0000	0.0000	0.0000	0.0000	113.9017	274.1109	433.6949	(98a)
Space heating requirement - total per year (kWh/year)												1921.6934	
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	419.2202	303.1931	231.5559	109.0763	36.9404	0.0000	0.0000	0.0000	0.0000	113.9017	274.1109	433.6949	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1921.6934	
Space heating per m2											(98c) / (4) =	27.4528	(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	419.2202	303.1931	231.5559	109.0763	36.9404	0.0000	0.0000	0.0000	0.0000	113.9017	274.1109	433.6949	(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)	454.1931	328.4866	250.8731	118.1758	40.0221	0.0000	0.0000	0.0000	0.0000	123.4038	296.9782	469.8752	(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	226.5606	200.5086	213.5556	189.2491	184.4157	167.2371	165.9073	171.9552	173.2255	191.8672	202.3987	224.2996	(64)
Efficiency of water heater (217)m	85.4201	84.9846	84.2416	82.8709	81.1729	79.8000	79.8000	79.8000	79.8000	82.9310	84.7406	79.8000	(216)
Fuel for water heating, kWh/month	265.2309	235.9352	253.5036	228.3660	227.1886	209.5702	207.9039	215.4827	217.0745	231.3577	238.8451	262.3006	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	20.7172	16.6201	14.9646	10.9637	8.4687	6.9190	7.7254	10.0418	13.0432	17.1134	19.3296	21.2930	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-23.8077	-34.6460	-51.3918	-59.6971	-66.0363	-62.2499	-61.4906	-57.2292	-49.9884	-40.4697	-26.5566	-20.4591	(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	-10.3568	-22.0783	-44.4240	-67.5170	-90.0484	-90.7545	-89.6834	-75.5790	-54.9319	-31.8327	-13.9117	-8.1681	(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												2082.0080	(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												2792.7590	(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)												167.1996	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1153.3085	(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												3974.6581	(238)

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

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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2082.0080	0.2100	437.2217 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2792.7590	0.2100	586.4794 (264)
Space and water heating			1023.7011 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	167.1996	0.1443	24.1321 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-554.0225	0.1339	-74.1929
PV Unit electricity exported	-599.2860	0.1256	-75.2407
Total			-149.4336 (269)
Total CO2, kg/year			910.3288 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.0000 (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	2082.0080	1.1300	2352.6690 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2792.7590	1.1300	3155.8177 (278)
Space and water heating			5508.4867 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	167.1996	1.5338	256.4563 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-554.0225	1.4949	-828.2060
PV Unit electricity exported	-599.2860	0.4608	-276.1754
Total			-1104.3813 (283)
Total Primary energy kWh/year			4790.6624 (286)
Target Primary Energy Rate (TPER)			68.4400 (287)

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Property Reference	Flat 3			Issued on Date	11/04/2024
Assessment Reference	Flat 3 - 2 bed MF	Prop Type Ref	HTA		
Property	Flat 3, 3 New Road, London, N8 8 TA				
SAP Rating	78 C	DER	5.66	TER	12.50
Environmental	95 A	% DER < TER			54.72
CO ₂ Emissions (t/year)	0.37	DFEE	67.15	TFEE	35.26
Compliance Check	See BREL	% DFEE < TFEE			-90.44
% DPER < TPER	10.56	DPER	58.76	TPER	65.70
Assessor Details	Ms. Ruth Pike			Assessor ID	AU93-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	75.7000 (1b)	2.6000 (2b)	196.8200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.7000		196.8200 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 196.8200 (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	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	2 (19)

Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.6375 (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	0.8128	0.7969	0.7809	0.7013	0.6853	0.6056	0.6056	0.5897	0.6375	0.6853	0.7172	0.7491 (22b)
Effective ac	0.8303	0.8175	0.8049	0.7459	0.7348	0.6834	0.6834	0.6739	0.7032	0.7348	0.7572	0.7805 (25)

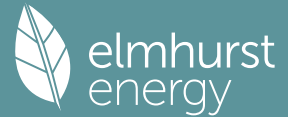
3. Heat losses and heat loss parameter

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
Solid Doors			2.2000	1.3000	2.8600		(26)
Windows (Uw = 1.60)			19.9500	1.5038	30.0000		(27)
Opening			4.8000	1.5038	7.2180		(27a)
External Wall 1	52.5000	19.0000	33.5000	0.1700	5.6950	110.0000	3685.0000 (29a)
Wall to corridor	15.0000	3.1500	11.8500	0.1800	2.1330	110.0000	1303.5000 (29a)
sloping roof	44.7600	4.8000	39.9600	0.2000	7.9920	9.0000	359.6400 (30)
Total net area of external elements Aum(A, m ²)			112.2600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.8980		(33)
Party Wall 1			37.5000	0.0000	0.0000	20.0000	750.0000 (32)
Party Floor			75.7000			30.0000	2271.0000 (32a)
Party Ceiling 1			38.4000			20.0000	768.0000 (32b)
Internal Wall Stud			95.0000			9.0000	855.0000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9992.1400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		131.9966 (35)
Thermal bridges (Default value 0.200 * total exposed area)		22.4520 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	78.3500 (37)

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

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(38)m	Jan 53.9306	Feb 53.0974	Mar 52.2808	Apr 48.4451	May 47.7274	Jun 44.3866	Jul 44.3866	Aug 43.7680	Sep 45.6735	Oct 47.7274	Nov 49.1792	Dec 50.6970	(38)
Heat transfer coeff	132.2806	131.4475	130.6308	126.7951	126.0775	122.7367	122.7367	122.1180	124.0235	126.0775	127.5293	129.0471	(39)
Average = Sum(39)m / 12 =												126.7917	
HLP	Jan 1.7474	Feb 1.7364	Mar 1.7256	Apr 1.6750	May 1.6655	Jun 1.6214	Jul 1.6214	Aug 1.6132	Sep 1.6384	Oct 1.6655	Nov 1.6847	Dec 1.7047	(40)
HLP (average)												1.6749	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3762	(42)
Hot water usage for mixer showers	80.0762	78.8729	77.1193	73.7641	71.2881	68.5269	66.9574	68.6977	70.6054	73.5701	76.9973	79.7694	(42a)	
Hot water usage for baths	27.6715	27.2606	26.6819	25.6148	24.8158	23.9299	23.4513	24.0260	24.6517	25.5997	26.6887	27.5780	(42b)	
Hot water usage for other uses	38.9648	37.5479	36.1310	34.7141	33.2972	31.8803	31.8803	33.2972	34.7141	36.1310	37.5479	38.9648	(42c)	
Average daily hot water use (litres/day)													134.9061	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	146.7126	143.6814	139.9322	134.0930	129.4011	124.3370	122.2890	126.0209	129.9712	135.3008	141.2340	146.3123	(44)	
Energy content (annual)	232.3569	204.6003	215.0705	183.5667	174.1988	152.8869	147.8979	156.0402	160.2675	183.6019	201.2137	229.0896	(45)	
Distribution loss (46)m = 0.15 x (45)m	34.8535	30.6900	32.2606	27.5350	26.1298	22.9330	22.1847	23.4060	24.0401	27.5403	30.1821	34.3634	(46)	
Water storage loss:														
Store volume													250.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8400	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.9936	(55)
Total storage loss	30.8016	27.8208	30.8016	29.8080	30.8016	29.8080	30.8016	30.8016	29.8080	30.8016	29.8080	30.8016	(56)	
If cylinder contains dedicated solar storage	30.8016	27.8208	30.8016	29.8080	30.8016	29.8080	30.8016	30.8016	29.8080	30.8016	29.8080	30.8016	(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	286.4209	253.4323	269.1345	235.8867	228.2628	205.2069	201.9619	210.1042	212.5875	237.6659	253.5337	283.1536	(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	286.4209	253.4323	269.1345	235.8867	228.2628	205.2069	201.9619	210.1042	212.5875	237.6659	253.5337	283.1536	(64)	
12Total per year (kWh/year)									Total per year (kWh/year) = Sum(64)m =			2877.3509	(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	120.5099	107.0952	114.7621	102.8919	101.1723	92.6909	92.4273	95.1346	95.1449	104.2988	108.7595	119.4235	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 118.8107	Feb 118.8107	Mar 118.8107	Apr 118.8107	May 118.8107	Jun 118.8107	Jul 118.8107	Aug 118.8107	Sep 118.8107	Oct 118.8107	Nov 118.8107	Dec 118.8107	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.0318	117.3923	106.0318	109.5662	106.0318	109.5662	106.0318	106.0318	109.5662	106.0318	109.5662	106.0318	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.2199	212.4013	206.9042	195.2015	180.4289	166.5448	157.2693	155.0879	160.5850	172.2877	187.0603	200.9444	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	(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)	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	(71)
Water heating gains (Table 5)	161.9756	159.3679	154.2502	142.9054	135.9843	128.7373	124.2302	127.8690	132.1457	140.1866	151.0549	160.5155	(72)
Total internal gains	536.8705	547.8047	525.8294	506.3163	481.0882	463.4915	446.1745	447.6319	460.9401	477.1493	506.3246	526.1349	(73)

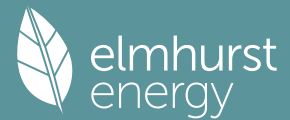
6. Solar gains

[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			
Northeast				10.5000	11.2829	0.6300	0.7000	0.7700	36.2062 (75)			
Southwest				3.1500	36.7938	0.6300	0.7000	0.7700	35.4207 (79)			
Northwest				6.3000	11.2829	0.6300	0.7000	0.7700	21.7237 (81)			
Northwest				4.8000	16.3666	0.6300	0.7000	1.0000	31.1803 (82)			
Solar gains	124.5310	242.4261	413.3660	650.9894	857.2509	907.7648	851.5534	494.1182	289.8387	154.6495	103.0355	(83)
Total gains	661.4015	790.2308	939.1954	1157.3057	1338.3391	1371.2563	1297.7279	1136.3889	955.0583	766.9881	660.9742	629.1704 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains from living area, nil,m (see Table 9a)														
tau	Jan 20.9826	Feb 21.1156	Mar 21.2476	Apr 21.8904	May 22.0150	Jun 22.6142	Jul 22.6142	Aug 22.7288	Sep 22.3796	Oct 22.0150	Nov 21.7644	Dec 21.5084		
alpha	2.3988	2.4077	2.4165	2.4594	2.4677	2.5076	2.5076	2.5153	2.4920	2.4677	2.4510	2.4339		
util living area														

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	0.9605	0.9394	0.8982	0.8028	0.6632	0.5023	0.3879	0.4479	0.6735	0.8691	0.9422	0.9645 (86)
Living	18.6007	18.8842	19.3487	19.9862	20.4563	20.7340	20.8234	20.7997	20.5620	19.9263	19.1891	18.5966
Non living	16.7841	17.1445	17.7265	18.5173	19.0481	19.3496	19.4196	19.4132	19.1974	18.4775	17.5585	16.7983
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	19.7726	18.8842	19.3487	19.9862	20.4563	20.7340	20.8234	20.7997	20.5620	19.9263	19.1891	18.9328 (87)
Th 2	19.5070	19.5148	19.5225	19.5588	19.5657	19.5977	19.5977	19.6037	19.5853	19.5657	19.5518	19.5375 (88)
util rest of house												
	0.9524	0.9271	0.8773	0.7637	0.5993	0.4124	0.2748	0.3285	0.5856	0.8330	0.9284	0.9572 (89)
MIT 2	18.4215	17.1445	17.7265	18.5173	19.0481	19.3496	19.4196	19.4132	19.1974	18.4775	17.5585	17.2919 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	18.8677	17.7190	18.2622	19.0024	19.5132	19.8068	19.8832	19.8711	19.6480	18.9560	18.0970	17.8338 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8677	17.7190	18.2622	19.0024	19.5132	19.8068	19.8832	19.8711	19.6480	18.9560	18.0970	17.8338 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9481	0.9072	0.8546	0.7460	0.5967	0.4267	0.2989	0.3528	0.5900	0.8138	0.9096	0.9458	(94)
Useful gains	627.0912	716.8981	802.6663	863.4013	798.5778	585.0494	387.9264	400.9219	563.4529	624.1674	601.2261	595.0901	(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	1927.0225	1685.0295	1536.5081	1280.9376	985.0675	639.0624	402.9715	423.8866	688.0885	1053.4982	1402.4352	1759.4022	(97)
Space heating kWh	967.1489	650.5843	545.9783	300.6262	138.7483	0.0000	0.0000	0.0000	0.0000	319.4221	576.8705	866.2482	(98a)
Space heating requirement - total per year (kWh/year)												4365.6267	
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	967.1489	650.5843	545.9783	300.6262	138.7483	0.0000	0.0000	0.0000	0.0000	319.4221	576.8705	866.2482	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4365.6267	
Space heating per m2											(98c) / (4) =	57.6701	(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 %)													261.5319 (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	967.1489	650.5843	545.9783	300.6262	138.7483	0.0000	0.0000	0.0000	0.0000	319.4221	576.8705	866.2482	(98)
Space heating efficiency (main heating system 1)	261.5319	261.5319	261.5319	261.5319	261.5319	0.0000	0.0000	0.0000	0.0000	261.5319	261.5319	261.5319	(210)
Space heating fuel (main heating system)	369.8015	248.7591	208.7616	114.9482	53.0522	0.0000	0.0000	0.0000	0.0000	122.1350	220.5737	331.2209	(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	286.4209	253.4323	269.1345	235.8867	228.2628	205.2069	201.9619	210.1042	212.5875	237.6659	253.5337	283.1536	(64)
Efficiency of water heater	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	(216)
(217)m	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	282.0799	(217)
Fuel for water heating, kWh/month	101.5389	89.8442	95.4107	83.6241	80.9213	72.7478	71.5974	74.4839	75.3643	84.2548	89.8801	100.3806	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	21.5810	17.3131	15.5885	11.4208	8.8218	7.2075	8.0475	10.4605	13.5871	17.8270	20.1356	22.1808	(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													1669.2522 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													282.0799
Water heating fuel used													1020.0481 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year													0.0000 (231)
Electricity for lighting (calculated in Appendix L)													174.1711 (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)

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Total delivered energy for all uses

2863.4714 (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	1669.2522	0.1554	259.3661 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	1020.0481	0.1409	143.7699 (264)
Space and water heating			403.1360 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	174.1711	0.1443	25.1383 (268)
Total CO ₂ , kg/year			428.2743 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.6600 (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	1669.2522	1.5752	2629.4160 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	1020.0481	1.5212	1551.6594 (278)
Space and water heating			4181.0754 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	174.1711	1.5338	267.1494 (282)
Total Primary energy kWh/year			4448.2248 (286)
Dwelling Primary energy Rate (DPER)			58.7600 (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	75.7000 (1b)	x 2.6000 (2b)	= 196.8200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 196.8200 (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)

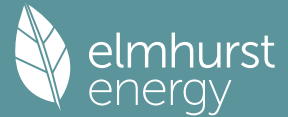
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1524 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4024	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3421 (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	0.4361	0.4276	0.4190	0.3763	0.3677	0.3250	0.3250	0.3164	0.3421	0.3677	0.3848	0.4019 (22b)
Effective ac	0.5951	0.5914	0.5878	0.5708	0.5676	0.5528	0.5528	0.5501	0.5585	0.5676	0.5740	0.5808 (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			2.2000	1.0000	2.2000		(26)
TER Opening Type (Uw = 1.20)			13.4900	1.1450	15.4466		(27)
Opening			3.2400	1.8519	6.0000		(27a)
External Wall 1	52.5000	13.5600	38.9400	0.1800	7.0092		(29a)
Wall to corridor	15.0000	2.1300	12.8700	0.1800	2.3166		(29a)
sloping roof	44.7600	3.2400	41.5200	0.1100	4.5672		(30)
Total net area of external elements Aum(A, m ²)			112.2600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.5396		(33)
Party Wall 1			37.5000	0.0000	0.0000		(32)

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Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 137.0692 (35)
 Thermal bridges (User defined value 0.050 * total exposed area) 5.6130 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 43.1526 (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	38.6523	38.4124	38.1773	37.0730	36.8664	35.9046	35.9046	35.7265	36.2751	36.8664	37.2844	37.7214	(38)
Heat transfer coeff	81.8049	81.5650	81.3299	80.2256	80.0190	79.0572	79.0572	78.8790	79.4276	80.0190	80.4370	80.8739	(39)
Average = Sum(39)m / 12 =												80.2246	
HLP	1.0806	1.0775	1.0744	1.0598	1.0571	1.0443	1.0443	1.0420	1.0492	1.0571	1.0626	1.0683	(40)
HLP (average)												1.0598	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3762 (42)
Hot water usage for mixer showers	64.0610	63.0983	61.6954	59.0113	57.0305	54.8215	53.5659	54.9582	56.4843	58.8561	61.5979	63.8155 (42a)	
Hot water usage for baths	27.6715	27.2606	26.6819	25.6148	24.8158	23.9299	23.4513	24.0260	24.6517	25.5997	26.6887	27.5780 (42b)	
Hot water usage for other uses	38.9648	37.5479	36.1310	34.7141	33.2972	31.8803	31.8803	33.2972	34.7141	36.1310	37.5479	38.9648 (42c)	
Average daily hot water use (litres/day)												120.1405 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	130.6974	127.9068	124.5083	119.3402	115.1435	110.6317	108.8975	112.2813	115.8501	120.5868	125.8345	130.3584 (44)	
Distribution loss (46)m = 0.15 x (45)m	206.9927	182.1376	191.3646	163.3708	155.0053	136.0345	131.7021	139.0277	142.8548	163.6351	179.2743	204.1097 (45)	
	31.0489	27.3206	28.7047	24.5056	23.2508	20.4052	19.7553	20.8542	21.4282	24.5453	26.8911	30.6165 (46)	
Water storage loss:													
Store volume												250.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.8903 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												1.0208 (55)	
Total storage loss	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (56)	
If cylinder contains dedicated solar storage	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (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	261.8995	231.7308	246.2714	216.5064	209.9121	189.1701	186.6089	193.9345	195.9904	218.5419	232.4099	259.0165 (62)	
WWHRS	-29.2860	-25.9008	-27.1218	-22.4579	-20.9300	-17.9099	-16.7877	-17.8520	-18.5303	-21.8452	-24.7480	-28.7437 (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	232.6134	205.8300	219.1496	194.0485	188.9821	171.2602	169.8212	176.0825	177.4601	196.6967	207.6620	230.2728 (64)	
12Total per year (kWh/year)												2369.8791 (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	112.7505	100.2353	107.5542	96.8293	95.4647	87.7400	87.7164	90.1522	90.0077	98.3341	102.1172	111.7919 (65)	

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

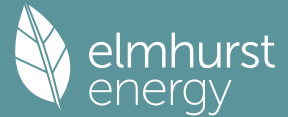
Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107	118.8107 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.0318	117.3923	106.0318	109.5662	106.0318	109.5662	106.0318	106.0318	109.5662	106.0318	109.5662	106.0318 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	210.2199	212.4013	206.9042	195.2015	180.4289	166.5448	157.2693	155.0879	160.5850	172.2877	187.0603	200.9444 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811	34.8811 (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)	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486	-95.0486 (71)
Water heating gains (Table 5)	151.5464	149.1597	144.5621	134.4851	128.3128	121.8611	117.8984	121.1723	125.0107	132.1695	141.8294	150.2579 (72)
Total internal gains	529.4413	540.5966	519.1413	500.8960	476.4167	456.6152	439.8427	440.9351	453.8051	472.1322	500.0991	518.8774 (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	
Northeast						7.1000	11.2829	0.6300	0.7000	0.7700	24.4823 (75)	
Southwest						2.1300	36.7938	0.6300	0.7000	0.7700	23.9512 (79)	
Northwest						4.2600	11.2829	0.6300	0.7000	0.7700	14.6894 (81)	
Northwest						3.2400	16.3666	0.6300	0.7000	1.0000	21.0467 (82)	
Solar gains	84.1696	163.8498	279.3733	439.9549	579.3391	613.4719	575.4859	465.4745	333.9444	195.8921	104.5257	69.6414 (83)
Total gains	613.6108	704.4464	798.5145	940.8509	1055.7557	1070.0871	1015.3286	906.4097	787.7495	668.0243	604.6248	588.5187 (84)

7. Mean internal temperature (heating season)

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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	35.2334	35.3370	35.4391	35.9270	36.0197	36.4579	36.4579	36.5403	36.2879	36.0197	35.8325	35.6389
alpha	3.3489	3.3558	3.3626	3.3951	3.4013	3.4305	3.4305	3.4360	3.4192	3.4013	3.3888	3.3759
util living area	0.9610	0.9386	0.8936	0.7844	0.6243	0.4530	0.3368	0.3898	0.6191	0.8493	0.9387	0.9655 (86)
MIT	19.2555	19.5337	19.9516	20.4739	20.8075	20.9519	20.9867	20.9783	20.8631	20.4008	19.7566	19.2176 (87)
Th 2	20.0167	20.0193	20.0218	20.0338	20.0361	20.0465	20.0465	20.0485	20.0425	20.0361	20.0315	20.0268 (88)
util rest of house	0.9543	0.9283	0.8759	0.7520	0.5756	0.3916	0.2662	0.3133	0.5527	0.8176	0.9266	0.9594 (89)
MIT 2	17.9981	18.3476	18.8657	19.4952	19.8637	20.0129	20.0401	20.0373	19.9359	19.4297	18.6406	17.9571 (90)
Living area fraction	18.4134	18.7393	19.2243	19.8184	20.1754	20.3230	20.3528	20.3481	20.2421	19.7504	19.0092	18.3734 (92)
MIT	18.4134	18.7393	19.2243	19.8184	20.1754	20.3230	20.3528	20.3481	20.2421	19.7504	19.0092	18.3734 (93)
Temperature adjustment												0.0000
adjusted MIT	18.4134	18.7393	19.2243	19.8184	20.1754	20.3230	20.3528	20.3481	20.2421	19.7504	19.0092	18.3734 (93)

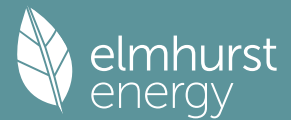
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9397	0.9114	0.8590	0.7441	0.5829	0.4098	0.2892	0.3378	0.5672	0.8069	0.9106	0.9458 (94)
Useful gains	576.6261	642.0152	685.9179	700.1034	615.4119	438.5125	293.5842	306.1715	446.8301	539.0040	550.5647	556.6289 (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	1154.5409	1128.8034	1034.8659	875.9378	678.1894	452.4461	296.6822	311.4210	487.8522	732.2080	957.9378	1146.2561 (97)
Space heating kWh	429.9686	327.1217	259.6174	126.6007	46.7065	0.0000	0.0000	0.0000	0.0000	143.7438	293.3087	438.6827 (98a)
Space heating requirement - total per year (kWh/year)												2065.7501
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	429.9686	327.1217	259.6174	126.6007	46.7065	0.0000	0.0000	0.0000	0.0000	143.7438	293.3087	438.6827 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2065.7501
Space heating per m2										(98c) / (4) =		27.2886 (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	429.9686	327.1217	259.6174	126.6007	46.7065	0.0000	0.0000	0.0000	0.0000	143.7438	293.3087	438.6827 (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)	465.8382	354.4114	281.2756	137.1622	50.6030	0.0000	0.0000	0.0000	0.0000	155.7354	317.7776	475.2792 (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	232.6134	205.8300	219.1496	194.0485	188.9821	171.2602	169.8212	176.0825	177.4601	196.6967	207.6620	230.2728 (64)	
Efficiency of water heater (217)m	85.4179	85.0936	84.4408	83.1264	81.4356	79.8000	79.8000	79.8000	79.8000	83.3676	84.8340	79.8000 (216)	
Fuel for water heating, kWh/month	272.3239	241.8867	259.5305	233.4378	232.0632	214.6118	212.8085	220.6547	222.3810	235.9391	244.7863	269.3836 (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	22.0313	17.6743	15.9138	11.6591	9.0058	7.3578	8.2154	10.6787	13.8706	18.1990	20.5557	22.6436 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-25.6531	-37.2821	-55.2273	-64.0585	-70.7728	-66.6746	-65.8525	-61.3266	-53.6309	-43.4989	-28.5947	-22.0498 (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)	-11.2935	-24.0612	-48.3906	-73.5144	-98.0216	-98.7887	-97.6314	-82.2960	-59.8329	-34.6911	-15.1689	-8.9085 (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													2238.0824 (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													2859.8072 (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)													177.8053 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-1247.2207 (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)

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Energy used	0.0000 (237)
Total delivered energy for all uses	4114.4742 (238)

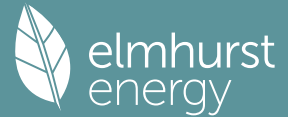
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2238.0824	0.2100	469.9973 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2859.8072	0.2100	600.5595 (264)
Space and water heating			1070.5568 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	177.8053	0.1443	25.6628 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-594.6219	0.1339	-79.6486
PV Unit electricity exported	-652.5989	0.1256	-81.9407
Total			-161.5894 (269)
Total CO2, kg/year			946.5595 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.5000 (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	2238.0824	1.1300	2529.0331 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2859.8072	1.1300	3231.5821 (278)
Space and water heating			5760.6152 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	177.8053	1.5338	272.7237 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-594.6219	1.4950	-888.9684
PV Unit electricity exported	-652.5989	0.4609	-300.7685
Total			-1189.7368 (283)
Total Primary energy kWh/year			4973.7029 (286)
Target Primary Energy Rate (TPER)			65.7000 (287)

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Property Reference	Flat 4				Issued on Date	11/04/2024		
Assessment Reference	Flat 4 - 1 bed MF			Prop Type Ref	HTA			
Property	Flat 4, 3 New Road, London, N8 8 TA							
SAP Rating	79 C		DER	5.81		TER	12.92	
Environmental	96 A		% DER < TER				55.03	
CO ₂ Emissions (t/year)	0.32		DFEE	64.45		TFEE	32.89	
Compliance Check	See BREL		% DFEE < TFEE				-95.95	
% DPER < TPER	11.22		DPER	60.42		TPER	68.06	
Assessor Details	Ms. Ruth Pike					Assessor ID	AU93-0001	
Client								

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	62.8000 (1b)	2.6000 (2b)	163.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	163.2800 (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	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.6375 (21)

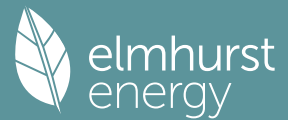
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.8128	0.7969	0.7809	0.7013	0.6853	0.6056	0.6056	0.5897	0.6375	0.6853	0.7172	0.7491 (22b)
Effective ac	0.8303	0.8175	0.8049	0.7459	0.7348	0.6834	0.6834	0.6739	0.7032	0.7348	0.7572	0.7805 (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
Solid Doors			2.2000	1.3000	2.8600		(26)
Windows (Uw = 1.60)			10.5000	1.5038	15.7895		(27)
Opening			4.8000	1.5038	7.2180		(27a)
External Wall 1	55.0000	12.7000	42.3000	0.1700	7.1910	110.0000	4653.0000 (29a)
Wall to corridor	17.5000		17.5000	0.1800	3.1500	110.0000	1925.0000 (29a)
sloping roof	38.8800	4.8000	34.0800	0.2000	6.8160	9.0000	306.7200 (30)
Total net area of external elements Aum(A, m ²)			111.3800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.0245		(33)
Party Wall 1			37.5000	0.0000	0.0000	20.0000	750.0000 (32)
Party Floor			62.8000			30.0000	1884.0000 (32a)
Party Ceiling 1			23.9200			20.0000	478.4000 (32b)
Internal Wall Stud			75.0000			9.0000	675.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		10672.1200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							169.9382 (35)
Thermal bridges (Default value 0.200 * total exposed area)							22.2760 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		65.3005 (37)

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

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(38)m	Jan 44.7403	Feb 44.0491	Mar 43.3717	Apr 40.1896	May 39.5942	Jun 36.8227	Jul 36.8227	Aug 36.3095	Sep 37.8903	Oct 39.5942	Nov 40.7986	Dec 42.0578	(38)
Heat transfer coeff	110.0408	109.3496	108.6722	105.4901	104.8947	102.1233	102.1233	101.6100	103.1908	104.8947	106.0991	107.3583	(39)
Average = Sum(39)m / 12 =												105.4872	
HLP	Jan 1.7522	Feb 1.7412	Mar 1.7304	Apr 1.6798	May 1.6703	Jun 1.6262	Jul 1.6262	Aug 1.6180	Sep 1.6432	Oct 1.6703	Nov 1.6895	Dec 1.7095	(40)
HLP (average)												1.6797	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0596	(42)
Hot water usage for mixer showers														
73.4403	72.3366	70.7283	67.6512	65.3804	62.8480	61.4086	63.0047	64.7543	67.4733	70.6165	73.1589	73.1589	(42a)	
Hot water usage for baths														
25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	25.3028	(42b)	
Hot water usage for other uses														
35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	35.7223	(42c)	
Average daily hot water use (litres/day)												123.7235	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
134.5512	131.7714	128.3332	122.9781	118.6752	114.0309	112.1524	115.5748	119.1975	124.0853	129.5267	134.1839	134.1839	(44)	
Energy conte	213.0961	187.6408	197.2434	168.3509	159.7596	140.2143	135.6387	143.1057	146.9824	168.3826	184.5345	210.0996	(45)	
Energy content (annual)										Total = Sum(45)m =		2055.0486		
Distribution loss (46)m = 0.15 x (45)m														
31.9644	28.1461	29.5865	25.2526	23.9639	21.0322	20.3458	21.4659	22.0474	25.2574	27.6802	31.5149	31.5149	(46)	
Water storage loss:														
Store volume												250.0000	(47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.8400	(48)	
Temperature factor from Table 2b												0.5400	(49)	
Enter (49) or (54) in (55)												0.9936	(55)	
Total storage loss														
30.8016	27.8208	30.8016	29.8080	30.8016	29.8080	30.8016	30.8016	29.8080	30.8016	29.8080	30.8016	30.8016	(56)	
If cylinder contains dedicated solar storage														
30.8016	27.8208	30.8016	29.8080	30.8016	29.8080	30.8016	30.8016	29.8080	30.8016	29.8080	30.8016	30.8016	(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														
267.1601	236.4728	251.3074	220.6709	213.8236	192.5343	189.7027	197.1697	199.3024	222.4466	236.8545	264.1636	264.1636	(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														
267.1601	236.4728	251.3074	220.6709	213.8236	192.5343	189.7027	197.1697	199.3024	222.4466	236.8545	264.1636	264.1636	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2691.6086	(64)	
Electric shower(s)												2692	(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														
114.1057	101.4562	108.8346	97.8327	96.3713	88.4773	88.3511	90.8339	90.7276	99.2384	103.2137	113.1093	113.1093	(65)	

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 102.9797	Feb 102.9797	Mar 102.9797	Apr 102.9797	May 102.9797	Jun 102.9797	Jul 102.9797	Aug 102.9797	Sep 102.9797	Oct 102.9797	Nov 102.9797	Dec 102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
90.7638	100.4885	90.7638	93.7892	90.7638	93.7892	90.7638	90.7638	93.7892	90.7638	93.7892	90.7638	90.7638	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)													
-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)													
153.3678	150.9764	146.2831	135.8787	129.5313	122.8851	118.7514	122.0885	126.0106	133.3850	143.3524	152.0287	152.0287	(72)
Total internal gains													
477.9749	487.1755	468.0519	450.6554	428.6371	413.1314	398.0325	399.5022	411.1554	425.5218	451.1601	468.6959	468.6959	(73)

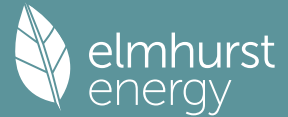
6. Solar gains

[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	
Northeast				5.2500	11.2829		0.6300	0.7000		0.7700	18.1031 (75)	
Southwest				5.2500	36.7938		0.6300	0.7000		0.7700	59.0345 (79)	
Southeast				4.8000	39.9751		0.6300	0.7000		1.0000	76.1574 (82)	
Solar gains	153.2951	277.4011	417.5644	572.5400	685.4443	698.2545	665.9199	580.0660	471.5538	317.3423	186.7044	129.1190 (83)
Total gains	631.2699	764.5765	885.6163	1023.1953	1114.0813	1111.3860	1063.9524	979.5682	882.7092	742.8642	637.8645	597.8149 (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	26.9398	27.1101	27.2791	28.1020	28.2615	29.0284	29.0284	29.1751	28.7281	28.2615	27.9406	27.6129
alpha	2.7960	2.8073	2.8186	2.8735	2.8841	2.9352	2.9352	2.9450	2.9152	2.8841	2.8627	2.8409
util living area												
	0.9663	0.9432	0.9029	0.8174	0.6914	0.5299	0.4022	0.4473	0.6601	0.8641	0.9464	0.9706 (86)

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Living	19.0554	19.3336	19.7258	20.2251	20.5814	20.7961	20.8626	20.8508	20.6968	20.2106	19.5732	19.0467
Non living	17.3142	17.6665	18.1552	18.7747	19.1708	19.4020	19.4489	19.4495	19.3146	18.7833	17.9985	17.3239
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	20.0052	19.3336	19.7258	20.2251	20.5814	20.7961	20.8626	20.8508	20.6968	20.2106	19.5732	19.3199 (87)
Th 2	19.5036	19.5114	19.5191	19.5554	19.5622	19.5942	19.5942	19.6002	19.5818	19.5622	19.5484	19.5340 (88)
util rest of house	0.9582	0.9299	0.8801	0.7756	0.6230	0.4324	0.2821	0.3232	0.5646	0.8225	0.9315	0.9634 (89)
MIT 2	18.6308	17.6665	18.1552	18.7747	19.1708	19.4020	19.4489	19.4495	19.3146	18.7833	17.9985	17.7222 (90)
Living area fraction									FLA = Living area /	(4) =		0.4076 (91)
MIT	19.1911	18.3461	18.7954	19.3659	19.7458	19.9703	20.0252	20.0208	19.8780	19.3652	18.6404	18.3735 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1911	18.3461	18.7954	19.3659	19.7458	19.9703	20.0252	20.0208	19.8780	19.3652	18.6404	18.3735 (93)

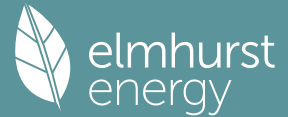
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9561	0.9165	0.8664	0.7693	0.6326	0.4599	0.3202	0.3622	0.5865	0.8156	0.9194	0.9561	(94)
Useful gains	603.5738	700.7510	767.3331	787.1818	704.7521	511.1774	340.7091	354.7853	517.6827	605.9149	586.4781	571.5514	(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	1638.6250	1470.3264	1336.1700	1104.0534	843.9655	548.4345	349.7897	367.9050	596.2399	919.4199	1224.4287	1521.6417	(97)
Space heating kWh	770.0781	517.1546	423.2147	228.1475	103.5747	0.0000	0.0000	0.0000	0.0000	233.2477	459.3244	706.8671	(98a)
Space heating requirement - total per year (kWh/year)												3441.6089	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	770.0781	517.1546	423.2147	228.1475	103.5747	0.0000	0.0000	0.0000	0.0000	233.2477	459.3244	706.8671	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3441.6089	
Space heating per m2										(98c) / (4) =		54.8027	(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 %)													257.0525 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	770.0781	517.1546	423.2147	228.1475	103.5747	0.0000	0.0000	0.0000	0.0000	233.2477	459.3244	706.8671	(98)
Space heating efficiency (main heating system 1)	257.0525	257.0525	257.0525	257.0525	257.0525	0.0000	0.0000	0.0000	0.0000	257.0525	257.0525	257.0525	(210)
Space heating fuel (main heating system)	299.5801	201.1864	164.6414	88.7552	40.2932	0.0000	0.0000	0.0000	0.0000	90.7393	178.6890	274.9894	(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	267.1601	236.4728	251.3074	220.6709	213.8236	192.5343	189.7027	197.1697	199.3024	222.4466	236.8545	264.1636	(64)
Efficiency of water heater	281.2402	281.2402	281.2402	281.2402	281.2402	281.2402	281.2402	281.2402	281.2402	281.2402	281.2402	281.2402	(216)
Fuel for water heating, kWh/month	94.9936	84.0821	89.3569	78.4635	76.0288	68.4590	67.4522	70.1072	70.8655	79.0949	84.2179	93.9281	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	18.4735	14.8201	13.3438	9.7763	7.5515	6.1696	6.8887	8.9542	11.6306	15.2600	17.2361	18.9869	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1338.8741	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												281.2402	
Water heating fuel used												957.0498	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												149.0914	(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												2445.0152	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1338.8741	0.1556	208.3681 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	957.0498	0.1409	134.8487 (264)
Space and water heating			343.2168 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	149.0914	0.1443	21.5185 (268)
Total CO2, kg/year			364.7353 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.8100 (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	1338.8741	1.5761	2110.2390 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	957.0498	1.5210	1455.6717 (278)
Space and water heating			3565.9107 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	149.0914	1.5338	228.6813 (282)
Total Primary energy kWh/year			3794.5920 (286)
Dwelling Primary energy Rate (DPER)			60.4200 (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	62.8000 (1b)	x 2.6000 (2b)	= 163.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 163.2800 (5)

2. Ventilation rate

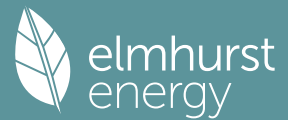
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1225 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3725 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3166 (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	0.4037	0.3958	0.3879	0.3483	0.3404	0.3008	0.3008	0.2929	0.3166	0.3404	0.3562	0.3720 (22b)
Effective ac	0.5815	0.5783	0.5752	0.5606	0.5579	0.5452	0.5452	0.5429	0.5501	0.5579	0.5634	0.5692 (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			2.2000	1.0000	2.2000		(26)
TER Opening Type (Uw = 1.20)			9.2600	1.1450	10.6031		(27)
Opening			4.2400	1.4151	6.0000		(27a)
External Wall 1	55.0000	11.4600	43.5400	0.1800	7.8372		(29a)
Wall to corridor	17.5000		17.5000	0.1800	3.1500		(29a)
sloping roof	38.8800	4.2400	34.6400	0.1100	3.8104		(30)
Total net area of external elements Aum(A, m2)			111.3800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.6007		(33)
Party Wall 1			37.5000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							173.7471 (35)

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Thermal bridges (User defined value 0.050 * total exposed area)
 Point Thermal bridges (36a) = 5.5690 (36)
 Total fabric heat loss (33) + (36) + (36a) = 39.1697 (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	31.3316	31.1611	30.9940	30.2091	30.0622	29.3786	29.3786	29.2520	29.6419	30.0622	30.3593	30.6699	(38)
Heat transfer coeff	70.5012	70.3307	70.1636	69.3787	69.2319	68.5483	68.5483	68.4217	68.8116	69.2319	69.5290	69.8396	(39)
Average = Sum(39)m / 12 =												69.3780	
HLP	1.1226	1.1199	1.1173	1.1048	1.1024	1.0915	1.0915	1.0895	1.0957	1.1024	1.1071	1.1121	(40)
HLP (average)												1.1047	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

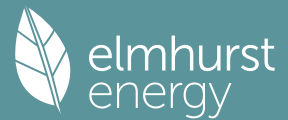
4. Water heating energy requirements (kWh/year)													
Assumed occupancy													2.0596 (42)
Hot water usage for mixer showers													
58.7522	57.8693	56.5827	54.1210	52.3043	50.2784	49.1269	50.4037	51.8034	53.9786	56.4932	58.5271	58.5271	(42a)
Hot water usage for baths													
25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	25.3028	(42b)
Hot water usage for other uses													
35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	35.7223	(42c)
Average daily hot water use (litres/day)												110.1816	(43)
Daily hot water use													
119.8631	117.3041	114.1876	109.4479	105.5991	101.4613	99.8707	102.9738	106.2466	110.5906	115.4034	119.5522	119.5522	(44)
Energy conte	189.8339	167.0395	175.5020	149.8286	142.1567	124.7585	120.7850	127.5031	131.0127	150.0704	164.4133	187.1898	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
28.4751	25.0559	26.3253	22.4743	21.3235	18.7138	18.1177	19.1255	19.6519	22.5106	24.6620	28.0785	28.0785	(46)
Water storage loss:													
Store volume												250.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8903	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												1.0208	(55)
Total storage loss													
31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	(56)
If cylinder contains dedicated solar storage													
31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	(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													
244.7406	216.6327	230.4088	202.9642	197.0635	177.8942	175.6918	182.4099	184.1483	204.9772	217.5489	242.0966	242.0966	(62)
WWHRS	-26.8591	-23.7544	-24.8742	-20.5968	-19.1955	-16.4257	-15.3965	-16.3726	-16.9947	-20.0349	-22.6971	-26.3617	(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													
217.8816	192.8784	205.5346	182.3674	177.8680	161.4684	160.2953	166.0373	167.1536	184.9424	194.8518	215.7349	215.7349	(64)
Total per year (kWh/year)												2227.0137	(64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
107.0452	95.2152	102.2799	92.3265	91.1925	83.9907	84.0864	86.3202	86.0702	93.8239	97.1759	106.1660	106.1660	(65)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
(66)m	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
90.7638	100.4885	90.7638	93.7892	90.7638	93.7892	90.7638	90.7638	93.7892	90.7638	93.7892	90.7638	90.7638	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)													
-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)													
143.8779	141.6893	137.4729	128.2313	122.5706	116.6537	113.0194	116.0218	119.5420	126.1073	134.9665	142.6963	142.6963	(72)
Total internal gains													
471.4850	480.8883	462.2417	446.0079	424.6764	406.9001	392.3005	393.4355	404.6867	421.2442	445.7743	462.3635	462.3635	(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				
Northeast	4.6300		11.2829		0.6300		0.7000		0.7700		15.9652	(75)	
Southwest	4.6300		36.7938		0.6300		0.7000		0.7700		52.0628	(79)	
Southeast	4.2400		39.9751		0.6300		0.7000		1.0000		67.2724	(82)	
Solar gains	135.3005	244.8413	368.5572	505.3444	604.9936	616.2975	587.7594	511.9859	416.2108	280.0960	164.7887	113.9618	(83)
Total gains	606.7854	725.7297	830.7989	951.3523	1029.6700	1023.1976	980.0598	905.4214	820.8975	701.3402	610.5629	576.3253	(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)													

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	42.9911	43.0953	43.1979	43.6866	43.7793	44.2159	44.2159	44.2977	44.0467	43.7793	43.5922	43.3984
alpha	3.8661	3.8730	3.8799	3.9124	3.9186	3.9477	3.9477	3.9532	3.9364	3.9186	3.9061	3.8932
util living area	0.9611	0.9276	0.8669	0.7439	0.5840	0.4200	0.3057	0.3441	0.5481	0.8070	0.9316	0.9670 (86)
MIT	19.6546	19.9597	20.3264	20.7003	20.9032	20.9795	20.9954	20.9928	20.9433	20.6496	20.0962	19.6017 (87)
Th 2	19.9824	19.9846	19.9868	19.9970	19.9989	20.0078	20.0078	20.0094	20.0043	19.9989	19.9950	19.9910 (88)
util rest of house	0.9531	0.9139	0.8433	0.7049	0.5314	0.3581	0.2377	0.2716	0.4787	0.7658	0.9161	0.9602 (89)
MIT 2	18.4504	18.8284	19.2722	19.7073	19.9190	19.9951	20.0059	20.0063	19.9655	19.6672	19.0116	18.3905 (90)
Living area fraction	18.9413	19.2896	19.7019	20.1121	20.3202	20.3964	20.4093	20.4084	20.3641	20.0676	19.4537	18.8843 (92)
MIT	18.9413	19.2896	19.7019	20.1121	20.3202	20.3964	20.4093	20.4084	20.3641	20.0676	19.4537	18.8843 (93)
Temperature adjustment												0.0000
adjusted MIT	18.9413	19.2896	19.7019	20.1121	20.3202	20.3964	20.4093	20.4084	20.3641	20.0676	19.4537	18.8843 (93)

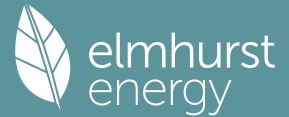
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9428	0.9027	0.8359	0.7097	0.5487	0.3826	0.2654	0.3010	0.5045	0.7689	0.9062	0.9506 (94)
Useful gains	572.1060	655.1320	694.4829	675.1352	565.0204	391.4708	260.0854	272.5567	414.1264	539.2587	553.2862	547.8517 (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	1032.2295	1012.0297	926.2931	777.8813	596.7909	397.3319	261.1212	274.2635	431.0419	655.4620	858.9417	1025.5415 (97)
Space heating kWh	342.3319	239.8353	172.4668	73.9772	23.6372	0.0000	0.0000	0.0000	0.0000	86.4553	220.0719	355.4012 (98a)
Space heating requirement - total per year (kWh/year)												1514.1768
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	342.3319	239.8353	172.4668	73.9772	23.6372	0.0000	0.0000	0.0000	0.0000	86.4553	220.0719	355.4012 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1514.1768
Space heating per m2										(98c) / (4) =		24.1111 (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	342.3319	239.8353	172.4668	73.9772	23.6372	0.0000	0.0000	0.0000	0.0000	86.4553	220.0719	355.4012 (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)	370.8904	259.8432	186.8546	80.1487	25.6091	0.0000	0.0000	0.0000	0.0000	93.6677	238.4311	385.0501 (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	217.8816	192.8784	205.5346	182.3674	177.8680	161.4684	160.2953	166.0373	167.1536	184.9424	194.8518	215.7349 (64)
Efficiency of water heater (217)m	85.0686	84.5496	83.6691	82.2044	80.7601	79.8000	79.8000	79.8000	79.8000	82.4624	84.3334	79.8000 (216)
Fuel for water heating, kWh/month	256.1247	228.1246	245.6518	221.8464	220.2423	202.3414	200.8713	208.0668	209.4657	224.2748	231.0493	253.2944 (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	18.8589	15.1293	13.6223	9.9803	7.7090	6.2984	7.0324	9.1410	11.8733	15.5784	17.5958	19.3831 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.4508	-31.2651	-46.4524	-54.0566	-59.8900	-56.5005	-55.8219	-51.9134	-45.2778	-36.5728	-23.9482	-18.4288 (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)	-9.1998	-19.6248	-39.5081	-60.0726	-80.1403	-80.7663	-79.8028	-67.2345	-48.8507	-28.2928	-12.3576	-7.2539 (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												1640.4950 (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												2701.3536 (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)												152.2023 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1034.6824 (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												3545.3684 (238)

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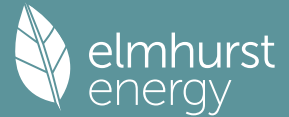
----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1640.4950	0.2100	344.5039 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2701.3536	0.2100	567.2842 (264)
Space and water heating			911.7882 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	152.2023	0.1443	21.9675 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-501.5783	0.1339	-67.1501
PV Unit electricity exported	-533.1041	0.1255	-66.9263
Total			-134.0765 (269)
Total CO2, kg/year			811.6085 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.9200 (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	1640.4950	1.1300	1853.7593 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2701.3536	1.1300	3052.5295 (278)
Space and water heating			4906.2888 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	152.2023	1.5338	233.4530 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-501.5783	1.4947	-749.7338
PV Unit electricity exported	-533.1041	0.4608	-245.6568
Total			-995.3906 (283)
Total Primary energy kWh/year			4274.4520 (286)
Target Primary Energy Rate (TPER)			68.0600 (287)

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Property Reference	Flat 5			Issued on Date	11/04/2024
Assessment Reference	Flat 5 - 1 bed TF	Prop Type Ref	HTA		
Property	Flat 5, 3 New Road, London, N8 8TA				
SAP Rating	74 C	DER	7.03	TER	15.12
Environmental	95 A	% DER < TER			53.51
CO ₂ Emissions (t/year)	0.38	DFEE	84.98	TFEE	42.73
Compliance Check	See BREL	% DFEE < TFEE			-98.88
% DPER < TPER	8.73	DPER	72.92	TPER	79.89
Assessor Details	Ms. Ruth Pike			Assessor ID	AU93-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	62.6000 (1b)	2.6000 (2b)	162.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.6000		162.7600 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	162.7600 (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	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7500 (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) = 0.7500 (21)

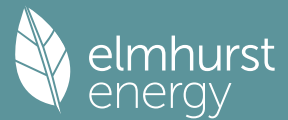
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9562	0.9375	0.9188	0.8250	0.8062	0.7125	0.7125	0.6938	0.7500	0.8062	0.8438	0.8813 (22b)
Effective ac	0.9572	0.9395	0.9221	0.8403	0.8250	0.7538	0.7538	0.7406	0.7812	0.8250	0.8560	0.8883 (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
Solid Doors			2.2000	1.3000	2.8600		(26)
Windows (U _w = 1.60)			10.5000	1.5038	15.7895		(27)
Opening			2.4000	1.5038	3.6090		(27a)
Opening			2.4000	1.5038	3.6090		(27a)
External Wall 1	67.5000	12.7000	54.8000	0.1700	9.3160	110.0000	6028.0000 (29a)
Wall to corridor	15.0000		15.0000	0.1800	2.7000	110.0000	1650.0000 (29a)
sloping roof	62.6000	4.8000	57.8000	0.2000	11.5600	9.0000	520.2000 (30)
Total net area of external elements A _{um} (A, m ²)			145.1000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	49.4435	(33)
Party Floor			62.6000			30.0000	1878.0000 (32d)
Party Ceiling 1			1.0000			20.0000	20.0000 (32b)
Internal Wall Stud			55.0000			9.0000	495.0000 (32c)
Heat capacity C _m = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		10591.2000 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							169.1885 (35)
Thermal bridges (Default value 0.200 * total exposed area)							29.0200 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =		78.4635 (37)

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

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(38)m	Jan 51.4124	Feb 50.4588	Mar 49.5241	Apr 45.1339	May 44.3125	Jun 40.4887	Jul 40.4887	Aug 39.7806	Sep 41.9616	Oct 44.3125	Nov 45.9741	Dec 47.7113	(38)
Heat transfer coeff	129.8759	128.9223	127.9876	123.5974	122.7760	118.9522	118.9522	118.2441	120.4251	122.7760	124.4377	126.1749	(39)
Average = Sum(39)m / 12 =												123.5934	
HLP	Jan 2.0747	Feb 2.0595	Mar 2.0445	Apr 1.9744	May 1.9613	Jun 1.9002	Jul 1.9002	Aug 1.8889	Sep 1.9237	Oct 1.9613	Nov 1.9878	Dec 2.0156	(40)
HLP (average)												1.9743	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0541	(42)
Hot water usage for mixer showers														
73.3254	72.2234	70.6177	67.5454	65.2781	62.7497	61.3125	62.9061	64.6530	67.3677	70.5060	73.0444	(42a)		
Hot water usage for baths														
25.3491	24.9726	24.4425	23.4650	22.7330	21.9214	21.4830	22.0095	22.5827	23.4511	24.4487	25.2634	(42b)		
Hot water usage for other uses														
35.6662	34.3692	33.0723	31.7753	30.4783	29.1814	29.1814	30.4783	31.7753	33.0723	34.3692	35.6662	(42c)		
Average daily hot water use (litres/day)												123.5299	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
134.3406	131.5652	128.1324	122.7856	118.4895	113.8525	111.9769	115.3939	119.0109	123.8911	129.3240	133.9739	(44)		
Energy content (annual)	212.7626	187.3471	196.9347	168.0874	159.5096	139.9949	135.4264	142.8818	146.7524	168.1190	184.2457	209.7708	(45)	
Energy content (annual)										Total = Sum(45)m =		2051.8324		
Distribution loss (46)m = 0.15 x (45)m														
31.9144	28.1021	29.5402	25.2131	23.9264	20.9992	20.3140	21.4323	22.0129	25.2179	27.6369	31.4656	(46)		
Water storage loss:														
Store volume												250.0000	(47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.8400	(48)	
Temperature factor from Table 2b												0.5400	(49)	
Enter (49) or (54) in (55)												0.9936	(55)	
Total storage loss														
30.8016	27.8208	30.8016	29.8080	30.8016	29.8080	30.8016	30.8016	29.8080	30.8016	29.8080	30.8016	(56)		
If cylinder contains dedicated solar storage														
30.8016	27.8208	30.8016	29.8080	30.8016	29.8080	30.8016	30.8016	29.8080	30.8016	29.8080	30.8016	(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														
266.8266	236.1791	250.9987	220.4074	213.5736	192.3149	189.4904	196.9458	199.0724	222.1830	236.5657	263.8348	(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	266.8266	236.1791	250.9987	220.4074	213.5736	192.3149	189.4904	196.9458	199.0724	222.1830	236.5657	263.8348	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2688.3924	(64)	
Electric shower(s)												2688	(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														
113.9948	101.3585	108.7320	97.7451	96.2881	88.4043	88.2805	90.7594	90.6512	99.1508	103.1177	113.0000	(65)		

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

Metabolic gains (Table 5), Watts														
(66)m	Jan 102.7056	Feb 102.7056	Mar 102.7056	Apr 102.7056	May 102.7056	Jun 102.7056	Jul 102.7056	Aug 102.7056	Sep 102.7056	Oct 102.7056	Nov 102.7056	Dec 102.7056	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
90.5136	100.2115	90.5136	93.5307	90.5136	93.5307	90.5136	90.5136	93.5307	90.5136	93.5307	90.5136	90.5136	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
179.4533	181.3155	176.6229	166.6329	154.0224	142.1702	134.2523	132.3901	137.0827	147.0727	159.6832	171.5354	(68)		
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	33.2706	(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)														
-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	-82.1645	(71)	
Water heating gains (Table 5)														
153.2188	150.8311	146.1451	135.7570	129.4196	122.7838	118.6566	121.9884	125.9044	133.2672	143.2190	151.8817	(72)		
Total internal gains														
476.9974	486.1698	467.0933	449.7324	427.7672	412.2964	397.2341	398.7038	410.3295	424.6652	450.2447	467.7424	(73)		

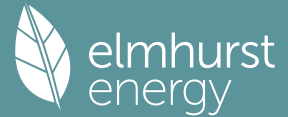
6. Solar gains

[Jan]												Gains	
				Area	Solar flux		g		FF		Access		
				m2	Table 6a		Specific data		Specific data		factor		
					W/m2		or Table 6b		or Table 6c		Table 6d	W	
Northeast				10.5000		11.2829		0.6300		0.7000		0.7700	36.2062 (75)
Southeast				2.4000		39.9751		0.6300		0.7000		1.0000	38.0787 (82)
Northwest				2.4000		16.3666		0.6300		0.7000		1.0000	15.5902 (82)
Solar gains	89.8751	175.7825	298.7562	464.4794	603.9323	635.7302	597.9087	488.7658	355.5637	210.1771	111.8313	74.1819	(83)
Total gains	566.8725	661.9523	765.8496	914.2118	1031.6995	1048.0266	995.1428	887.4696	765.8933	634.8423	562.0760	541.9242	(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			
22.6524	22.8199	22.9866	23.8031	23.9623	24.7326	24.7326	24.8807	24.4301	23.9623	23.6424	23.3168			
2.5102	2.5213	2.5324	2.5869	2.5975	2.6488	2.6488	2.6587	2.6287	2.5975	2.5762	2.5545			
util living area														
0.9743	0.9611	0.9347	0.8687	0.7576	0.6026	0.4757	0.5354	0.7532	0.9109	0.9620	0.9770	(86)		

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Living	18.6038	18.8475	19.2657	19.8749	20.3637	20.6953	20.8115	20.7844	20.5151	19.8766	19.1790	18.6162
Non living	16.6046	16.9178	17.4477	18.2201	18.7819	19.1431	19.2291	19.2242	18.9837	18.2505	17.3718	16.6447
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	19.7742	18.8475	19.2657	19.8749	20.3637	20.6953	20.8115	20.7844	20.5151	19.8766	19.1790	18.9497 (87)
Th 2	19.2840	19.2940	19.3038	19.3505	19.3593	19.4007	19.4007	19.4084	19.3847	19.3593	19.3415	19.3230 (88)
util rest of house	0.9675	0.9509	0.9167	0.8318	0.6878	0.4892	0.3223	0.3789	0.6545	0.8774	0.9502	0.9709 (89)
MIT 2	18.2158	16.9178	17.4477	18.2201	18.7819	19.1431	19.2291	19.2242	18.9837	18.2505	17.3718	17.1273 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	19.0174	17.9104	18.3828	19.0713	19.5955	19.9415	20.0430	20.0267	19.7714	19.0870	18.3014	18.0647 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0174	17.9104	18.3828	19.0713	19.5955	19.9415	20.0430	20.0267	19.7714	19.0870	18.3014	18.0647 (93)

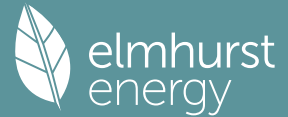
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9662	0.9397	0.9041	0.8243	0.6992	0.5307	0.3876	0.4444	0.6818	0.8703	0.9402	0.9649 (94)
Useful gains	547.7391	622.0036	692.4356	753.5682	721.3437	556.1696	385.6760	394.3809	522.1478	552.5121	528.4487	522.8853 (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	1911.4389	1677.3296	1520.8574	1257.1436	969.3769	635.3873	409.5577	428.8384	682.9792	1041.9940	1393.8737	1749.3753 (97)
Space heating kWh	1014.5926	709.1791	616.3458	362.5743	184.5367	0.0000	0.0000	0.0000	0.0000	364.1745	623.1060	912.5085 (98a)
Space heating requirement - total per year (kWh/year)												4787.0176
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	1014.5926	709.1791	616.3458	362.5743	184.5367	0.0000	0.0000	0.0000	0.0000	364.1745	623.1060	912.5085 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4787.0176
Space heating per m2										(98c) / (4) =		76.4699 (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 %)												260.9885 (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	1014.5926	709.1791	616.3458	362.5743	184.5367	0.0000	0.0000	0.0000	0.0000	364.1745	623.1060	912.5085 (98)
Space heating efficiency (main heating system 1)	260.9885	260.9885	260.9885	260.9885	260.9885	0.0000	0.0000	0.0000	0.0000	260.9885	260.9885	260.9885 (210)
Space heating fuel (main heating system)	388.7499	271.7281	236.1582	138.9235	70.7068	0.0000	0.0000	0.0000	0.0000	139.5366	238.7484	349.6355 (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	266.8266	236.1791	250.9987	220.4074	213.5736	192.3149	189.4904	196.9458	199.0724	222.1830	236.5657	263.8348 (64)
Efficiency of water heater	281.9722	281.9722	281.9722	281.9722	281.9722	281.9722	281.9722	281.9722	281.9722	281.9722	281.9722	281.9722 (216)
Fuel for water heating, kWh/month	94.6287	83.7597	89.0154	78.1664	75.7428	68.2035	67.2018	69.8458	70.6000	78.7961	83.8968	93.5677 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	18.4225	14.7792	13.3071	9.7493	7.5307	6.1526	6.8697	8.9295	11.5986	15.2179	17.1886	18.9346 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1834.1869 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												281.9722
Water heating fuel used												953.4246 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												148.6804 (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												2936.2919 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1834.1869	0.1549	284.1929 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	953.4246	0.1409	134.3372 (264)
Space and water heating			418.5300 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	148.6804	0.1443	21.4592 (268)
Total CO2, kg/year			439.9892 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.0300 (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	1834.1869	1.5736	2886.2785 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	953.4246	1.5210	1450.1550 (278)
Space and water heating			4336.4335 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	148.6804	1.5338	228.0510 (282)
Total Primary energy kWh/year			4564.4844 (286)
Dwelling Primary energy Rate (DPER)			72.9200 (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	62.6000 (1b)	x 2.6000 (2b)	= 162.7600 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 162.7600 (5)

2. Ventilation rate

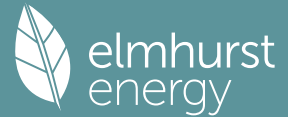
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1229 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3729 (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) = 0.3729 (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	0.4754	0.4661	0.4568	0.4102	0.4008	0.3542	0.3542	0.3449	0.3729	0.4008	0.4195	0.4381 (22b)
Effective ac	0.6130	0.6086	0.6043	0.5841	0.5803	0.5627	0.5627	0.5595	0.5695	0.5803	0.5880	0.5960 (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			2.2000	1.0000	2.2000		(26)
TER Opening Type (Uw = 1.20)			9.2300	1.1450	10.5687		(27)
Opening			2.1100	1.4151	2.9858		(27a)
Opening			2.1100	1.4151	2.9858		(27a)
External Wall 1	67.5000	11.4300	56.0700	0.1800	10.0926		(29a)
Wall to corridor	15.0000		15.0000	0.1800	2.7000		(29a)
sloping roof	62.6000	4.2200	58.3800	0.1100	6.4218		(30)
Total net area of external elements Aum(A, m2)			145.1000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.9548		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							169.3482 (35)

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Thermal bridges (User defined value 0.050 * total exposed area)

Point Thermal bridges

Total fabric heat loss

(33) + (36) + (36a) = 45.2098 (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	32.9254	32.6897	32.4587	31.3735	31.1705	30.2253	30.2253	30.0503	30.5894	31.1705	31.5812	32.0106	(38)
Heat transfer coeff	78.1352	77.8995	77.6685	76.5833	76.3803	75.4351	75.4351	75.2601	75.7992	76.3803	76.7910	77.2204	(39)
Average = Sum(39)m / 12 =												76.5823	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2482	1.2444	1.2407	1.2234	1.2201	1.2050	1.2050	1.2022	1.2108	1.2201	1.2267	1.2336	(40)
HLP (average)												1.2234	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy

Hot water usage for mixer showers 2.0541 (42)

Hot water usage for baths 58.4355 (42a)

Hot water usage for other uses 25.2634 (42b)

Average daily hot water use (litres/day) 35.6662 (42c)

110.0092 (43)

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

Daily hot water use 119.6755 117.1205 114.0088 109.2766 105.4339 101.3025 99.7144 102.8127 106.0803 110.4175 115.2227 119.3651 (44)

Energy conte 189.5368 166.7781 175.2274 149.5942 141.9342 124.5633 120.5960 127.3036 130.8077 149.8356 164.1559 186.8968 (45)

Energy content (annual) Total = Sum(45)m = 1827.2294

Distribution loss (46)m = 0.15 x (45)m 28.4305 25.0167 26.2841 22.4391 21.2901 18.6845 18.0894 19.0955 19.6211 22.4753 24.6234 28.0345 (46)

Water storage loss: Store volume 250.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.8903 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 1.0208 (55)

Total storage loss 31.6444 28.5820 31.6444 30.6236 31.6444 30.6236 31.6444 31.6444 30.6236 31.6444 30.6236 31.6444 (56)

If cylinder contains dedicated solar storage 31.6444 28.5820 31.6444 30.6236 31.6444 30.6236 31.6444 31.6444 30.6236 31.6444 30.6236 31.6444 (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 244.4435 216.3713 230.1341 202.7298 196.8410 177.6989 175.5027 182.2104 183.9433 204.7424 217.2915 241.8036 (62)

WWHRS -26.8170 -23.7172 -24.8353 -20.5646 -19.1655 -16.4000 -15.3724 -16.3470 -16.9681 -20.0035 -22.6616 -26.3204 (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 217.6265 192.6541 205.2989 182.1652 177.6756 161.2989 160.1303 165.8634 166.9752 184.7388 194.6300 215.4832 (64)

12Total per year (kWh/year) Total per year (kWh/year) = Sum(64)m = 2224.5399 (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 106.9464 95.1283 102.1885 92.2485 91.1186 83.9258 84.0236 86.2539 86.0020 93.7458 97.0903 106.0686 (65)

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

Metabolic gains (Table 5), Watts

(66)m 102.7056 102.7056 102.7056 102.7056 102.7056 102.7056 102.7056 102.7056 102.7056 102.7056 102.7056 102.7056 (66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 90.5136 100.2115 90.5136 93.5307 90.5136 93.5307 90.5136 90.5136 93.5307 90.5136 93.5307 90.5136 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 179.4533 181.3155 176.6229 166.6329 154.0224 142.1702 134.2523 132.3901 137.0827 147.0727 159.6832 171.5354 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 33.2706 33.2706 33.2706 33.2706 33.2706 33.2706 33.2706 33.2706 33.2706 33.2706 33.2706 33.2706 (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) -82.1645 -82.1645 -82.1645 -82.1645 -82.1645 -82.1645 -82.1645 -82.1645 -82.1645 -82.1645 -82.1645 -82.1645 (71)

Water heating gains (Table 5) 143.7452 141.5600 137.3502 128.1230 122.4712 116.5636 112.9349 115.9326 119.4473 126.0024 134.8477 142.5654 (72)

Total internal gains 470.5238 479.8986 461.2984 445.0983 423.8189 406.0762 391.5125 392.6480 403.8724 420.4003 444.8733 461.4260 (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
Northeast	9.2300	11.2829	0.6300	0.7000	0.7700	31.8270 (75)
Southeast	2.1100	39.9751	0.6300	0.7000	1.0000	33.4775 (82)
Northwest	2.1100	16.3666	0.6300	0.7000	1.0000	13.7063 (82)

Solar gains 79.0109 154.5334 262.6407 408.3289 530.9222 558.8756 525.6266 429.6788 312.5805 184.7700 98.3129 65.2147 (83)

Total gains 549.5347 634.4320 723.9391 853.4272 954.7411 964.9518 917.1391 822.3269 716.4529 605.1703 543.1863 526.6407 (84)

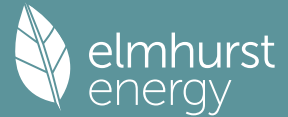
7. Mean internal temperature (heating season)

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)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	37.6882	37.8023	37.9147	38.4520	38.5542	39.0372	39.0372	39.1280	38.8497	38.5542	38.3480	38.1347
alpha	3.5125	3.5202	3.5276	3.5635	3.5703	3.6025	3.6025	3.6085	3.5900	3.5703	3.5565	3.5423
util living area	0.9717	0.9530	0.9131	0.8118	0.6546	0.4788	0.3559	0.4100	0.6467	0.8733	0.9534	0.9752 (86)
MIT	19.2695	19.5405	19.9540	20.4720	20.8071	20.9529	20.9875	20.9796	20.8648	20.3991	19.7601	19.2346 (87)
Th 2	19.8817	19.8846	19.8876	19.9013	19.9039	19.9160	19.9160	19.9182	19.9113	19.9039	19.8987	19.8933 (88)
util rest of house	0.9655	0.9430	0.8949	0.7758	0.5976	0.4051	0.2709	0.3183	0.5686	0.8392	0.9418	0.9698 (89)
MIT 2	17.9031	18.2441	18.7566	19.3786	19.7413	19.8866	19.9111	19.9094	19.8150	19.3159	18.5343	17.8667 (90)
Living area fraction	17.9031	18.2441	18.7566	19.3786	19.7413	19.8866	19.9111	19.9094	19.8150	19.3159	18.5343	17.8667 (90)
MIT	18.6059	18.9110	19.3725	19.9410	20.2895	20.4351	20.4648	20.4599	20.3550	19.8731	19.1648	18.5703 (92)
Temperature adjustment	18.6059	18.9110	19.3725	19.9410	20.2895	20.4351	20.4648	20.4599	20.3550	19.8731	19.1648	18.5703 (93)
adjusted MIT	18.6059	18.9110	19.3725	19.9410	20.2895	20.4351	20.4648	20.4599	20.3550	19.8731	19.1648	18.5703 (93)

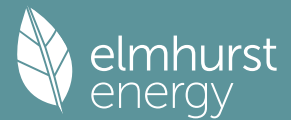
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9562	0.9321	0.8850	0.7772	0.6185	0.4411	0.3144	0.3649	0.6019	0.8381	0.9321	0.9612 (94)
Useful gains	525.4899	591.3791	640.6823	663.3146	590.4960	425.6180	288.3208	300.0970	431.2485	507.2009	506.3019	506.2051 (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	1117.7977	1091.4468	999.7877	845.5561	656.0705	440.1707	291.5396	305.5463	474.1212	708.2820	926.4704	1109.6794 (97)
Space heating kWh	440.6771	336.0455	267.1744	131.2139	48.7874	0.0000	0.0000	0.0000	0.0000	149.6043	302.5213	448.9849 (98a)
Space heating requirement - total per year (kWh/year)												2125.0089
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	440.6771	336.0455	267.1744	131.2139	48.7874	0.0000	0.0000	0.0000	0.0000	149.6043	302.5213	448.9849 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2125.0089
Space heating per m2										(98c) / (4) =		33.9458 (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	440.6771	336.0455	267.1744	131.2139	48.7874	0.0000	0.0000	0.0000	0.0000	149.6043	302.5213	448.9849 (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)	477.4399	364.0796	289.4631	142.1602	52.8575	0.0000	0.0000	0.0000	0.0000	162.0849	327.7588	486.4408 (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	217.6265	192.6541	205.2989	182.1652	177.6756	161.2989	160.1303	165.8634	166.9752	184.7388	194.6300	215.4832 (64)
Efficiency of water heater (217)m	85.6082	85.2947	84.6516	83.3365	81.5813	79.8000	79.8000	79.8000	79.8000	83.5909	85.0450	79.8000 (216)
Fuel for water heating, kWh/month	254.2123	225.8689	242.5222	218.5899	217.7896	202.1289	200.6646	207.8488	209.2420	221.0036	228.8553	251.5365 (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	18.8069	15.0876	13.5847	9.9528	7.6878	6.2810	7.0131	9.1158	11.8406	15.5355	17.5473	19.3296 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.3850	-31.1706	-46.3140	-53.8982	-59.7171	-56.3387	-55.6624	-51.7640	-45.1456	-36.4637	-23.8754	-18.3722 (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)	-9.1679	-19.5572	-39.3727	-59.8675	-79.8672	-80.4910	-79.5304	-67.0045	-48.6831	-28.1953	-12.3149	-7.2287 (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												2302.2848 (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												2680.2626 (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)												151.7828 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1031.3873 (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												4188.9429 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2302.2848	0.2100	483.4798 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2680.2626	0.2100	562.8552 (264)
Space and water heating			1046.3350 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	151.7828	0.1443	21.9069 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-500.1069	0.1339	-66.9526
PV Unit electricity exported	-531.2804	0.1255	-66.6972
Total			-133.6498 (269)
Total CO2, kg/year			946.5213 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.1200 (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	2302.2848	1.1300	2601.5818 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2680.2626	1.1300	3028.6968 (278)
Space and water heating			5630.2786 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	151.7828	1.5338	232.8095 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-500.1069	1.4947	-747.5323
PV Unit electricity exported	-531.2804	0.4608	-244.8160
Total			-992.3483 (283)
Total Primary energy kWh/year			5000.8406 (286)
Target Primary Energy Rate (TPER)			79.8900 (287)

APPENDIX 5: LZCT ASSESSMENT

Wind	<i>The ability to generate electricity via a turbine or similar device which harnesses natural wind energy. This could be considered as an onsite solution to reducing carbon emissions (turbines included within the development), or offsite (investing financially into a nearby wind farm).</i>
Installation considerations	▪ Wind turbines come in a variety of sizes and shapes. Turbines of 1 Kw can be installed to single house and large-scale turbines of 1-2 MW can be installed on a development to generate electricity to multiple dwellings and other buildings. In both instances the electricity generated can be used on site or exported to the grid. Vertical- or horizontal-axis turbines are available. ▪ A roof-mounted 1 kW micro wind system costs up to £3,000. A 2.5 kW pole-mounted system costs between £9,900 and £19,000. A 6 kW pole-mounted system costs between £21,000 and £30,000 (taken from the Energy Saving Trust, TBC by supplier) ▪ Local average wind speed is a determining factor. A minimum average wind speed of 6 m/s is required. ▪ Noise considerations can be an issue dependent on density and build-up of the surrounding area. ▪ Buildings in the immediate area can disrupt wind speed and reduce performance of the system. ▪ Planning permission will be required along with suitable space to site the turbine, whether ground installed, or roof mounted.
Advantages	▪ Generation of clean electricity which can be exported to the grid or used onsite. ▪ Can benefit from the Feed in Tariff, reducing payback costs.

Disadvantages	▪ Planning restrictions and local climate often limit installation opportunities. ▪ Annual maintenance required. ▪ High initial capital cost. It is usual for an investor to consider a series of turbines to make the investment financially sound.
Development feasibility x	▪ Installing a large turbine in an area such as this is not considered to be appropriate due to its appearance and physical impact on the built-up environment. Residents' and neighbours' concerns may include the look of the turbine, the hum of the generator and the possibility of stroboscopic shadowing from the blades on homes. ▪ Wind speed has been checked for the development scheme using the NOABL wind map: ▪ http://www.rensmart.com/Weather/BERR. The wind speed at ten metres for the development scheme is 4.6 metres per second (m/s) which is below the minimum of 5 m/s and threshold for technical viability. ▪ Typical payback times for a single turbine are expected to be greater than 15 years which means that the cost of installing and maintaining a single wind turbine is not considered a commercially-viable option.
Solar PV Solar Thermal	<i>The ability to generate energy (either electricity, hot water or a combination of the two) through harnessing natural solar energy. This could include the use of solar thermal panels, photovoltaic (PV) panels, or a combined solution. PV panels, similarly, to turbines, can be considered both on and offsite.</i> Solar Photovoltaics convert solar radiation into electricity which can be used on site or exported to the national grid. Solar Thermal generates domestic hot water from the sun's radiation. Glycol circulates within either flat plate or

	evacuated tube panels, absorbing heat from the sun, and transferring this energy to a water cylinder. A well-designed solar thermal system will account for 50-60% of a dwelling's annual hot water demand. Sizing the system to meet a higher demand will lead to excess heat generation in the summer months and overheating of the system.
Installation considerations	▪ Operate most efficiently on a south-facing sloping roof (between 30- and 45-degree pitch.) ▪ Shading must be minimal (one shaded panel can impact the output of the rest of the array.) ▪ Panels must not be laid horizontally on a flat roof as they will not self-clean. Panels will therefore need to be installed at an angle and with appropriate space between them, to avoid over-shading. ▪ Large arrays may require upgrades to substations if exporting electricity to the grid. ▪ Local planning requirements may restrict installation of panels on certain elevations. ▪ Installation must take into account pitch and fall of the roof, along with any additional plant on the roof to ensure there is sufficient room. ▪ The average domestic solar PV system is 4kWp and costs £5,000 - £8,000 (including VAT at 5 per cent) - (taken from the Energy Saving Trust).
Advantages	▪ Relatively straightforward installation, connection to landlord's supply and metering. ▪ Linear improvement in performance as more panels are installed. ▪ Installation costs are continually reducing. ▪ Can benefit from the Feed in Tariff to improve financial payback.

Disadvantages	▪ Less appropriate for high-rise developments, due to lack of roof space in relation to total floor area. ▪ With Solar Thermal, performance is limited by the hot water demand of the building – system oversizing will lead to overheating.
Development feasibility x	▪ The suitability of Solar panels has been considered for this Development and are concluded as a technically-viable option. ▪ Solar PV has been incorporated to feed the existing flats on the development and all available roof space has been maximised already. There is no further space available for PV for these change of use units.
Aerothermal	<i>The transfer of latent heat in the atmosphere to a compressed refrigerant gas to warm the water in a heating system. This includes air to water heat pumps and air conditioning systems.</i> Air Source Heat Pumps (ASHPs) extract heat from the external air and condense this energy to heat a smaller space within a dwelling or non-domestic building. A pump circulates a refrigerant through a coil to absorb energy from the air. This refrigerant is then compressed to raise its temperature which can then be used for space heating and domestic hot water. They can feed either low-temperature radiators or underfloor heating and often have electric immersion heater back-up for the winter months.
Installation	▪ ASHPs operate effectively in buildings with a low energy demand, as they emit low levels of energy suitable for maintaining rather than dramatically increasing internal temperatures. It is therefore vital that the dwelling has a

considerations	low heating demand to ensure the system can provide appropriate space-heating capability. ▪ Underfloor heating will give the best performance, but oversized radiators can also be used. ▪ Immersion heater back-up required to ensure appropriate Domestic Hot Water (DHW) temperature in winter months. ▪ Noise from the external unit can limit areas for installation. ▪ £7,000-£11,000 per dwelling (taken from the Energy Saving Trust).
Advantages	▪ Air source systems are a good alternative solution to providing heating and hot water to well-insulated, low heat loss dwellings. ▪ They require additional space when compared to a gas boiler. Space for an external unit is needed, as is space for the hot water cylinder and internal pump. ▪ Heat pumps are generally quiet to run, however if a collection of pumps were used, this could generate a noticeable hum while in operation. ▪ Running costs between heat pumps and modern gas boilers are comparable.
Disadvantages	▪ Residents need to be made aware of the most efficient way of using a heat pump as the low flow rates used by such a system means that room temperature cannot be changed as reactively as a conventional gas or oil boiler system. ▪ Will not perform well in homes that are left unoccupied and unheated for a long period of time. ▪ Back-up immersion heating can drastically increase running costs. ▪ Noise and aesthetic considerations limit installation opportunities.
Development	▪ ASHPs are considered a viable option for this development scheme and shall be utilised as part of a

feasibility

✓

communal heat pump strategy for the dwellings. This works well with the reduced energy demand, as achieved through passive design principles.

- This presents a zero carbon ready energy strategy for the development, as the national grid continues to decarbonise.

Geothermal

The transfer of latent heat from the ground to a compressed refrigerant gas to warm the water in a heating system. This includes ground source heat pumps. Heat can be collected through the use of either horizontally laid or vertically installed coils.

Ground Source Heat Pumps (GSHPs) operate on the same principle as an Air Source Heat Pump (ASHP) in that they extract heat from a source (in this instance the ground) and compress this energy to increase temperature for space heating and hot water. Pipework is installed into the ground, either through coils or in bore holes and piles, circulating a mix of water and antifreeze to extract energy from the ground, where the year-round temperature is relatively consistent (approx. 10 °C at 4 metres depth). This leads to a reliable source of heat for the building.

Again, an electrically powered pump circulates the liquid and powers the compressor, however annual efficiencies for GSHPs tend to be higher than those of ASHPs.

Installation considerations

- Require appropriate ground conditions to sink piles/bore holes or excavate for coils (which also require a large area of land.)
- Decision between coils or piles can lead to significant extra cost.

	▪ Need to consider whether low temperature output is fed through underfloor heating (most efficient) or oversized radiators. ▪ Similar to ASHPs, perform best in well-insulated buildings with a low heating demand. ▪ Electric immersion heater required for winter use. ▪ £11,000-£15,000 per dwelling dependent on the size of the system (taken from the Energy Saving Trust).
Advantages	▪ Perform well in well-insulated buildings, with limited heating demand. ▪ More efficient than ASHPs.
Disadvantages	▪ The coils can be damaged by natural earthworks and by intensive gardening practices – occupants would need to be aware of the location of the coils for this system, and how to operate the system efficiently. Coils may also be damaged within the dwelling where the circuit is connected to the internal unit. ▪ Will not perform well in buildings that are left unoccupied and unheated for a long period of time. ▪ Back up immersion heating can drastically increase running costs. ▪ Large area of ground needed for coil installation.
Development feasibility x	▪ GSHPs are not considered a viable option for this development scheme as they conflict with the preferred option of ASHP electric heating which works well with the reduced energy demand, as achieved through passive design principles.

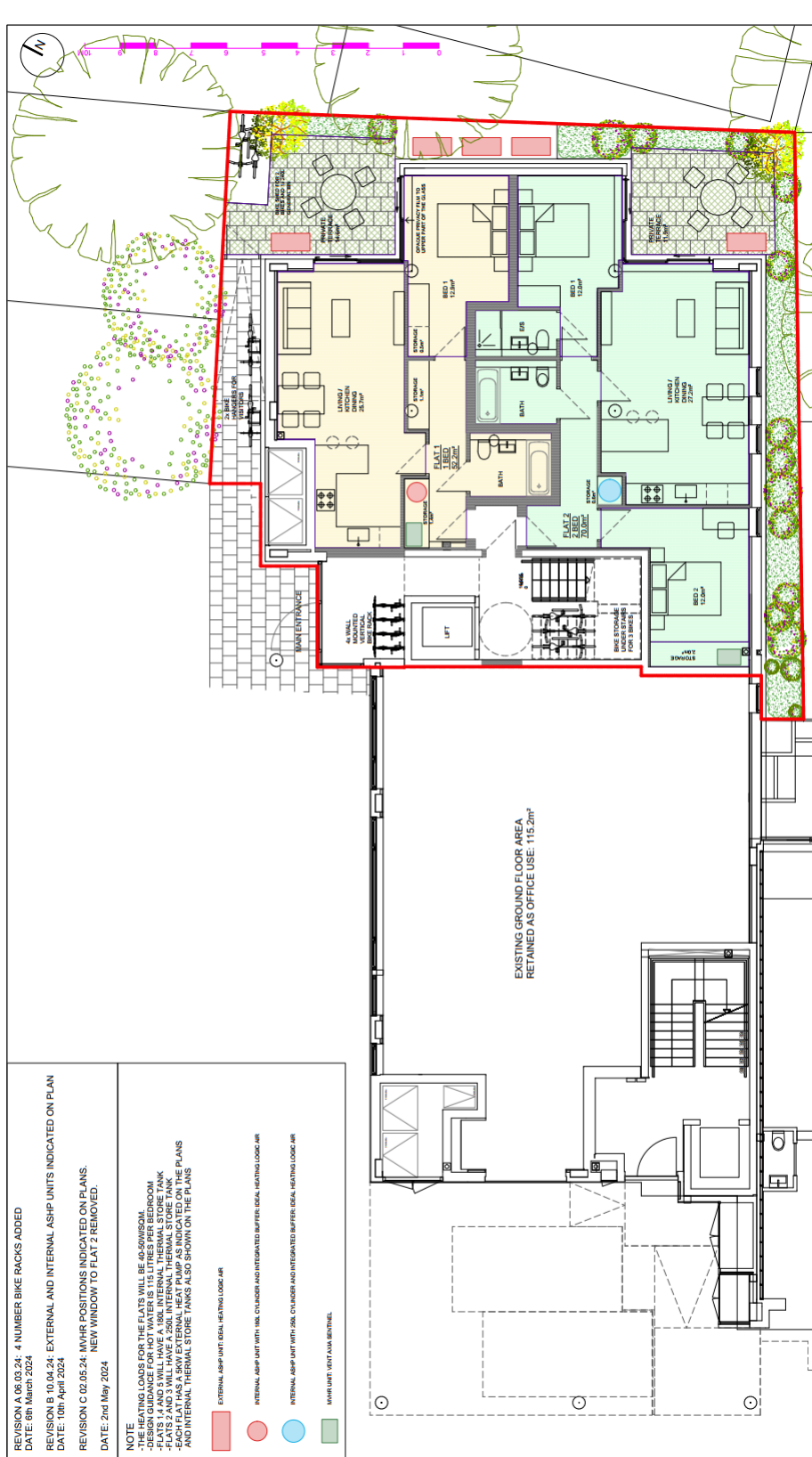
Water Source Heat Pumps	<i>The transfer of latent heat from a local water source to a compressed refrigerant gas to warm the water in a heating system. This includes water source heat pumps. Heat can be collected through the use of either horizontally laid or vertically installed coils.</i> Water Source Heat Pumps (WSHPs) operate on the same principle as an Air Source Heat Pump (ASHP) in that they extract heat from a source (in this instance the water) and compress this energy to increase temperature for space heating and hot water. Pipework is installed into the water source, circulating a mix of water and antifreeze to extract energy from the water, where the year-round temperature is relatively consistent (approx. 10 °C below surface). This leads to a reliable source of heat for the building. Again, an electrically powered pump circulates the liquid and powers the compressor, however annual efficiencies for WSHPs tend to be higher than those of ASHPs.
Installation considerations	▪ Require a reliable water source near to the site. ▪ Need to consider affect on the water course. ▪ Need to consider whether low temperature output is fed through underfloor heating (most efficient) or oversized radiators. ▪ Similar to ASHPs, perform best in well-insulated buildings with a low heating demand. ▪ Electric immersion heater required for winter use. ▪ £11,000-£15,000 per dwelling dependent on the size of the system (taken from the Energy Saving Trust).
Advantages	▪ Perform well in well-insulated buildings, with limited heating demand. ▪ More efficient than ASHPs.

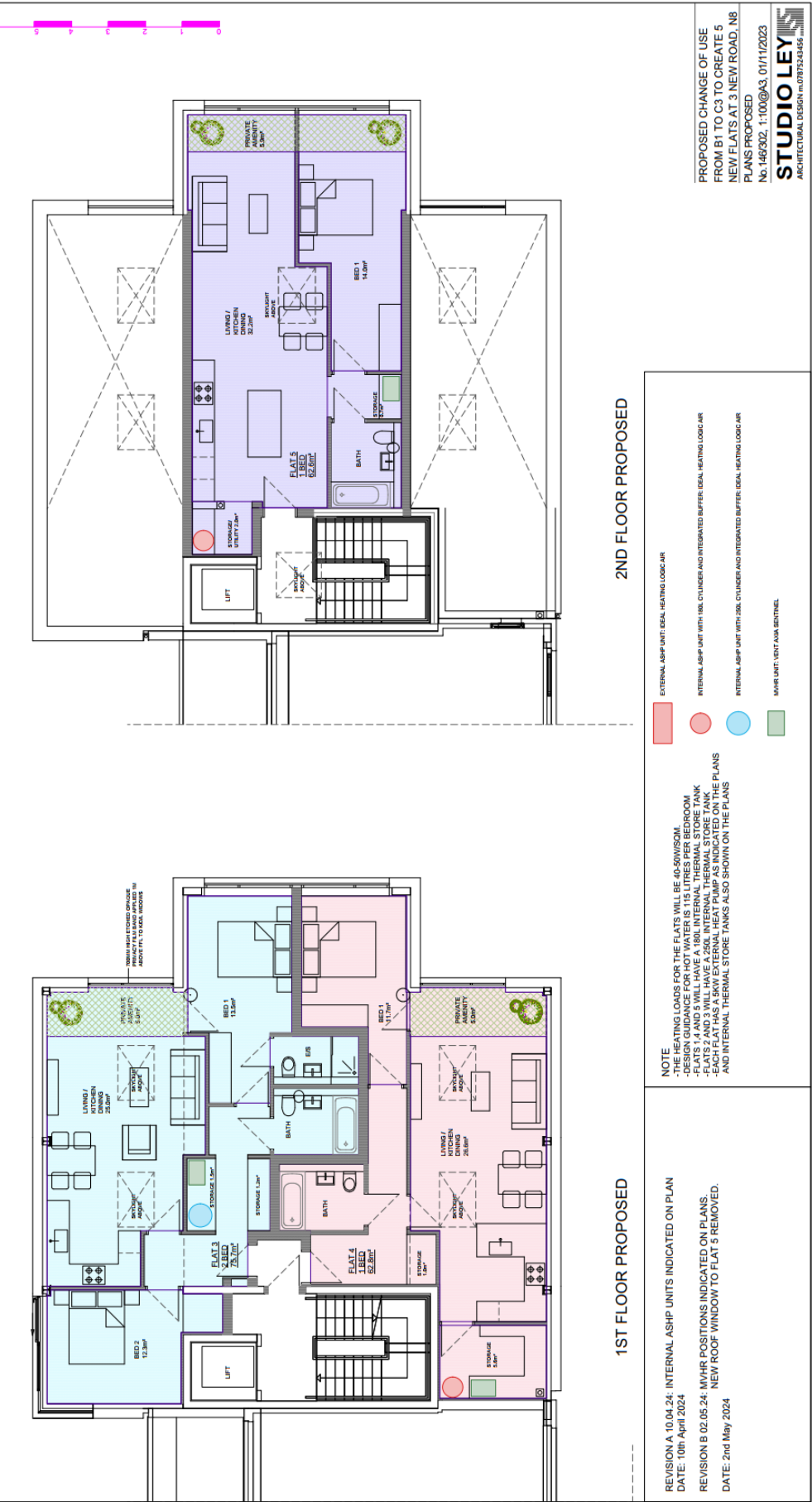
Disadvantages	▪ The coils can be damaged by high water flow or low water levels– occupants would need to be aware of the location of the coils for this system, and how to operate the system efficiently. Coils may also be damaged within the dwelling where the circuit is connected to the internal unit. ▪ Will not perform well in buildings that are left unoccupied and unheated for a long period of time. ▪ Back up immersion heating can drastically increase running costs. ▪ Large area of water needed for coil installation.
Development feasibility x	▪ WSHPs are not considered a viable option for this development scheme as they conflict with the preferred option of ASHP electric heating which works well with the reduced energy demand, as achieved through passive design principles.
Biomass	<i>Providing a heating system fuelled by plant based materials such as wood, crops, or food waste.</i> Biomass boilers generate heat for space heating and domestic hot water through the combustion of biofuels, such as woodchip, wood pellets or potentially biofuel or bio diesel. Biomass is considered to be virtually zero carbon. They can be used on an individual scale or for multiple dwellings as part of a district-heating network. A back-up heat source should be provided as consistent delivery of fuel is necessary for continued operation.
Installation considerations	▪ Biomass boilers are larger than conventional gas-fired boilers and also require what can be significant storage space for the fuel source. This needs to be considered at planning stage to ensure an appropriate plant room can be provided.

	▪ Flue required to expel exhaust gases – design needs to be in line with the requirements of the Building Regulations. ▪ Need to consider whether fuel deliveries will be reliable and consistent to the location of the site (especially relevant in rural areas) and whether the plant room can be easily accessed by the delivery vehicle. ▪ £9,000-£21,000 per dwelling dependent on size (taken from Energy Saving Trust).
Advantages	▪ Considerable reduction in CO₂ emissions.
Disadvantages	▪ Limited reduction in running costs compared to A-rated gas boilers, but at a substantially higher up-front cost. ▪ Plant room space required for boiler and storage. ▪ Dependent on consistent delivery of fuel. ▪ Ongoing maintenance costs (need to be cleaned regularly to remove ash.)
Development feasibility x	▪ Biomass is not considered a technically-viable option for the development scheme. The primary reason for this is down to the development's location within the context of London and the negative environmental impact of high levels of NO_x gases that are emitted from biomass boilers and the subsequent impact on local air quality. This is contrary to planning policies for air quality in London. ▪ There are also concerns regarding a sustainable supply of biomass to the site. ▪ The capital installation cost would be high which leads us to the conclusion that biomass would not be a commercially-viable option for this development scheme.

APPENDIX 6: Drawings of the Internal and External MVHR and ASHP positioning.

Drawings from Studio Ley (2nd May), showing the internal and external MVHR and ASHP positioning.









PART 2

OVERHEATING STATEMENT

The additional window to Flat 2 has been sized to provide sufficient natural ventilation.

This window is faces southwest and due to this will have an adequate G Value to mitigate overheating, this will be lower than standard glazing. In addition to this the window will be triple glazed. Finally, all the proposed flats will have an MVHR system that will further mitigate any overheating within the units.

The additional rooflight to Flat 5 will allow for additional natural ventilation and be designed with an adequate G Value to mitigate overheating. Again this unit will have an MVHR system to further mitigate any overheating.

PART 3

SUSTAINABILITY STATEMENT

We understand from your planning policy and validation requirements that a full Sustainability Statement is not required however we have given careful consideration to sustainability issues and can report as follows:

- Re-using existing buildings significantly reduces carbon emissions when compared to new buildings. In this case the building is only a few years old and has high levels of insulation incorporated into the fabric already. This means there will be relatively 'light touch' approach to converting to residential use with a low embodied carbon impact.
- The location is highly sustainable close to the centre of Crouch End with all of its facilities (shops, restaurants, doctors, dentists). Priory Park is within 400m and there is an excellent range of public transport available (underground, overground and buses). Good cycle storage will be provided and the development will also be car free.
- The existing roof has a green roof reducing rainwater run-off into the mains drainage.
- The location is very attractive for residential use, located away from busy roads and in a quiet pocket surrounded by trees and gardens promoting health and wellbeing. Access is either from Park Road or via an intimate gated alley, and the development is part of a mixed use community of flats, houses, office space and a Doctors surgery. These round the clock uses will enhance the sense of security.
- No fossil fuels will be used directly within the dwellings. The all-electric system will use the latest high performance heat pumps with a min COP of 3.2 for heating and hot water and will tap into a rapidly de-carbonising grid.
- The development faces predominantly east and north with only a few small south facing windows, plus many of the windows will be partially shaded in summer by deciduous trees so overheating risk is low.
- The combination of thermally efficient envelope, zero direct fossil fuel use, and re-use of an existing building will result in a low lifecycle carbon impact.

PART 4

EXTERNAL AND INTERNAL ASHP POSITON WITH HEATING OUTPUTS AND MVHR POSITION

The external ASHP for the apartments are shown on Ground Floor Proposed Plan.

The internal ASHP with thermal store is shown on Ground Floor Proposed Plan for Flat 1 and 2. First Floor Proposed plan for Flat 3 and 4, Second Floor Proposed plan for Flat 5.

- Heating load for all flats 40-50W/sqm
- 115 Litres required per bedroom for hot water store tank
- 1 Bedroom Flat will have a 180 Litre Thermal Store Tank
- 2 Bedroom Flat will have a 250 Litre Thermal Store Tank
- 5kW External ASHP for each flat to provide heating and internal thermal stores

REVISION A 06.03.24: 4 NUMBER BIKE RACKS ADDED
DATE: 6th March 2024

REVISION B 10.04.24: EXTERNAL AND INTERNAL ASHP UNITS INDICATED ON PLAN
DATE: 10th April 2024

REVISION C 02.05.24: MVHR POSITIONS INDICATED ON PLANS.
NEW WINDOW TO FLAT 2 REMOVED.
DATE: 2nd May 2024

NOTE

- THE HEATING LOADS FOR THE FLATS WILL BE 40-50W/SQM.
- DESIGN GUIDANCE FOR HOT WATER IS 115 LITRES PER BEDROOM
- FLATS 1,4 AND 5 WILL HAVE A 180L INTERNAL THERMAL STORE TANK
- FLATS 2 AND 3 WILL HAVE A 250L INTERNAL THERMAL STORE TANK
- EACH FLAT HAS A 5KW EXTERNAL HEAT PUMP AS INDICATED ON THE PLANS
- AND INTERNAL THERMAL STORE TANKS ALSO SHOWN ON THE PLANS

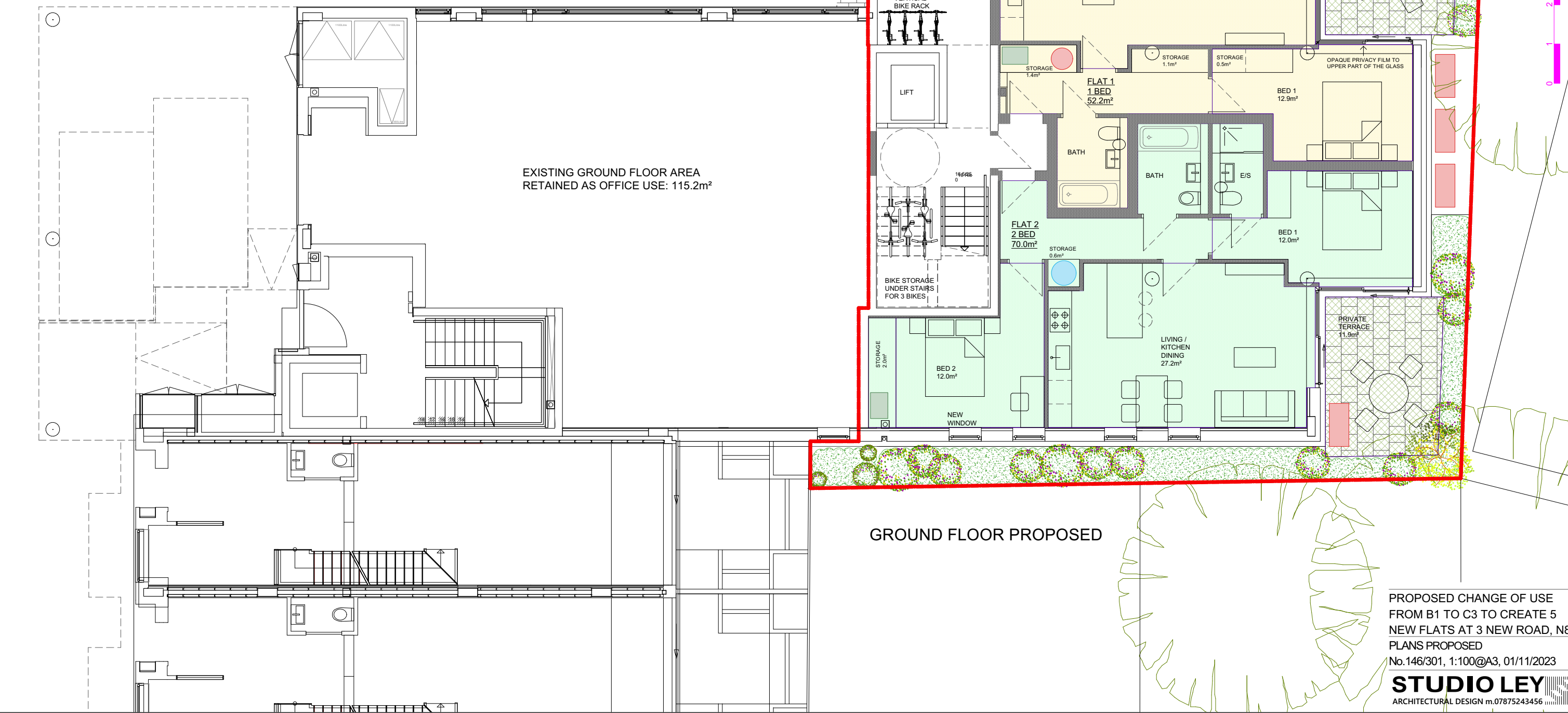
EXTERNAL ASHP UNIT: IDEAL HEATING LOGIC AIR

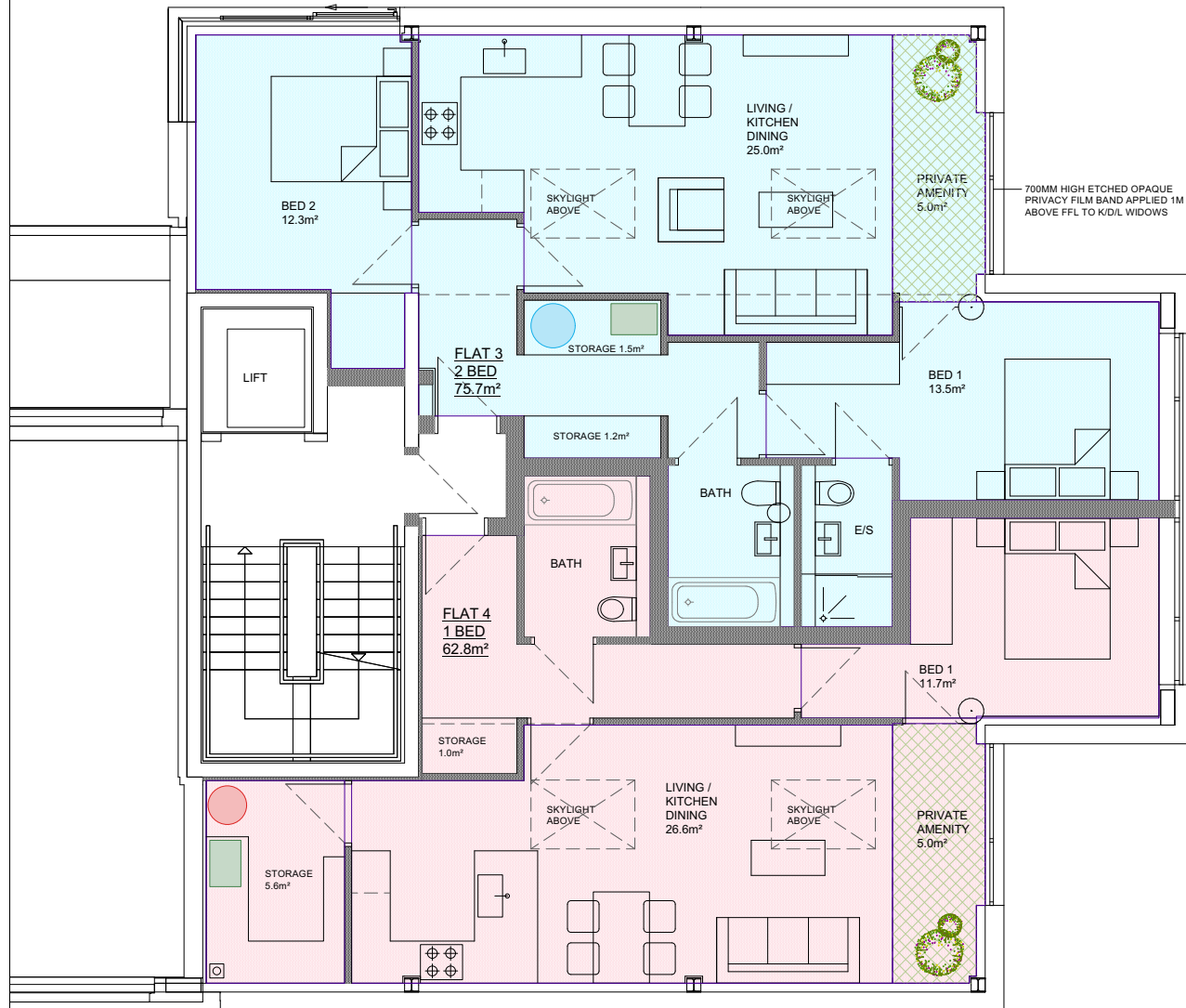
INTERNAL ASHP UNIT WITH 180L CYLINDER AND INTEGRATED BUFFER: IDEAL HEATING LOGIC AIR

INTERNAL ASHP UNIT WITH 250L CYLINDER AND INTEGRATED BUFFER: IDEAL HEATING LOGIC AIR

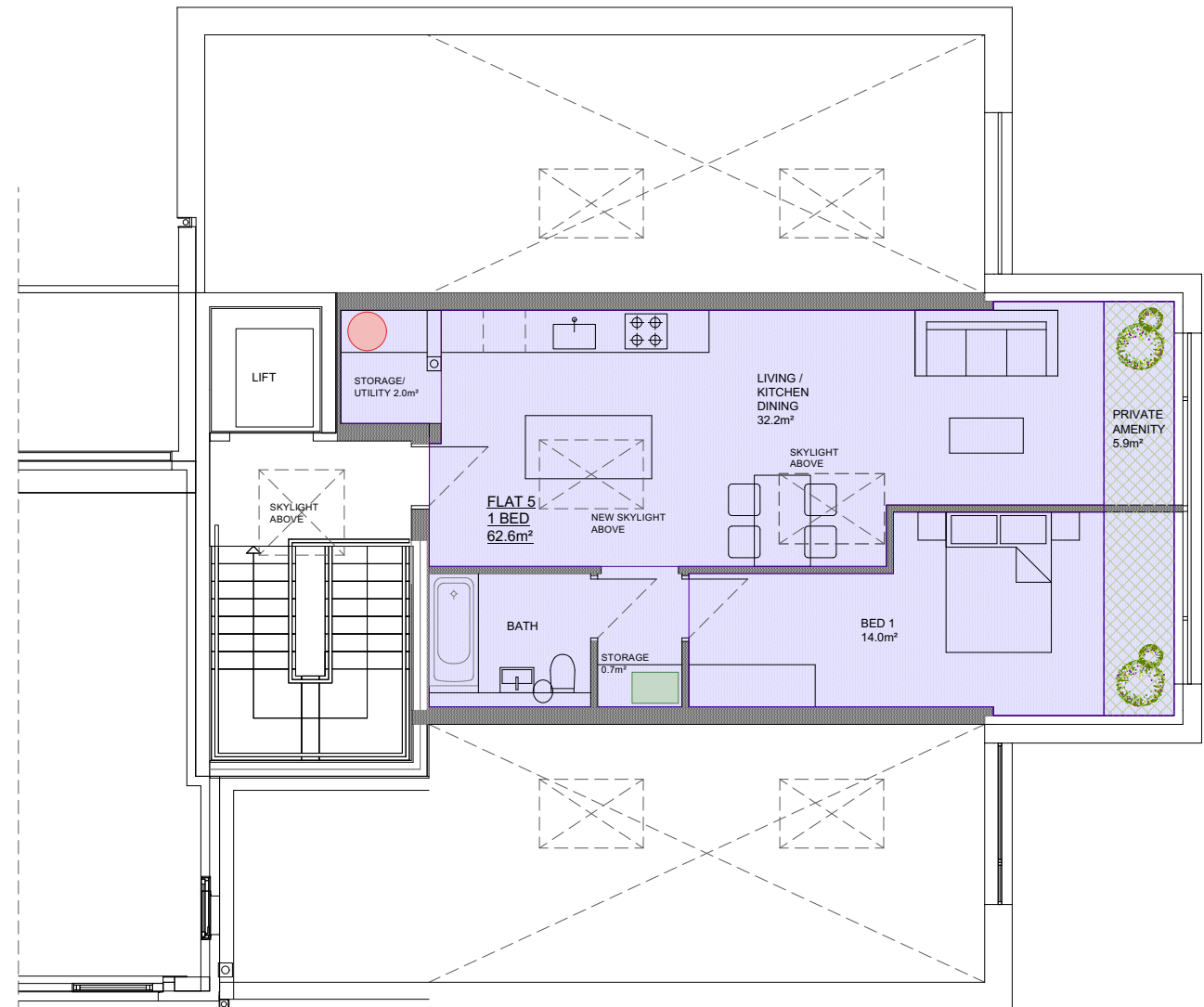
MVHR UNIT: VENT AXIA SENTINEL

REVISION D 19.05.24: NEW WINDOW TO FLAT 2 REINSTATED FOLLOWING
FEEDBACK FROM HARINGEY CASE OFFICER AND CLIMATE
CHANGE OFFICER.
DATE: 19th May 2024





1ST FLOOR PROPOSED



2ND FLOOR PROPOSED

REVISION A 10.04.24: INTERNAL ASHP UNITS INDICATED ON PLAN
DATE: 10th April 2024

REVISION B 02.05.24: MVHR POSITIONS INDICATED ON PLANS.
NEW ROOF WINDOW TO FLAT 5 REMOVED.
DATE: 2nd May 2024

REVISION C 19.05.24: NEW ROOF WINDOW TO FLAT 5 REINSTATED FOLLOWING
FEEDBACK FROM HARINGEY CASE OFFICER AND CLIMATE
CHANGE OFFICER.
DATE: 19th May 2024

NOTE

- THE HEATING LOADS FOR THE FLATS WILL BE 40-50W/SQM.
- DESIGN GUIDANCE FOR HOT WATER IS 115 LITRES PER BEDROOM
- FLATS 1,4 AND 5 WILL HAVE A 180L INTERNAL THERMAL STORE TANK
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- AND INTERNAL THERMAL STORE TANKS ALSO SHOWN ON THE PLANS

- EXTERNAL ASHP UNIT: IDEAL HEATING LOGIC AIR
- INTERNAL ASHP UNIT WITH 180L CYLINDER AND INTEGRATED BUFFER: IDEAL HEATING LOGIC AIR
- INTERNAL ASHP UNIT WITH 250L CYLINDER AND INTEGRATED BUFFER: IDEAL HEATING LOGIC AIR
- MVHR UNIT: VENT AXIA SENTINEL

PROPOSED CHANGE OF USE
FROM B1 TO C3 TO CREATE 5
NEW FLATS AT 3 NEW ROAD, N8
PLANS PROPOSED

No.146/302, 1:100@A3, 01/11/2023

STUDIO LEY
ARCHITECTURAL DESIGN m.07875243456

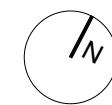
PART 5

EXISTING AND PROPOSED ROOF PLAN

Roof plan showing the existing extensive green roof for the building. PV panels cannot be secured onto this roof due to the extensive green roof system and unusual profile of the roof. The construction of the roof is a corrugated metal deck that is weatherproofed and then an extensive green roof system containing insulation.

Attempting to install PV panels to this roof would compromise the weatherproofing of the roof and disrupt the green roof system considerably.

The entire roof will need to be redesigned with a different profile and removal of the extensive green roof to allow for secure attachment of PV panels. The original site development had maximised the flat roof areas for installation of PV panels. This conversion is unable to add to this provision as stated above.



0 1 2 3 4 5 6 7 8 9 10M



PROPOSED CHANGE OF USE
FROM B1 TO C3 TO CREATE 5
NEW FLATS AT 3 NEW ROAD, N8
ROOF PLAN EXISTING
No.146/13, 1:100@A3, 01/11/2023

STUDIO LEY
ARCHITECTURAL DESIGN m.07875243456

REVISION A 19.05.24: NEW ROOF WINDOW REMOVED.
DATE: 2nd May 2024

REVISION B 19.05.24: NEW ROOF WINDOW TO FLAT 5 REINSTATED FOLLOWING
FEEDBACK FROM HARINGEY CASE OFFICER AND CLIMATE
CHANGE OFFICER.

DATE: 19th May 2024

