



HODKINSON



Energy Statement

Highgate Care Ltd

Former Mary Fielding Care Home

Final

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Executive Summary

The proposed development is to redevelop the Former Mary Feilding Guild Care Home to provide a new rehabilitation clinic and 9 apartments in the London Borough of Haringey.

The Energy Strategy for the development has been formulated following The London Plan Energy Hierarchy: Be Lean, Be Clean, Be Green and Be Seen. The overriding objective in the formulation of the strategy is to maximise the reductions in CO₂ emissions through the application of this Hierarchy with a cost-effective, viable and technically appropriate approach and to minimise the emission of other pollutants. The energy strategy has been developed in consultation with London Borough of Haringey throughout the pre-application process.

The energy strategy proposed for the development is compliant with the requirements of the London Plan and local policies.

The proposed development has been assessed under Part L 2021.

A range of Be Lean energy efficiency measures are proposed for this development to exceed the Part L 2021 baseline through energy efficiency measures alone.

In line with The London Plan, the feasibility of decentralised energy production as a Be Clean measure has been assessed. There are no existing or proposed heat networks for the development to connect to. A communal heating system consisting of air source heat pumps is proposed for the rehabilitation clinic.

An appropriate range of Be Green renewable energy generation technologies have been considered. Air source heat pumps and solar photovoltaics are considered the most appropriate technologies for this development and have therefore, been specified.

The summary tables below demonstrate the reduction in regulated CO₂ emissions after each stage of the Energy Hierarchy showing energy policy requirements have been exceeded.

Summary Table i: Residential: Apartments Carbon Dioxide Emissions and Savings after each stage of the Energy Hierarchy

	Regulated CO ₂ Emissions (tCO ₂)Yr)	Unregulated CO ₂ Emissions (tCO ₂)Yr)	Savings Regulated CO ₂ Emissions (tCO ₂)Yr)	Reduction in Regulated CO ₂ Emissions Achieved (%)
Baseline	10.5	1.6	-	-
After Be Lean Measures	8.8	1.6	1.7	16.2%
After Be Clean Measures	8.8	1.6	0.0	0.0%
After Be Green Measures	3.3	1.6	5.5	52.4%
Cumulative On-Site	-	-	7.2	68.6%

Summary Table ii: Non-Residential: Rehabilitation clinic Carbon Dioxide Emissions and Savings after each stage of the Energy Hierarchy

	Regulated CO ₂ Emissions (tCO ₂)Yr)	Unregulated CO ₂ Emissions (tCO ₂)Yr)	Savings Regulated CO ₂ Emissions (tCO ₂)Yr)	Reduction in Regulated CO ₂ Emissions Achieved (%)
Baseline	18.9	25.1	-	-
After Be Lean Measures	15.3	25.1	3.6	19.0%
After Be Clean Measures	13.1	25.1	2.2	11.6%
After Be Green Measures	12.2	25.1	0.9	4.8%
Cumulative On-Site	-	-	6.7	35.4%

Summary Table iii: Site Wide Carbon Dioxide Emissions and Savings after each stage of the Energy Hierarchy

	Regulated CO₂ Emissions (tCO₂)Yr)	Unregulated CO₂ Emissions (tCO₂)Yr)	Savings Regulated CO₂ Emissions (tCO₂)Yr)	Reduction in Regulated CO₂ Emissions Achieved (%)
Baseline	29.4	26.7	-	-
After Be Lean Measures	24.1	26.7	5.3	18.0%
After Be Clean Measures	21.9	26.7	2.2	7.5%
After Be Green Measures	15.5	26.7	6.4	21.8%
Cumulative On-Site	-	-	13.9	47.3%

- 1.1** In line with the GLA guidelines, a carbon offset payment is required achieve the Zero Carbon target. A regulated CO₂ emission of 15.5tCO₂ emission will need to be offset over a 30-year period. The table below shows the estimated carbon offset payment for the development is expected to be £44,175.

Table iv: Carbon Offset	
Residual CO₂ (tCO₂/year)	15.5
Carbon Price (£/t)	£95
Carbon Offset Payment (£)	£1,473
Total Carbon Offset Payment (£)	£44,175

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1. INTRODUCTION

- 1.1** This Energy Statement has been prepared by Hodkinson Consultancy, a specialist energy and environmental consultancy for planning and development, appointed by Highgate Care Ltd.
- 1.2** The Energy Strategy for the development has been formulated following The London Plan Energy Hierarchy: *Be Lean*, *Be Clean*, *Be Green* and *Be Seen*. The overriding objective in the formulation of the strategy is to maximise the reductions in CO₂ emissions through the application of this hierarchy with a cost-effective, viable and technically appropriate approach and to minimise the emission of other pollutants. This includes:
- > A *Be Lean* reduction with improved building fabric efficiency and M&E services;
 - > Considering *Be Clean* options;
 - > Providing renewable energy generation for the *Be Green* measures.
- 1.3** This statement first establishes a baseline assessment of the energy demands and associated CO₂ emissions for the development based on current Building Regulations Part L 2021. The report will then address sustainable energy measures that help achieve the project targets. The proposed measures are considered appropriate at this stage of the design, it would be expected that through detailed design subtle variations could be implemented to achieve the same goal.

2. DEVELOPMENT OVERVIEW

Site Location

- 2.1 The proposed development site at Former Mary Fielding Care Home is located at 103-107 North Hill in the London Borough of Haringey is located at Highgate, London N6 4DP, as shown in Figure 1 below.



Figure 1: Site Location – Map data © 2024 Google

- 2.2 The site measures 0.374 hectares and is occupied by a series of five interlinked buildings which wrap around the site in an L shape. The current Mary Feilding Guid Care Home is a registered care home for the elderly. The building has the main frontage on to North Hill to the east and a back entrance with parking spaces on to View Road to the south-east.

Proposed Development

2.3 The proposed development is described as follows:

Demolition of existing buildings and redevelopment to provide a new 50-bed rehabilitation clinic (Class C2 – Residential Institutions) principally fronting onto and accessed from View Road together with a separate residential (Class C3 - Dwelling House) block fronting North Hill. This consists of 9 flats (5 x 1 bed; 3 x 2 bed and 1 x 3 bed).

2.4 Figure 2 below illustrates the proposed site layout.



Figure 2: Proposed Ground Floor GA Plan (RM Design Group, June 2024)

Planning History

- 2.5

The site has planning permission (planning application references HGY/2021/3481 dated October 2022 and HGY/2022/4415 dated February 2023) for the demolition of existing buildings and redevelopment to provide a new care home (Class C2 - Residential Institution), for up to 70 bedrooms, a hydrotherapy pool, steam room, sauna, gym, treatment/medical rooms, hairdressing and beauty salon, restaurant, cafe, lounge, bar, well-being shop, general shop, car and cycle parking, refuse/recycling storage, mechanical and electrical plant, landscaping, and associated works.
- 2.6

The site was previously occupied by a care home known as the Mary Feilding Guild Care Home and has now come under new management as the Highgate Care Home. The care home was operational until May 2021.

3. RELEVANT PLANNING POLICY

- 3.1

The following planning policies and requirements have informed the sustainable design of the proposed development.

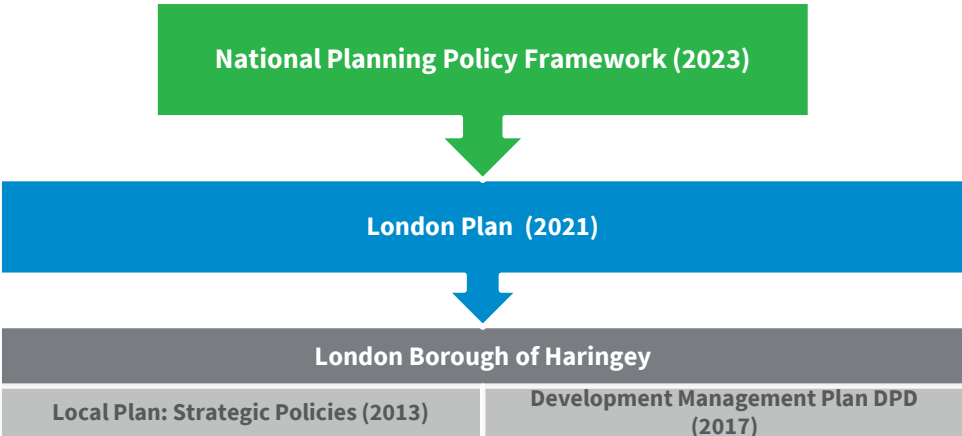


Figure 3: Relevant Planning Policy Documents

National Policy: NPPF

- 3.2

The revised National Planning Policy Framework (NPPF) was published on the 20th December 2023 and sets out the Government’s planning policies for England.
- 3.3

The NPPF provides a framework for achieving sustainable development, which has been summarised as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (Resolution 42/187 of the United Nations General Assembly).

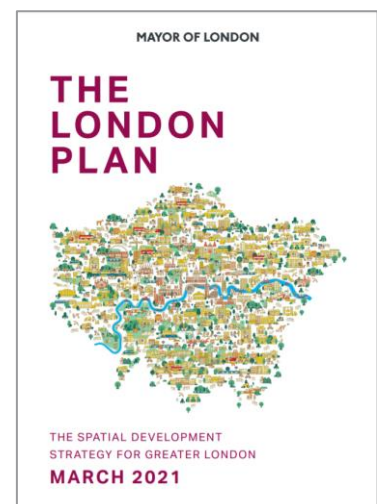
These address social progress, economic well-being and environmental protection. At the heart of the framework is a **presumption in favour of sustainable development**.

- 3.4** The document states that the planning system has three overarching objectives which are interdependent and need to be pursued in mutually supportive ways:
- a) An economic objective** – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;
 - b) A social objective** – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities’ health, social and cultural well-being; and
 - c) An environmental objective** – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

Regional Policy: The London Plan

The London Plan (2021)

- 3.5** The London Plan sets out an integrated economic, environmental, transport and social framework for the development of London. The following policies are considered relevant to the proposed development and this Statement:
- 3.6** **Policy SI1 Improving Air Quality** states that development should seek opportunities to identify and deliver further improvements to air quality. Where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site.
- 3.7** **Policy SI2 Minimising Greenhouse Gas Emissions** states that 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:
- > Be Lean: Use less energy and manage demand during operation;



- > Be Clean: Exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly;
 - > Be Green: Maximise opportunities for renewable energy by producing, storing and using renewable energy on-site.
 - > Be Seen: Monitoring and reporting of the actual operational energy performance of major developments for at least five years.
- 3.8** A minimum on-site reduction of at least 35% beyond Building Regulations is required for major development. Residential development should achieve 10%, and non-residential development should achieve 15% through energy efficiency measures.'
- 3.9** **Policy S13 Energy Infrastructure** states that energy masterplans should be developed for large-scale development locations which establish the most effective energy supply options. 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:
- > Connect to local existing or planned heat networks;
 - > Use zero-emission or local secondary heat sources (in conjunction with heat pump, if required);
 - > 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);
 - > Use ultra-low NOx gas boilers.

Regional Policy: GLA Energy Assessment Guidance

- 3.10** The GLA Energy Assessment Guidance published June 2022 provides advice on how the energy statement can demonstrate compliance with the London Plan Policy S12. The following key points have been taken from the document:
- > The GLA requires the use of Part L 2021 and associated SAP 10.2 carbon factors;

The guidance on report energy demands and improvements in CO₂ emissions at each stage of the energy hierarchy.

Local Policy: London Borough of Haringey Local Plan

- 3.11** The London Borough of Haringey's Local Plan was adopted in 2013. The following policies are considered relevant to this Statement:
- 3.12 Policy SP4 Working Towards a Low Carbon Haringey** indicates that the following measures will be promoted to reduce carbon emissions from new and existing buildings.
- > All new residential development will achieve a minimum 25% reduction in total (regulated) CO₂ emissions. All new residential development shall be zero carbon from 2016 onwards;
 - > From 2011 onwards all new non-residential development shall be built to at least BREEAM "Very Good" standard and should aim to achieve BREEAM "Excellent" or the current nationally agreed standard. All new non-residential development shall be zero carbon from 2019;
 - > All developments should identify and implement, where viable, site-wide and area-wide decentralised energy facilities including the potential to link into a wider network;
 - > Establish local networks of decentralised heat and energy facilities by requiring developers to prioritise connection to existing or planned networks where feasible;
 - > All new developments are required, where viable, to achieve a reduction in predicted carbon dioxide emissions of 20% from on-site renewable energy regeneration, which can include connections to local sources of decentralised renewable energy.

Local Policy: Development Management DPD

- 3.13** This document gives effect to Haringey's spatial strategy and the key objectives of the Strategic Policies Local Plan by supporting proposals that contribute to the delivery of sustainable development in accordance with the strategy. The following are the relevant policies:
- 3.14 Policy DM21 Sustainable Design, Layout and Construction** states that all new development will be expected to consider and implement sustainable design, layout and construction techniques. Proposal should apply the energy and cooling hierarchies to minimize energy use; maximise opportunities to enhance biodiversity on-site including via SuDS, living roofs and green walls; use building materials with high environmental performance ratings; and seek opportunities for locally sourced labour. Consideration will be given to the use of carbon offset payments.
- 3.15 Policy DM22 Decentralised Energy** states that subject to other policy requirements, proposals that contribute to the provision and use of Decentralised Energy network infrastructure will be supported.

New Local Plan

- 3.16** The council has begun the process of preparing a New Local Plan which will replace the existing Local Plan documents adopted in July 2017. However, this plan is still in the early stages of consultation and a structured framework of guidance policies is yet to be developed.
- 3.17** The New Local plan will be structured around the Borough Plan priorities of Housing, People, Place and Economy.

Summary of Planning Targets

- 3.18** The rehabilitation clinic will aim to achieve a 15% reduction in regulated CO₂ emissions over Part L 2021, through energy efficiency measures in accordance with the London Plan.
- 3.19** The apartment block will aim to achieve a 10% reduction in regulated CO₂ emissions through energy efficiency measures in accordance with the London Plan.
- 3.20** The Development will target a 35% reduction in regulated CO₂ emissions over Part L 2021 for the rehabilitation clinic and the apartment block. In line with the energy hierarchy depicted in the London Plan.
- 3.21** The development will aim to achieve a 20% reduction in regulated CO₂ emissions with onsite renewable technologies, in line with the London Borough of Haringey policy.
- 3.22** In line with the GLA guidelines, the development will need meet the zero-carbon target. The shortfall in achieving the zero-carbon target will be met through a cash-in-lieu payment. The London Borough of Haringey increased the carbon offset payment to £95 per tonne of CO₂ in January 2020.
- 3.23** The BREEAM Very Good energy credits will be targeted.

4. BUILDING REGULATIONS BASELINE

Methodology

- 4.1** This statement first establishes a baseline assessment of the energy demands and associated CO₂ emissions for the development based on Part L Building Regulations (2021). The London Plan Energy Hierarchy approach of Be Lean, Be Clean and Be Green has been followed to demonstrate the required energy targets of 35%.
- 4.2** The estimated annual energy demand for the apartments has been calculated using Standard Assessment Procedure (SAP 10.2) methodology and the SAP 10.2 carbon factors. SAP calculates the regulated energy demands associated with hot water, space heating and fixed electrical items.
- 4.3** The rehabilitation clinic has been assessed as non-domestic building using the Simplified Building Energy Model (SBEM) software. The estimated annual energy demand has been calculated using Simplified Building Energy Model (SBEM) software, developed using the National Calculation Method (NCM 2021 Edition). SBEM calculates the Regulated energy demands associated with hot water, space heating and fixed electrical items, as well as the unregulated energy demands.

Building Regulations Baseline

- 4.4** Table 1 shows the regulated CO₂ emissions for the baseline model of the development.

Table 1: Part L 2021 Baseline Regulated and unregulated CO₂ Emissions for the development.

	Regulated (tCO ₂ /Yr)	Unregulated (tCO ₂ /Yr)
Residential: Apartments	10.5	1.6
Non-Residential: Rehabilitation clinic	18.9	25.1

- 4.5** The SAP calculation sheets and the BRUKL documents for baseline are presented in Appendix A and B.

5. **BE LEAN: ENERGY EFFICIENCY MEASURES**

- 5.1** The first stage of the London Plan Energy Hierarchy is demand reduction from fabric energy efficiency measures. Number of measures are proposed to reduce energy demands across the development. The fabric energy strategy will aim to go above and beyond baseline Part L 2021 CO₂ emission reduction requirements. The aim is to comply with the following London Plan targets:
- > A 10% % reduction regulated in CO₂ emissions for the apartments;
 - > A 15% reduction in regulated CO₂ emissions for the rehabilitation clinic.
- 5.2** This section outlines the proposed strategies for achieving these targets. These measures, or alternatives, will be provided to achieve the policy requirements.
- 5.3** The fabric energy efficiency strategy should be reviewed at each detailed stage of the development, to ensure the most recent policy targets are being achieved.

Residential

Building Envelope

- 5.4** This development will incorporate enhanced insulation in the building envelope (walls, roofs, floors, and windows) to achieve average U-values better than those required by Part L 2021 of the Building Regulations. These are to are likely to include the following, although exact values will be confirmed during detailed design stage:
- > High Performance Glazing with a U-value of 0.85 W/m².K (soft low E-coating, G-value of 0.32 for the all the facades.
 - > Solid door U-value of 1.6W/m²K for the apartments;
 - > External walls with a U-value of 0.16W/m².K (minimum thickness 430mm);
 - > Apartment Wall to corridor/stair U value of 0.18W/m²K;
 - > Apartment Wall to stairs/lift U value of 0.16W/m²K;
 - > Party wall U-value of 0.00 W/m²K;
 - > Ground floor U-value of 0.10 W/m².K;
 - > Apartment floor above lobby & Exposed floor of 0.14 W/m².K;

- > Apartment floor above unheated spaces (e.g. bin/bike stores) U-value of $0.12 \text{ W/m}^2\text{K}$
- > Flat roof U-values of $0.10 \text{ W/m}^2\text{K}$
- > Exposed Ceiling to Lobby U-value of $0.16 \text{ W/m}^2\text{K}$
- > Terrace Roof U-value of $0.14 \text{ W/m}^2\text{K}$.

Air Tightness and Ventilation

- 5.5** The apartments are to have energy efficient Mechanical Ventilation Heat Recovery (MVHR) units. MVHR systems remove stale air and odours from kitchens and wet rooms, whilst retaining the heat within the home. Figure 4 below show the MVHR system. The selected MVHR units are expected to have a specific fan power of $0.51\text{-}0.58 \text{ W/l/s}$ and heat recovery efficiency of $87\text{-}89\%$.
- 5.6** Air tightness standards will conform to, and exceed, Approved Document Part L requirements. By reducing air leakage loss and convective bypass of insulation, an improvement of design air permeability rate from $8 \text{ m}^3/\text{h.m}^2$ to $3.0 \text{ m}^3/\text{h.m}^2$ has been specified for the apartments.

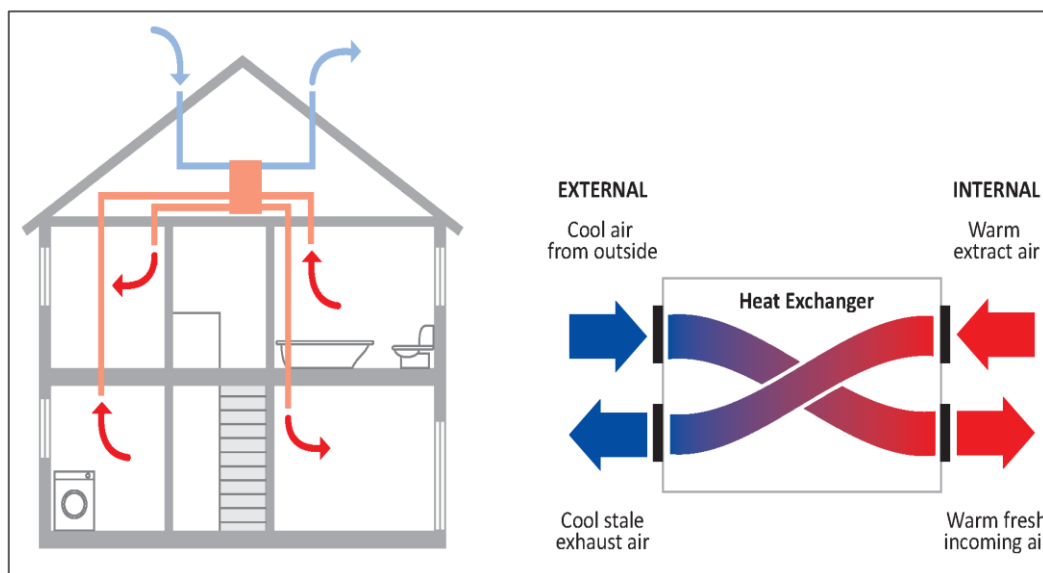


Figure 4: MVHR in Operation

Thermal Bridging

- 5.7** Part L 2021 has put an increased importance on addressing heat losses through thermal bridging. Consequently, default psi values are not sufficient to comply with Part L 2021 Fabric Energy Efficiency (FEE) target. Therefore, there is requirement to undertake bespoke psi value calculations, particularly as Accredited Construction Details (ACDs) can no longer be used.
- 5.8** The target psi values are significant improvement on the default psi values. The target psi values are summarised in Table 2. The bespoke psi values are based on what has been achieved on other schemes with a similar construction, these will be further refined and confirmed at detailed design stage.

Table 2: Thermal Bridging Psi Value Targets

Element	Thermal bridge	Psi-Value (Ψ) (W/m.K)
Lintels	E2	0.05
Sill	E3	0.10
Jamb	E4	0.06
Ground Floor	E5	0.12
Exposed floor to external wall	E20	0.20
Intermediate Floor between Dwelling	E7	0.18
Balcony	E23	0.50
Roof Parapet	E15	0.30
External corner	E16	0.09
Inverted corner	E17	-0.09
Party corner	E18	0.14
Party Wall Intermediate Floor	P3	0.00
Party wall - Roof (insulation at ceiling level)	P4	0.16

Space Heating and Hot Water

- 5.9** Space heating and hot water will be provided by refrigerant based air source heat pump (ASHP) with a good heating Coefficient of Performance (COP). Further details of the efficiencies of the actual air source heat pumps is presented in the renewable energy technologies section.
- 5.10** A low heat loss storage cylinder will cover the required hot water demand.
- 5.11** In line with the GLA guidelines, a gas boiler with an efficiency of 89.5% is utilised for space heating and hot water for the Be Lean stage.

Cooling

- 5.12** Significant noise levels from the roads that run past the site means windows cannot be opened. Therefore, active cooling is proposed to provide comfort to occupants acoustically and thermally for the apartments. Further information on the overheating strategy is provided in Overheating report, Harniss, June 2024.
- 5.13** Cooling is to be provided by the individual air source heat pump.
- 5.14** It is expected that the comfort cooling unit from the individual source heat pump will achieve Energy Efficiency Ratio (EER) of 3.26.

Lighting

- 5.15** Energy efficient lighting will be installed in 100% of internal fittings in the homes. It is expected that the light fittings specified are to exceed 80 lumens per circuit watt.

Non-Residential

Building Envelope

- 5.16** This development will incorporate enhanced insulation in the building envelope (walls, roofs, floors and windows) with aims to achieve average U-values better than those required by Part L 2021 of the Building Regulations. These are likely to include the following targets which will be further refined at detailed design stage:
- > High Performance Double Glazing with a U-value of $1.3 \text{ W/m}^2\text{.K}$ (soft low E-coating, G-values of 0.21, 0.28 & 0.32 and light transmittance of 0.60) .
 - > External walls with a U-value of $0.21 \text{ W/m}^2\text{.K}$;
 - > Wall to bin store and plant room U value of $0.21 \text{ W/m}^2\text{.K}$;
 - > Hydro pool wall U value of $0.21 \text{ W/m}^2\text{.K}$;
 - > Ground floor u-value of $0.10 \text{ W/m}^2\text{.K}$;
 - > Floor to bin store and plant room U value of $0.21 \text{ W/m}^2\text{.K}$;
 - > Pitched and flat roof U-value of $0.12 \text{ W/m}^2\text{.K}$

Air Tightness and Ventilation

- 5.17** All the bedrooms will be naturally ventilated.
- 5.18** Intermittent extract fans are expected to be specified for the wet rooms such as ensembles, WCs, laundry, and changing rooms. Extract fans will achieve a specific fan power of 0.2 W/l/s for the ensembles and 0.50 W/l/s for the other areas.
- 5.19** The kitchen will have a dedicated supply and extract fans which will achieve specific fan powers of 1.0W/l/s.
- 5.20** A mechanical ventilation unit with heat recovery is proposed for all areas excluding transitory areas and spaces mentioned above. The assessment has considered a specific fan power of no more than 1.0 W/l/s and heat recovery efficiency greater than 85%, with the inclusion of a summer bypass. Ventilation is expected to be demand controlled using variable speed control and CO₂ sensors.
- 5.21** The proposed development is expected to achieve an air permeability of 5 m³/hr.m² or less, thus further reducing space heating demands.

Space Heating

- 5.22** The space heating requirement will be reduced by the fabric and air tightness measures detailed above.
- 5.23** Communal air source heat pumps are proposed to provide space heating for the rehabilitation clinic. Further details of the proposed heating strategy are presented in Be Clean.
- 5.24** It is expected that radiators with underfloor heating emitters will be specified.
- 5.25** Variable Refrigerant Flow (VRF) heat pumps has been specified for spaces that also require cooling. This is because VRFs can provide space heating and cooling simultaneously. This is further discussed in the limiting the risk of summer overheating & cooling section of the report.
- 5.26** It is expected ducted ceiling cassettes emitters will be specified to provide space heating and cooling to these spaces.
- 5.27** In line with the GLA's Energy Assessment Guidance for the Be Lean stage, an air source heat pump with COP of 2.64 can be used.

Hot Water

- 5.28** The hot water provisions will be provided by the communal air source heat pumps. A low heat loss storage cylinder will cover will be specified to cover the required hot water demand.
- 5.29** A In line with the GLA's Energy Assessment Guidance for the Be Lean stage, an air source heat pump with COP of 2.86 can be used.
- 5.30** Hot water is contributing to most of the energy demand of the development, this is due to the large number of shower rooms. To reduce the hot water demand, the showers are to be fitted with flow restrictors to achieve a low flow rate of 6litres/min.

Lighting

- 5.31** Energy efficient LED light fittings are to be installed for all areas. Lighting in all areas is expected to exceed 110 lamp lumens per circuit-watt with light output ratio of 1. The light output ratio is the percentage of light emitted from the light source.
- 5.32** Appropriate demand reducing light controls are to be installed in most areas. This will be achieved through the use of occupancy sensors.

Metering

- 5.33** Lighting, heating, hot water and cooling are to be separately sub-metered.

BREEAM

- 5.34** The proposed energy strategy above is expected some energy credits to enable the development to achieve the BREEAM Very Good requirement.

Limiting the Risk of Summer Overheating & Cooling

- 5.35** Minimising the risk of summer overheating is important so as to ensure that buildings are adapted to climate change and remains comfortable to the occupants in the future.
- 5.36** It is anticipated that a G-Values ranging from 0.21, 0.28 & 0.32 have been specified. The initial SBEM calculation shows compliance with the Part L Criterion 3 limiting the effects of heat gains in summer. Further information on the overheating strategy is provided in Overheating report, Harniss, June 2024.
- 5.37** Cooling has not been specified for majority of the development, this includes bedrooms, transitory spaces and generally unoccupied spaces. Where cooling is specified is for specialist rooms which require controlled indoor temperatures.

- 5.38 Cooling will be provided by a dedicated air source heat pump. The air source heat pump will have a cooling Energy Efficiency Ratio (EER) of 4.0 and Seasonal Energy Efficiency Ratio SEER of 6.5.
- 5.39 Table 3 below shows the cooling demand for the development is small and significantly less than the notional cooling demand. This is because the rehabilitation clinic has been passively designed to minimise the requirement for active cooling.

Table 3: Cooling Demands

	Area weighted non-domestic cooling demand (MJ/m²)	Total area weighted non-domestic cooling demand (MJ/year)
Actual	25.3	88,131
Notional	30.3	105,833

CO₂ Emissions Following *Be Lean* Measures

- 5.40 Table 4 shows the apartments and the rehabilitation clinic achieve a 16.2% and 19% reduction in CO₂ emissions respectively through the application of energy efficiency measures, the development exceeds the required 10% and 15% reduction in regulated CO₂ at the *Be Lean* stage.

Table 4: Reduction in regulated CO₂ emissions following *Be Lean* measures

	Baseline (tCO ₂ /Yr)	Be Lean (tCO ₂ /Yr)	Reduction Achieved (%)
Residential: Apartments	10.5	8.8	16.2%
Non-Residential: Rehabilitation clinic	18.9	15.3	19.0%

- 5.41 The SAP calculation sheets and the BRUKL for the *Be Lean* stage are shown in Appendix A and B.
- 5.42 Table 5 shows the apartments exceed the Target Fabric Energy Efficiency (TFEE) requirements of Building Regulations Part L 2021.

Table 5: Fabric energy efficiency following Be Lean measures

	Fabric Energy Efficiency (kWh/yr)
Baseline	47.06
After Be Lean Measures	46.45
Reduction Achieved	1.3%

6. BE CLEAN : DECENTRALISED ENERGY

- 6.1** The second part of the London Plan Energy Hierarchy is Be Clean examines decentralised energy.
- 6.2** In line with the London Plan Policy SI3 Energy Infrastructure, the heat source for the onsite communal heat network has been considered in line with the following hierarchy:
- connect to local existing or planned heat networks;*
 - use zero-emission or local secondary heat sources (in conjunction with heat pump, if required);*
 - 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);*
 - use ultra-low NOx gas boilers.*

Connect to Local Existing or Planned Heat Networks

- 6.3** Figure, 5 below, shows the development (green) on the London Heat Map. Figure 3 shows there are no current or proposed networks in place for the development to connect to.

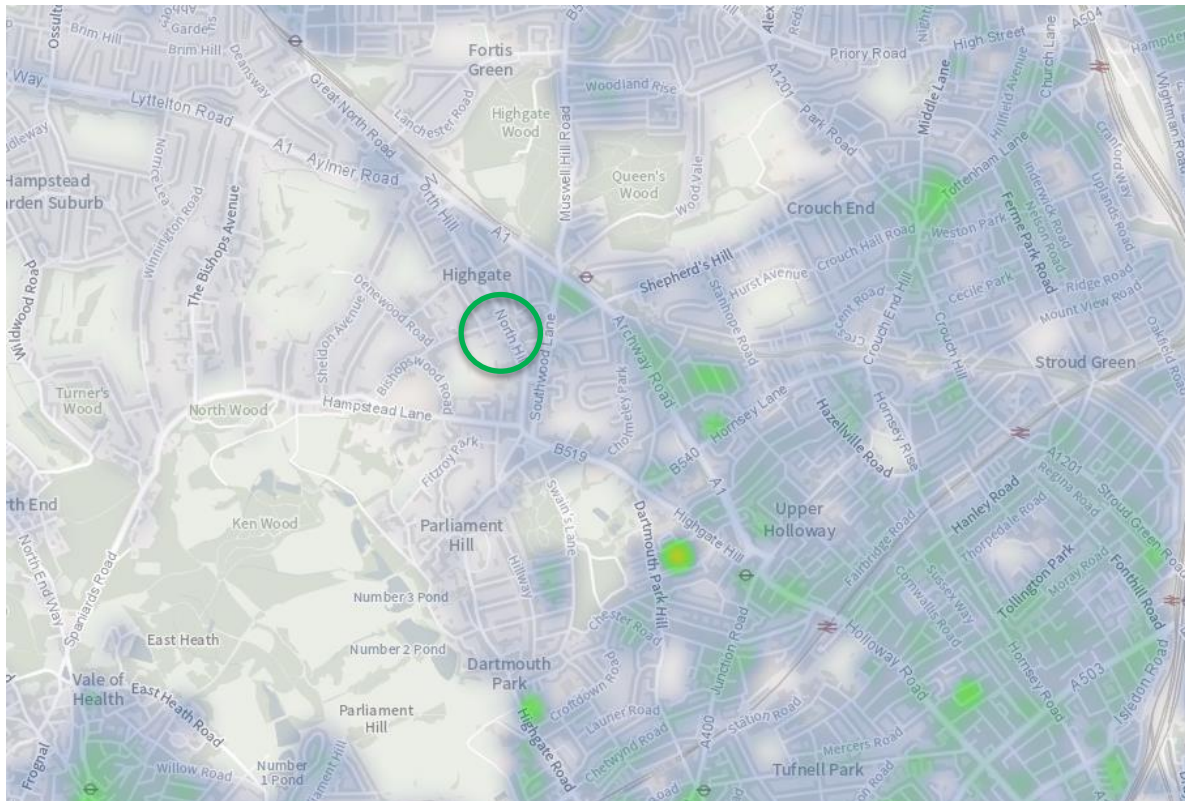


Figure 5: London Heat Map

Zero-Emission or Local Secondary Heat Sources (with Heat Pumps)

- 6.4** A low carbon heat network is proposed for the rehabilitation clinic. This will consist of air source heat pumps. The feasibility of ground source heat pumps has been considered and further information is provided in the Be Green section of the report.
- 6.5** The air source heat pumps will have Seasonal Coefficient of Performance (SCOP) of 3.6.
- 6.6** It is anticipated that the heat pump units are to be installed on the pitched roof space, in a plant deck. The rooftop heat pump units will be connected to the plant room and where the heat distribution will be led from.
- 6.7** In addition to the heat pump internal units, the plant room will also contain thermal stores and other ancillary plant. The plant room has been sized at 58 m², with a floor to ceiling height of 3.6m.
- 6.8** It has been determined that it is not suitable for the apartments to connect to the communal heating system located in the rehabilitation clinic building for the following reasons:
- > The rehabilitation clinic and the apartment block are going to be operated separately.

- > The rehabilitation clinic has significantly larger energy demand compared to the dwellings. This would result in a high cost to be passed onto the residents of the apartment block;
- > In line with the Energy Statement Guidance June 2022, it is not required for low density residential developments to connect to communal heat networks;
- > The lack of space in the apartment block for a plant room needed for the connection to the communal heating system;
- > Cooling is required for the apartments, and it is more appropriate for a single technology to provide this.

CO₂ Emissions Following *Be Clean* Measures

6.9 Table 5 below, shows for the rehabilitation clinic there is a further 11.6% reduction in CO₂ emissions following the *Be Clean* stage of the energy hierarchy.

Table 5: Reduction in regulated CO₂ emissions following *Be Clean* measures

	Baseline (tCO₂/Yr)	Be Lean (tCO₂/Yr)	Be Clean (tCO₂/Yr)	Reduction Achieved over the Be Lean (%)
Residential - Apartments	10.5	8.8	8.8	0.0%
Non-Residential: Rehabilitation clinic	18.9	15.3	13.1	11.6%

6.10 The BRUKL for the *Be Clean* stage are shown in Appendix C

7. **BE GREEN: RENEWABLE ENERGY TECHNOLOGIES**

- 7.1** The third part of the London Plan Energy Hierarchy is *Be Green* which examines the feasibility of renewable energy technologies.
- 7.2** In line with the Energy Hierarchy and Policy SP4 of the Haringey's local plan which requires a 20% reduction in CO₂ emissions from onsite renewable energy technologies. An assessment of the feasibility of renewable energy technologies is undertaken and presented in this section.

Wind Turbines

- 7.3** Small rooftop wind turbines are designed to generate electricity from the wind.
- 7.4** Urban rooftop wind turbines do not generally perform sufficiently well to warrant their installation, due to the low and turbulent wind conditions present. They are therefore likely to remain technically unfeasible.
- 7.5** It has therefore been concluded that wind turbines are not a suitable technology for this site.

Ground Source Heat Pumps (GSHPs)

- 7.6** Heat Pumps upgrade energy from the ground and utilise it for space heating and hot water.
- 7.7** Ground Source Heat Pumps (GSHPs) are able to provide substantial reductions in energy.
- 7.8** GSHP will require extensive work to be undertaken on the existing site. Ground excavation works to bury coils, or boreholes will need to be carried out. This will be very difficult and expensive to undertake.
- 7.9** It has therefore been concluded that ground source heat pumps are not a suitable technology for this development.

Air Source Heat Pumps (ASHPs)

- 7.10** Air Source Heat Pumps are a more economical alternative to GSHPs as they do not require ground works.
- 7.11** Air source heat pump utilise the ambient air temperature to generate heat. Communal air source heat pumps are proposed for the rehabilitation clinic and have been considered in the Be Clean section of the report.

- 7.12** Individual air source heat pumps are proposed for the apartments. The heat pump selected can provide space heating, cooling and hot water provisions simultaneously without requiring a separate unit to provide cooling. The estimated Seasonal Coefficient of Performance (SCOP) is 3.3 for space heating and hot water.
- 7.13** For the rehabilitation clinic where cooling is required, it is more efficient for the heat pump to simultaneously provide heating. A dedicated air source heat pump has been specified for these areas that require cooling. The unit which is specified is expected to achieve a SCOP of 5.0.

Solar Thermal Panels

- 7.14** Solar thermal panels use the sun's energy to generate hot water. Solar thermal panels are generally installed on the roofs, with panels facing as close to south as possible to maximise their efficiency.
- 7.15** The specification of showers with low flow rates and photovoltaics have been determined to be more suitable method for the development to achieve compliance with the planning requirements.

Photovoltaics (PV)

- 7.16** PV panels generate electricity from solar radiation. The generating potential of PV panels is not dependent on development demand, but only on available roof space for installation and ensuring that they are not over shaded. PV panels have the potential to offset a considerable amount of CO₂ emissions they represent a suitable measure for generating renewable energy.
- 7.17** It is estimated that a total PV output of 25kWp, with a south-east/south-west orientation and a pitch of 30 degrees can be specified for the rehabilitation clinic building.
- 7.18** The PV has been maximised on the available roof space because PV could not be specified on some sections of the roof due to the development being located in a conservation area.
- 7.19** The air source heat pumps are to be located on the roof of the apartment block which means there is insufficient space for PV panels.
- 7.20** An indicative roof plan showing the PV panels specified for the rehabilitation clinic and the air source heat pumps for the apartments are shown in the Appendix D for rehabilitation clinic.

CO₂ Emissions Following Be Green Measures

- 7.21 Table 6, below, outlines there is further 52.4 and 4.8% reduction in CO₂ emissions following the inclusion of PV for the apartments and rehabilitation clinic.
- 7.22 The specification of the air source heat pumps and PV means the development is compliant with planning policy to achieve a 20% reduction from onsite renewable energy and decentralised renewable energy.
- 7.23 The table 6 also shows the development exceeds the requirement to achieve a 35% reduction in CO₂ emissions over the baseline.

Table 6: Reduction in regulated CO₂ emissions following Be Green measures

	Baseline (tCO ₂ /Yr)	Be Lean (tCO ₂ /Yr)	Be Clean (tCO ₂ /Yr)	Be Green (tCO ₂ /Yr)	Reduction Achieved over Be Clean (%)
Residential: Apartments	10.5	8.8	8.8	3.3	52.4%
Non-Residential: Rehabilitation clinic	18.9	15.3	13.1	12.2	4.8%

- 7.24 The SAP calculation sheets and the BRUKL documents following Be Gren stage is shown in Appendix E and F. The GLA emission reporting spreadsheet is shown in Appendix G.

8. **BE SEEN: ENERGY MONITORING**

- 8.1** The London Plan (2021) introduced a fourth stage to the energy hierarchy; the *Be Seen* stage, which proposes monitoring and reporting of the actual operational energy performance of major developments for at least five years.
- 8.2** An effectively implemented post-construction monitoring regime can have several benefits including environmental (e.g. reduced grid infrastructure strain, carbon emissions reduction) and socio-economic (e.g. reduced occupants bills and raised awareness around energy use).
- 8.3** The *Be Seen* stage aims to monitor the actual energy and carbon performance of buildings and compare with the estimated figures put forward at both planning and as-built stages. This will assist with achieving a zero-carbon London and determining the effectiveness of the incumbent policies.
- 8.4** The figure below outlines the three stages for submission of information, and who is responsible for compiling all necessary outputs.

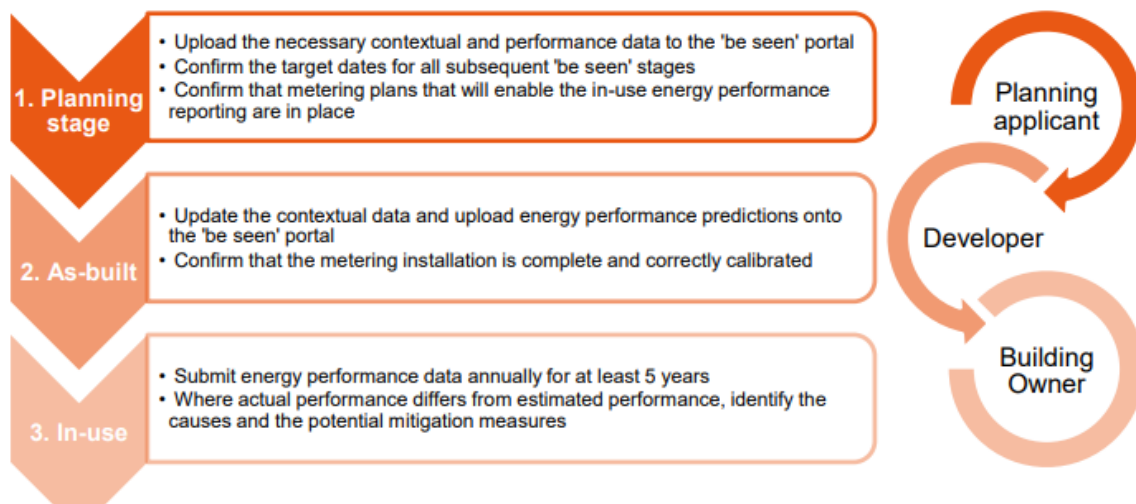


Figure 6: *Be Seen* Process and Responsibilities

- 8.5** In line with the GLA *Be Seen* energy monitoring guidance document (September 2021), the following data points are to be monitored:
- > Electricity consumption for dwellings and rehabilitation clinic (this encapsulates all energy used);
 - > Electricity consumption for communal areas for apartment and rehabilitation clinic ;
 - > Electricity, and water used in the plant room;

- > Heat and electricity leaving the plant room;
- > Generation from PV panels.

- 8.6 The metering and controls strategy will be further developed during the detailed design process. Carbon emissions associated with these energy uses will also be accounted for.
- 8.7 A reduction in unregulated demands will also be encouraged. More information on e.g. supply of white goods can be found in the sustainability statement.
- 8.8 The table below shows the expected Energy Use Intensity (EUI) and space heating demand of the development.

Table 7: Energy Use Intensity (EUI) and space heating demand

	EUI (kWh/m ² /Yr)	Space Heating Demand (kWh/m ² /Yr)
Residential - Apartments	52.8	9.4
Non-Residential: Rehabilitation clinic	135.0	7.1

- 8.9 The EUI for rehabilitation clinic is considerably above the figures provided in the Energy Statement Guidance June 2022. This is due to the large unregulated energy and hot water demand. However, this is despite the hot water demand being reduced significantly with the specification of low flow rate showers.

9. ZERO CARBON

- 9.1** In line with the GLA guidelines, the development will need to achieve the zero carbon target. Therefore, the development is subject to an additional offset payment to meet a 100% reduction in Regulated CO₂ emissions to achieve zero carbon target. This offset payment to the London borough of Haringey is expected to be allocated to carbon reductions savings elsewhere in the borough.
- 9.2** After the inclusion of Be Lean, Be Clean and Be Green measures as specified above, it is estimated that the remaining regulated CO₂ emissions from the development is 15.5Tonnes CO₂ per annum.
- 9.3** In line with the GLA's carbon offsetting policy, a carbon offset fee of £95 per tonne of Regulated CO₂ per year, for a period of 30 years, has been used to calculate the "Zero Carbon" contribution.
- 9.4** Table 8 below shows the calculation for the carbon offset payment, which is estimated to be £44,175 for the development.

Table 8: Carbon Offset Payment

	Emissions Per Annum (tCO₂)	Emissions over 30 years (tCO₂)
Shortfall to Zero Carbon	15.5	465
Cash in lieu Contribution (£95/tCO₂)	-	£44,175

10.SUMMARY

- 10.1** The proposed development is to redevelop the Former Mary Feilding Guild Care Home to provide a new rehabilitation clinic and 9 apartments in the London Borough of Haringey.
- 10.2** The Energy Strategy for the development has been formulated following The London Plan Energy Hierarchy: Be Lean, Be Clean, Be Green and Be Seen. The overriding objective in the formulation of the strategy is to maximise the reductions in CO₂ emissions through the application of this Hierarchy with a cost-effective, viable and technically appropriate approach and to minimise the emission of other pollutants. The energy strategy has been developed in consultation with London Borough of Haringey throughout the pre-application process.
- 10.3** The energy strategy proposed for the development is compliant with the requirements of the London Plan and local policies.
- 10.4** The proposed development has been assessed under Part L 2021.
- 10.5** A range of Be Lean energy efficiency measures are proposed for this development to exceed the Part L 2021 baseline through energy efficiency measures alone.
- 10.6** In line with The London Plan, the feasibility of decentralised energy production as a Be Clean measure has been assessed. There are no existing or proposed heat networks for the development to connect to. A communal heating system consisting of air source heat pumps is proposed for the rehabilitation clinic.
- 10.7** An appropriate range of Be Green renewable energy generation technologies have been considered. Air source heat pumps and solar photovoltaics are considered the most appropriate technologies for this development and have therefore, been specified.
- 10.8** The summary tables below demonstrate the reduction in regulated CO₂ emissions after each stage of the Energy Hierarchy showing energy policy requirements have been exceeded.

Summary Table i: Residential: Apartments Carbon Dioxide Emissions and Savings after each stage of the Energy Hierarchy

	Regulated CO ₂ Emissions (tCO ₂)Yr)	Unregulated CO ₂ Emissions (tCO ₂)Yr)	Savings Regulated CO ₂ Emissions (tCO ₂)Yr)	Reduction in Regulated CO ₂ Emissions Achieved (%)
Baseline	10.5	1.6	-	-
After Be Lean Measures	8.8	1.6	1.7	16.2%
After Be Clean Measures	8.8	1.6	0.0	0.0%
After Be Green Measures	3.3	1.6	5.5	52.4%
Cumulative On-Site	-	-	7.2	68.6%

Summary Table ii: Non-Residential: Rehabilitation clinic Carbon Dioxide Emissions and Savings after each stage of the Energy Hierarchy

	Regulated CO ₂ Emissions (tCO ₂)Yr)	Unregulated CO ₂ Emissions (tCO ₂)Yr)	Savings Regulated CO ₂ Emissions (tCO ₂)Yr)	Reduction in Regulated CO ₂ Emissions Achieved (%)
Baseline	18.9	25.1	-	-
After Be Lean Measures	15.3	25.1	3.6	19.0%
After Be Clean Measures	13.1	25.1	2.2	11.6%
After Be Green Measures	12.2	25.1	0.9	4.8%
Cumulative On-Site	-	-	6.7	35.4%

Summary Table iii: Site Wide Carbon Dioxide Emissions and Savings after each stage of the Energy Hierarchy

	Regulated CO ₂ Emissions (tCO ₂)Yr)	Unregulated CO ₂ Emissions (tCO ₂)Yr)	Savings Regulated CO ₂ Emissions (tCO ₂)Yr)	Reduction in Regulated CO ₂ Emissions Achieved (%)
Baseline	29.4	26.7	-	-
After Be Lean Measures	24.1	26.7	5.3	18.0%
After Be Clean Measures	21.9	26.7	2.2	7.5%
After Be Green Measures	15.5	26.7	6.4	21.8%
Cumulative On-Site	-	-	13.9	47.3%

10.10 In line with the GLA guidelines, a carbon offset payment is required achieve the Zero Carbon target. A regulated CO₂ emission of 15.5tCO₂ emission will need to be offset over a 30-year period. The table below shows the estimated carbon offset payment for the development is expected to be £44,175.

Table iv: Carbon Offset	
Residual CO₂ (tCO₂/year)	15.5
Carbon Price (£/t)	£95
Carbon Offset Payment (£)	£1,473
Total Carbon Offset Payment (£)	£44,175

APPENDICES

Appendix A

SAP Calculation Sheets – Be Lean

Appendix B

BRUKL – Be Lean

Appendix C

BRUKL – Be Clean

Appendix D

Roof Layout

Appendix E

SAP Calculation Sheets – Be Clean

Appendix F

BRUKL – Be Green

Appendix G

GLA Emission Reporting Spreadsheet

Appendix A

SAP Calculation Sheets – Be Lean

Full SAP Calculation Printout



Property Reference	1 Bed 1st Floor Flat - SE			Issued on Date	17/06/2024
Assessment Reference	1 Bed 1st Floor Flat - SE	Prop Type Ref	1 Bed 1st Floor Flat - SE		
Property	1 Bed 1st Floor Flat - SE, 1 Bed 1st Floor Flat - SE, North Hill , London, N10				
SAP Rating	83 B	DER	15.61	TER	15.94
Environmental	88 B	% DER < TER			2.07
CO ₂ Emissions (t/year)	0.85	DFEE	44.59	TFEE	42.14
Compliance Check	See BREL	% DFEE < TFEE			-5.80
% DPER < TPER	-5.29	DPER	89.30	TPER	84.81
Assessor Details	Miss Nimco Ali			Assessor ID	R572-0001
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	61.3000 (1b)	3.0000 (2b)	183.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	183.9000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (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
Glazing (Uw = 0.85)			15.1700	0.8221	12.4705		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
Exposed Floor to Corridor			4.9300	0.1400	0.6902		(28b)
External Wall	67.6800	15.1700	52.5100	0.1600	8.4016	150.0000	(29a)
Corridor	24.5100	2.0000	22.5100	0.1800	4.0518	150.0000	(29a)
Total net area of external elements Aum(A, m ²)			97.1200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.6141		(33)
Party Wall 1			15.2400	0.0000	0.0000	70.0000	(32)
Party Floor 1			56.3700			40.0000	(32d)
Party Ceiling 1			61.3000			30.0000	(32b)
Internal Wall 1			53.7300			9.0000	(32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	16897.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							275.6471 (35)
List of Thermal Bridges							

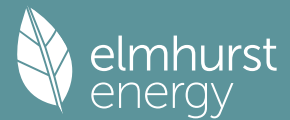
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	17.3204	17.1099	16.8994	15.8469	15.6364	14.5838	14.5838	14.3733	15.0049	15.6364	16.0574	16.4784 (38)
Heat transfer coeff	57.9002	57.6896	57.4791	56.4266	56.2161	55.1635	55.1635	54.9530	55.5846	56.2161	56.6371	57.0581 (39)
Average = Sum(39)m / 12 =												56.3740
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9445	0.9411	0.9377	0.9205	0.9171	0.8999	0.8999	0.8965	0.9068	0.9171	0.9239	0.9308 (40)
HLP (average)												0.9196
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy													2.0181 (42)
Hot water usage for mixer showers	58.0572	57.1847	55.9133	53.4808	51.6856	49.6836	48.5457	49.8075	51.1906	53.3401	55.8249	57.8347 (42a)	
Hot water usage for baths	25.0897	24.7171	24.1924	23.2249	22.5004	21.6971	21.2632	21.7843	22.3516	23.2112	24.1986	25.0049 (42b)	
Hot water usage for other uses	35.2978	34.0142	32.7307	31.4471	30.1636	28.8800	28.8800	30.1636	31.4471	32.7307	34.0142	35.2978 (42c)	
Average daily hot water use (litres/day)												108.8778 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	118.4447	115.9160	112.8364	108.1528	104.3496	100.2608	98.6889	101.7553	104.9893	109.2819	114.0377	118.1374 (44)	
Distribution loss (46)m = 0.15 x (45)m	187.5874	165.0629	173.4253	148.0557	140.4746	123.2823	119.3557	125.9943	129.4623	148.2946	162.4677	184.9747 (45)	
Total = Sum(45)m =												1808.4376	
Water storage loss:	28.1381	24.7594	26.0138	22.2084	21.0712	18.4923	17.9034	18.8992	19.4194	22.2442	24.3701	27.7462 (46)	
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)	
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.2908	50.9589	49.3151	50.9589	49.3151	50.9589 (61)	
Total heat required for water heating calculated for each month	238.5463	211.0903	224.3842	197.3708	191.4335	172.5974	169.6465	176.9532	178.7774	199.2535	211.7827	235.9336 (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	238.5463	211.0903	224.3842	197.3708	191.4335	172.5974	169.6465	176.9532	178.7774	199.2535	211.7827	235.9336 (64)	
12Total per year (kWh/year)												2407.7695 (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	75.1126	66.3903	70.4036	61.5573	59.4475	53.3201	52.2585	54.6328	55.3750	62.0477	66.3493	74.2438 (65)	

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	88.9646	98.4966	88.9646	91.9301	88.9646	91.9301	88.9646	88.9646	91.9301	88.9646	91.9301	88.9646 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	176.2133	178.0418	173.4339	163.6243	151.2415	139.6033	131.8283	129.9998	134.6076	144.4173	156.8001	168.4383 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907 (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)	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257 (71)
Water heating gains (Table 5)	100.9577	98.7950	94.6285	85.4962	79.9026	74.0557	70.2399	73.4312	76.9097	83.3974	92.1518	99.7901 (72)
Total internal gains	422.4077	431.6055	413.2992	397.3228	376.3808	358.8613	344.3050	345.6678	356.7196	373.0514	397.1541	413.4651 (73)

[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	9.8400	11.2829	0.3200	0.7000	0.7700	17.2345 (75)
Southeast	1.5500	36.7938	0.3200	0.7000	0.7700	8.8529 (77)
Southwest	3.7800	36.7938	0.3200	0.7000	0.7700	21.5898 (79)

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Solar gains	47.6772	86.9365	134.1560	191.7126	237.9973	246.5090	233.4026	197.3077	153.8412	100.1832	58.1488	40.1272 (83)
Total gains	470.0850	518.5421	547.4552	589.0354	614.3781	605.3703	577.7075	542.9755	510.5608	473.2346	455.3029	453.5923 (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	81.0647	81.3605	81.6585	83.1817	83.4932	85.0862	85.0862	85.4122	84.4418	83.4932	82.8725	82.2610
alpha	6.4043	6.4240	6.4439	6.5454	6.5662	6.6724	6.6724	6.6941	6.6295	6.5662	6.5248	6.4841
util living area	0.9949	0.9894	0.9761	0.9223	0.7886	0.5764	0.4194	0.4641	0.7196	0.9404	0.9880	0.9959 (86)
MIT	20.1635	20.3030	20.4983	20.7653	20.9355	20.9931	20.9993	20.9986	20.9728	20.7650	20.4326	20.1487 (87)
Th 2	20.1298	20.1327	20.1356	20.1501	20.1530	20.1676	20.1676	20.1705	20.1618	20.1530	20.1472	20.1414 (88)
util rest of house	0.9932	0.9859	0.9679	0.8976	0.7356	0.5046	0.3405	0.3812	0.6450	0.9159	0.9833	0.9945 (89)
MIT 2	19.3764	19.5165	19.7097	19.9716	20.1139	20.1648	20.1674	20.1702	20.1489	19.9786	19.6574	19.3713 (90)
Living area fraction									fLA = Living area / (4) =			0.4840 (91)
MIT	19.7573	19.8972	20.0914	20.3557	20.5116	20.5657	20.5700	20.5712	20.5477	20.3592	20.0326	19.7476 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.6073	19.7472	19.9414	20.2057	20.3616	20.4157	20.4200	20.4212	20.3977	20.2092	19.8826	19.5976 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9918	0.9839	0.9657	0.8994	0.7494	0.5263	0.3645	0.4064	0.6669	0.9178	0.9814	0.9933 (94)
Useful gains	466.2467	510.1982	528.6794	529.7887	460.4092	318.6187	210.5673	220.6553	340.5032	434.3448	446.8498	450.5532 (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	886.2979	856.5273	772.5993	637.9446	486.9188	320.8151	210.7274	220.9746	350.0538	540.1925	723.9695	878.5565 (97)
Space heating kWh	312.5180	232.7332	181.4763	77.8722	19.7231	0.0000	0.0000	0.0000	0.0000	78.7507	199.5262	318.4345 (98a)
Space heating requirement - total per year (kWh/year)												1421.0343
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	312.5180	232.7332	181.4763	77.8722	19.7231	0.0000	0.0000	0.0000	0.0000	78.7507	199.5262	318.4345 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1421.0343
Space heating per m2										(98c) / (4) =		23.1816 (99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	518.5373	408.2103	417.6431	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9516	0.9810	0.9708	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	493.4355	400.4365	405.4623	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	667.3243	637.1717	597.8063	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	125.1999	176.1310	143.1040	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.7178 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	22.4665	31.6059	25.6793	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												79.7518 (107)

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)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	312.5180	232.7332	181.4763	77.8722	19.7231	0.0000	0.0000	0.0000	0.0000	78.7507	199.5262	318.4345 (98)
Space heating efficiency (main heating system 1)	89.5000	89.5000	89.5000	89.5000	89.5000	0.0000	0.0000	0.0000	0.0000	89.5000	89.5000	89.5000 (210)
Space heating fuel (main heating system)	349.1822	260.0371	202.7669	87.0081	22.0370	0.0000	0.0000	0.0000	0.0000	87.9896	222.9343	355.7927 (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	238.5463	211.0903	224.3842	197.3708	191.4335	172.5974	169.6465	176.9532	178.7774	199.2535	211.7827	235.9336 (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	266.5322	235.8551	250.7086	220.5260	213.8922	192.8462	189.5492	197.7131	199.7513	222.6296	236.6287	263.6129 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	6.8916	9.6951	7.8771	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	21.1190	19.0753	21.1190	20.4378	21.1190	20.4378	21.1190	21.1190	20.4378	21.1190	20.4378	21.1190 (231)
Lighting	18.4851	14.8294	13.3523	9.7824	7.5562	6.1735	6.8930	8.9598	11.6380	15.2696	17.2470	18.9989 (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)

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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													1587.7478	(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													2690.2452	(219)
Space cooling fuel													24.4637	(221)
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)														
mechanical ventilation fans (SFP = 0.7250)													162.6595	(230a)
central heating pump													41.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													248.6595	(231)
Electricity for lighting (calculated in Appendix L)													149.1853	(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													4700.3016	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1587.7478	0.2100	333.4270	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2690.2452	0.2100	564.9515	(264)
Space and water heating			898.3785	(265)
Space cooling	24.4637	0.1139	2.7854	(266)
Pumps, fans and electric keep-hot	248.6595	0.1387	34.4921	(267)
Energy for lighting	149.1853	0.1443	21.5320	(268)
Total CO2, kg/year			957.1881	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			15.6100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1587.7478	1.1300	1794.1550	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2690.2452	1.1300	3039.9771	(278)
Space and water heating			4834.1321	(279)
Space cooling	24.4637	1.4197	34.7311	(280)
Pumps, fans and electric keep-hot	248.6595	1.5128	376.1722	(281)
Energy for lighting	149.1853	1.5338	228.8254	(282)
Total Primary energy kWh/year			5473.8608	(286)
Dwelling Primary energy Rate (DPER)			89.3000	(287)

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

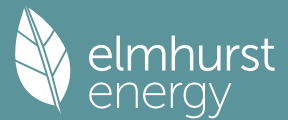
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	61.3000	(1b)	x	3.0000 (2b) = 183.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.3000			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	183.9000 (5)

2. Ventilation rate

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

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Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
20.0000 / (5) = 0.1088 (8)
Yes
Blower Door
5.0000 (17)
0.3588 (18)
1 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
(21) = (18) x (20) = 0.3318 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4231	0.4148	0.4065	0.3650	0.3567	0.3153	0.3153	0.3070	0.3318	0.3567	0.3733	0.3899 (22b)
	0.5895	0.5860	0.5826	0.5666	0.5636	0.5497	0.5497	0.5471	0.5551	0.5636	0.5697	0.5760 (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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			13.3200	1.1450	15.2519		(27)
Exposed Floor to Corridor			4.9300	0.1300	0.6409		(28b)
External Wall	67.6800	13.3200	54.3600	0.1800	9.7848		(29a)
Corridor	24.5100	2.0000	22.5100	0.1800	4.0518		(29a)
Total net area of external elements Aum(A, m ²)			97.1200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.7294		(33)
Party Wall 1			15.2400	0.0000	0.0000		(32)

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

285.6471 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	36.1200	0.0700	2.5284
E7 Party floor between dwellings (in blocks of flats)	14.4000	0.0700	1.0080
E16 Corner (normal)	12.0000	0.0900	1.0800
E16 Corner (normal)	6.0000	0.0900	0.5400
E17 Corner (inverted - internal area greater than external area)	9.0000	-0.0900	-0.8100
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E18 Party wall between dwellings	3.0000	0.0600	0.1800
E18 Party wall between dwellings	3.0000	0.0600	0.1800
E20 Exposed floor (normal)	1.9400	0.3200	0.6208
P7 Party Wall - Exposed floor (normal)	5.0800	0.1600	0.8128
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.0800	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	7.0600	0.0200	0.1412
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740
E3 Sill	6.5300	0.0500	0.3265
E4 Jamb	27.6400	0.0500	1.3820

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

8.0937 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 39.8231 (37)

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

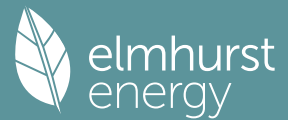
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	35.7756	35.5646	35.3579	34.3867	34.2050	33.3592	33.3592	33.2026	33.6850	34.2050	34.5726	34.9569 (38)
Heat transfer coeff	75.5987	75.3877	75.1810	74.2099	74.0282	73.1823	73.1823	73.0257	73.5081	74.0282	74.3957	74.7800 (39)
Average = Sum(39)m / 12 =												74.2090

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.2333	1.2298	1.2264	1.2106	1.2076	1.1938	1.1938	1.1913	1.1992	1.2076	1.2136	1.2199 (40)
HLP (average)												1.2106
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0181 (42)
Hot water usage for mixer showers													
58.0572	57.1847	55.9133	53.4808	51.6856	49.6836	48.5457	49.8075	51.1906	53.3401	55.8249	57.8347	(42a)	
Hot water usage for baths													
25.0897	24.7171	24.1924	23.2249	22.5004	21.6971	21.2632	21.7843	22.3516	23.2112	24.1986	25.0049	(42b)	
Hot water usage for other uses													
35.2978	34.0142	32.7307	31.4471	30.1636	28.8800	28.8800	30.1636	31.4471	32.7307	34.0142	35.2978	(42c)	
Average daily hot water use (litres/day)												108.8778 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
118.4447	115.9160	112.8364	108.1528	104.3496	100.2608	98.6889	101.7553	104.9893	109.2819	114.0377	118.1374	(44)	
Energy content (annual)	187.5874	165.0629	173.4253	148.0557	140.4746	123.2823	119.3557	125.9943	129.4623	148.2946	162.4677	184.9747 (45)	
Distribution loss (46)m = 0.15 x (45)m	28.1381	24.7594	26.0138	22.2084	21.0712	18.4923	17.9034	18.8992	19.4194	22.2442	24.3701	27.7462 (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	50.2908	50.9589	49.3151	50.9589	49.3151	50.9589 (61)	
Total heat required for water heating calculated for each month													
238.5463	211.0903	224.3842	197.3708	191.4335	172.5974	169.6465	176.9532	178.7774	199.2535	211.7827	235.9336	(62)	
WWHRS	-26.5413	-23.4734	-24.5800	-20.3532	-18.9684	-16.2314	-15.2144	-16.1790	-16.7936	-19.7979	-22.4286	-26.0498 (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	212.0050	187.6169	199.8043	177.0176	172.4651	156.3660	154.4322	160.7743	161.9838	179.4556	189.3542	209.8838 (64)	
Total per year (kWh/year) = Sum(64)m =												2161.1586 (64)	
12Total per year (kWh/year)												2161 (64)	

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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	75.1126	66.3903	70.4036	61.5573	59.4475	53.3201	52.2585	54.6328	55.3750	62.0477	66.3493	74.2438 (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	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	176.2133	178.0418	173.4339	163.6243	151.2415	139.6033	131.8283	129.9998	134.6076	144.4173	156.8001	168.4383	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	(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)	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	(71)
Water heating gains (Table 5)	100.9577	98.7950	94.6285	85.4962	79.9026	74.0557	70.2399	73.4312	76.9097	83.3974	92.1518	99.7901	(72)
Total internal gains	422.3941	431.5904	413.2856	397.3087	376.3672	358.8472	344.2913	345.6541	356.7055	373.0378	397.1400	413.4514	(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	8.6400	11.2829	0.6300	0.7000	0.7700	29.7926 (75)		
						Southeast	1.3600	36.7938	0.6300	0.7000	0.7700	15.2928 (77)		
						Southwest	3.3200	36.7938	0.6300	0.7000	0.7700	37.3323 (79)		
Solar gains		82.4176	150.2836	231.9098	331.4056	411.4161	426.1298	403.4733	341.0776	265.9389	173.1826	100.5195	69.3662 (83)	
Total gains		504.8117	581.8740	645.1954	728.7143	787.7833	784.9770	747.7647	686.7317	622.6444	546.2204	497.6595	482.8176 (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	64.3389	64.5189	64.6964	65.5430	65.7039	66.4633	66.4633	66.6058	66.1687	65.7039	65.3792	65.0433	
alpha	5.2893	5.3013	5.3131	5.3695	5.3803	5.4309	5.4309	5.4404	5.4112	5.3803	5.3586	5.3362	
util living area	0.9953	0.9893	0.9739	0.9165	0.7814	0.5815	0.4281	0.4840	0.7465	0.9484	0.9896	0.9962	(86)
MIT	19.8216	20.0101	20.2833	20.6420	20.8865	20.9815	20.9970	20.9945	20.9339	20.6079	20.1576	19.7953	(87)
Th 2	19.8935	19.8962	19.8989	19.9115	19.9139	19.9249	19.9249	19.9270	19.9207	19.9139	19.9091	19.9041	(88)
util rest of house	0.9935	0.9854	0.9641	0.8870	0.7178	0.4908	0.3249	0.3739	0.6561	0.9233	0.9851	0.9949	(89)
MIT 2	18.5460	18.7872	19.1315	19.5705	19.8288	19.9161	19.9242	19.9254	19.8820	19.5440	18.9856	18.5204	(90)
Living area fraction	FLA = Living area / (4) =												0.4840 (91)
MIT	19.1634	19.3791	19.6890	20.0891	20.3407	20.4317	20.4435	20.4429	20.3912	20.0589	19.5529	19.1375	(92)
Temperature adjustment													0.0000
adjusted MIT	19.1634	19.3791	19.6890	20.0891	20.3407	20.4317	20.4435	20.4429	20.3912	20.0589	19.5529	19.1375	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9920	0.9830	0.9619	0.8925	0.7443	0.5344	0.3750	0.4274	0.6978	0.9273	0.9831	0.9935	(94)
Ext temp.	500.7484	572.0106	620.5834	650.3555	586.3189	419.5217	280.4050	293.5206	434.5057	506.5077	489.2538	479.6828	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Space heating kWh	1123.6515	1091.5473	991.5608	830.3433	639.6583	426.7809	281.2737	295.2323	462.4511	700.2266	926.4390	1117.0240	(97)
Space heating requirement - total per year (kWh/year)	463.4399	349.1287	276.0072	129.5913	39.6845	0.0000	0.0000	0.0000	0.0000	144.1268	314.7733	474.1819	(98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)	463.4399	349.1287	276.0072	129.5913	39.6845	0.0000	0.0000	0.0000	0.0000	144.1268	314.7733	474.1819	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													2190.9336
Space heating per m ²													(98c) / (4) = 35.7412 (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	
463.4399	349.1287	276.0072	129.5913	39.6845	0.0000	0.0000	0.0000	0.0000	0.0000	144.1268	314.7733	474.1819	(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)	501.5584	377.8449	298.7090	140.2503	42.9486	0.0000	0.0000	0.0000	0.0000	155.9814	340.6638	513.1838	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)

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Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	212.0050	187.6169	199.8043	177.0176	172.4651	156.3660	154.4322	160.7743	161.9838	179.4556	189.3542	209.8838 (64)
Efficiency of water heater	86.0088	85.6921	85.0740	83.7232	81.7799	80.3000	80.3000	80.3000	80.3000	83.9158	85.4621	80.3000 (216)
Fuel for water heating, kWh/month	246.4923	218.9432	234.8595	211.4319	210.8894	194.7272	192.3190	200.2171	201.7232	213.8521	221.5650	86.0717 (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	18.4823	14.8272	13.3502	9.7809	7.5551	6.1726	6.8920	8.9585	11.6362	15.2673	17.2444	18.9959 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-16.5018	-24.4909	-37.0423	-43.9042	-49.3394	-46.7984	-46.2385	-42.6619	-36.6991	-28.9947	-18.5758	-14.1281 (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	-5.9370	-12.7648	-25.8882	-39.6481	-53.1748	-53.6927	-53.0505	-44.5647	-32.2111	-18.4925	-8.0033	-4.6739 (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												2371.1402 (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												2590.8675 (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)												149.1624 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-757.4765 (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												4439.6937 (238)

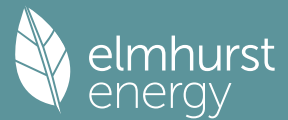
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2371.1402	0.2100	497.9394 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2590.8675	0.2100	544.0822 (264)
Space and water heating			1042.0216 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	149.1624	0.1443	21.5287 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-405.3748	0.1335	-54.1217
PV Unit electricity exported	-352.1017	0.1253	-44.1302
Total			-98.2519 (269)
Total CO2, kg/year			977.2277 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.9400 (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	2371.1402	1.1300	2679.3885 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2590.8675	1.1300	2927.6803 (278)
Space and water heating			5607.0688 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	149.1624	1.5338	228.7903 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-405.3748	1.4934	-605.3746
PV Unit electricity exported	-352.1017	0.4600	-161.9789
Total			-767.3535 (283)
Total Primary energy kWh/year			5198.6064 (286)
Target Primary Energy Rate (TPER)			84.8100 (287)

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Property Reference	1 Bed 2nd Floor Flat - SE			Issued on Date	17/06/2024
Assessment Reference	1 Bed 2nd Floor Flat - SE	Prop Type Ref	1 Bed 2nd Floor Flat - SE		
Property	1 Bed 2nd Floor Flat - SE, 1 Bed 2nd Floor Flat - SE, North Hill , London, N10				
SAP Rating	83 B	DER	15.21	TER	15.58
Environmental	89 B	% DER < TER			2.37
CO ₂ Emissions (t/year)	0.83	DFEE	42.86	TFEE	40.52
Compliance Check	See BREL	% DFEE < TFEE			-5.78
% DPER < TPER	-5.20	DPER	87.15	TPER	82.84
Assessor Details	Miss Nimco Ali			Assessor ID	R572-0001
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	61.3000 (1b)	3.0000 (2b)	183.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.3000		183.9000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	183.9000 (5)

2. Ventilation rate

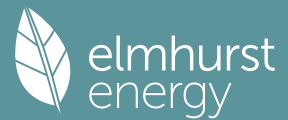
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (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
Glazing (Uw = 0.85)			15.1700	0.8221	12.4705		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
External Wall	67.6800	15.1700	52.5100	0.1600	8.4016	150.0000	7876.5000 (29a)
Corridor	24.5100	2.0000	22.5100	0.1800	4.0518	150.0000	3376.5000 (29a)
Total net area of external elements Aum(A, m ²)			92.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.9239		(33)
Party Wall 1			15.2400	0.0000	0.0000	70.0000	1066.8000 (32)
Party Floor 1			61.3000			40.0000	2452.0000 (32d)
Party Ceiling 1			61.3000			30.0000	1839.0000 (32b)
Internal Wall 1			53.7300			9.0000	483.5700 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 17094.3700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							278.8641 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

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E7 Party floor between dwellings (in blocks of flats)					38.0600	0.0900	3.4254					
E7 Party floor between dwellings (in blocks of flats)					16.3400	0.1100	1.7974					
E16 Corner (normal)					12.0000	0.0900	1.0800					
E16 Corner (normal)					6.0000	0.1400	0.8400					
E17 Corner (inverted - internal area greater than external area)					9.0000	0.0000	0.0000					
E17 Corner (inverted - internal area greater than external area)					3.0000	-0.0900	-0.2700					
E18 Party wall between dwellings					3.0000	0.0700	0.2100					
E18 Party wall between dwellings					3.0000	0.1000	0.3000					
P3 Party wall - intermediate floor between dwellings (in blocks of flats)					10.1600	0.0000	0.0000					
E23 Balcony within or between dwellings, balcony support penetrates wall insulation					7.0600	0.2500	1.7650					
E2 Other lintels (including other steel lintels)					7.4800	0.0500	0.3740					
E3 Sill					6.5300	0.1000	0.6530					
E4 Jamb					27.6400	0.0600	1.6584					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												11.8332 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 38.7571 (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	17.3204	17.1099	16.8994	15.8469	15.6364	14.5838	14.5838	14.3733	15.0049	15.6364	16.0574	16.4784 (38)
Average = Sum(39)m / 12 =	56.0776	55.8670	55.6565	54.6040	54.3935	53.3409	53.3409	53.1304	53.7620	54.3935	54.8145	55.2355 (39)
												54.5514
HLP	0.9148	0.9114	0.9079	0.8908	0.8873	0.8702	0.8702	0.8667	0.8770	0.8873	0.8942	0.9011 (40)
HLP (average)												0.8899
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.0181 (42)
Hot water usage for mixer showers												
	58.0572	57.1847	55.9133	53.4808	51.6856	49.6836	48.5457	49.8075	51.1906	53.3401	55.8249	57.8347 (42a)
Hot water usage for baths												
	25.0897	24.7171	24.1924	23.2249	22.5004	21.6971	21.2632	21.7843	22.3516	23.2112	24.1986	25.0049 (42b)
Hot water usage for other uses												
	35.2978	34.0142	32.7307	31.4471	30.1636	28.8800	28.8800	30.1636	31.4471	32.7307	34.0142	35.2978 (42c)
Average daily hot water use (litres/day)												108.8778 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	118.4447	115.9160	112.8364	108.1528	104.3496	100.2608	98.6889	101.7553	104.9893	109.2819	114.0377	118.1374 (44)
Energy content (annual)	187.5874	165.0629	173.4253	148.0557	140.4746	123.2823	119.3557	125.9943	129.4623	148.2946	162.4677	184.9747 (45)
Distribution loss (46)m = 0.15 x (45)m												
	28.1381	24.7594	26.0138	22.2084	21.0712	18.4923	17.9034	18.8992	19.4194	22.2442	24.3701	27.7462 (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	50.2908	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month												
	238.5463	211.0903	224.3842	197.3708	191.4335	172.5974	169.6465	176.9532	178.7774	199.2535	211.7827	235.9336 (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												
	238.5463	211.0903	224.3842	197.3708	191.4335	172.5974	169.6465	176.9532	178.7774	199.2535	211.7827	235.9336 (64)
12Total per year (kWh/year)												2407.7695 (64)
Electric shower(s)												2408 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	75.1126	66.3903	70.4036	61.5573	59.4475	53.3201	52.2585	54.6328	55.3750	62.0477	66.3493	74.2438 (65)

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

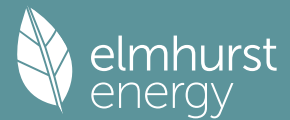
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	88.9646	98.4966	88.9646	91.9301	88.9646	91.9301	88.9646	88.9646	91.9301	88.9646	91.9301	88.9646 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	176.2133	178.0418	173.4339	163.6243	151.2415	139.6033	131.8283	129.9998	134.6076	144.4173	156.8001	168.4383 (68)
Pumps, fans	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907 (69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257 (71)
Water heating gains (Table 5)												
	100.9577	98.7950	94.6285	85.4962	79.9026	74.0557	70.2399	73.4312	76.9097	83.3974	92.1518	99.7901 (72)
Total internal gains	422.4077	431.6055	413.2992	397.3228	376.3808	358.8613	344.3050	345.6678	356.7196	373.0514	397.1541	413.4651 (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			9.8400		11.2829		0.3200		0.7000		0.7700	17.2345 (75)
Southeast			1.5500		36.7938		0.3200		0.7000		0.7700	8.8529 (77)
Southwest			3.7800		36.7938		0.3200		0.7000		0.7700	21.5898 (79)

Solar gains	47.6772	86.9365	134.1560	191.7126	237.9973	246.5090	233.4026	197.3077	153.8412	100.1832	58.1488	40.1272 (83)

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Total gains 470.0850 518.5421 547.4552 589.0354 614.3781 605.3703 577.7075 542.9755 510.5608 473.2346 455.3029 453.5923 (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	84.6762	84.9953	85.3168	86.9613	87.2979	89.0205	89.0205	89.3732	88.3233	87.2979	86.6274	85.9671
alpha	6.6451	6.6664	6.6878	6.7974	6.8199	6.9347	6.9347	6.9582	6.8882	6.8199	6.7752	6.7311
util living area	0.9949	0.9891	0.9747	0.9160	0.7739	0.5592	0.4058	0.4492	0.7026	0.9357	0.9875	0.9959 (86)
MIT	20.2180	20.3548	20.5434	20.7971	20.9491	20.9952	20.9995	20.9991	20.9795	20.7940	20.4772	20.2037 (87)
Th 2	20.1549	20.1578	20.1608	20.1754	20.1783	20.1929	20.1929	20.1959	20.1871	20.1783	20.1724	20.1666 (88)
util rest of house	0.9931	0.9854	0.9662	0.8902	0.7210	0.4910	0.3316	0.3712	0.6299	0.9100	0.9826	0.9944 (89)
MIT 2	19.4506	19.5880	19.7744	20.0224	20.1478	20.1910	20.1928	20.1957	20.1776	20.0268	19.7218	19.4462 (90)
Living area fraction	fLA = Living area / (4) = 0.4840 (91)											
MIT	19.8221	19.9592	20.1466	20.3973	20.5356	20.5803	20.5833	20.5845	20.5657	20.3982	20.0874	19.8129 (92)
Temperature adjustment	-0.1500											
adjusted MIT	19.6721	19.8092	19.9966	20.2473	20.3856	20.4303	20.4333	20.4345	20.4157	20.2482	19.9374	19.6629 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9918	0.9835	0.9642	0.8927	0.7350	0.5112	0.3538	0.3944	0.6511	0.9125	0.9809	0.9933 (94)
Useful gains	466.2465	510.0077	527.8340	525.8337	451.5715	309.4939	204.3731	214.1555	332.4099	431.8211	446.5933	450.5651 (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	862.0278	832.9307	751.1744	619.6101	472.4415	310.9930	204.4715	214.3572	339.5448	524.7972	703.6783	854.1003 (97)
Space heating kWh	294.4613	217.0043	166.1652	67.5191	15.5273	0.0000	0.0000	0.0000	0.0000	69.1743	185.1012	300.2301 (98a)
Space heating requirement - total per year (kWh/year)	1315.1828											
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	294.4613	217.0043	166.1652	67.5191	15.5273	0.0000	0.0000	0.0000	0.0000	69.1743	185.1012	300.2301 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1315.1828											
Space heating per m2	(98c) / (4) = 21.4549 (99)											

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	501.4049	394.7230	403.7913	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9618	0.9859	0.9779	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	482.2507	389.1727	394.8523	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	667.3243	637.1717	597.8063	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	133.2530	184.5113	150.9978	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) = 0.7178 (105)											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	23.9116	33.1097	27.0959	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	84.1172 (107)											

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)

Cooling System Energy Efficiency Ratio (see Table 10c)

3.2600 (209)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	294.4613	217.0043	166.1652	67.5191	15.5273	0.0000	0.0000	0.0000	0.0000	69.1743	185.1012	300.2301 (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)	329.0071	242.4629	185.6595	75.4403	17.3489	0.0000	0.0000	0.0000	0.0000	77.2897	206.8170	335.4527 (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	238.5463	211.0903	224.3842	197.3708	191.4335	172.5974	169.6465	176.9532	178.7774	199.2535	211.7827	235.9336 (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	266.5322	235.8551	250.7086	220.5260	213.8922	192.8462	189.5492	197.7131	199.7513	222.6296	236.6287	263.6129 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	7.3349	10.1563	8.3116	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	21.1190	19.0753	21.1190	20.4378	21.1190	20.4378	21.1190	21.1190	20.4378	21.1190	20.4378	21.1190 (231)
Lighting	18.4851	14.8294	13.3523	9.7824	7.5562	6.1735	6.8930	8.9598	11.6380	15.2696	17.2470	18.9989 (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)												

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(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
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												1469.4779	(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												2690.2452	(219)
Space cooling fuel												25.8028	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)													
mechanical ventilation fans (SFP = 0.7250)												162.6595	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												248.6595	(231)
Electricity for lighting (calculated in Appendix L)												149.1853	(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												4583.3708	(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	1469.4779	0.2100	308.5904	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2690.2452	0.2100	564.9515	(264)
Space and water heating			873.5419	(265)
Space cooling	25.8028	0.1139	2.9384	(266)
Pumps, fans and electric keep-hot	248.6595	0.1387	34.4921	(267)
Energy for lighting	149.1853	0.1443	21.5320	(268)
Total CO2, kg/year			932.5045	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			15.2100	(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	1469.4779	1.1300	1660.5101	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2690.2452	1.1300	3039.9771	(278)
Space and water heating			4700.4872	(279)
Space cooling	25.8028	1.4198	36.6343	(280)
Pumps, fans and electric keep-hot	248.6595	1.5128	376.1722	(281)
Energy for lighting	149.1853	1.5338	228.8254	(282)
Total Primary energy kWh/year			5342.1190	(286)
Dwelling Primary energy Rate (DPER)			87.1500	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET EMISSIONS

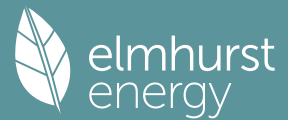
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	61.3000 (1b)	x 3.0000 (2b)	= 183.9000 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.3000		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	183.9000 (5)	

2. Ventilation rate

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

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1088 (8)

Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3588 (18)
Number of sides sheltered 1 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3318 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	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)
Effective ac	0.4231	0.4148	0.4065	0.3650	0.3567	0.3153	0.3153	0.3070	0.3318	0.3567	0.3733	0.3899	(22b)
	0.5895	0.5860	0.5826	0.5666	0.5636	0.5497	0.5497	0.5471	0.5551	0.5636	0.5697	0.5760	(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			2.0000	1.0000	2.0000			(26)
TER Opening Type (Uw = 1.20)			13.3200	1.1450	15.2519			(27)
External Wall	67.6800	13.3200	54.3600	0.1800	9.7848			(29a)
Corridor	24.5100	2.0000	22.5100	0.1800	4.0518			(29a)
Total net area of external elements Aum(A, m2)			92.1900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.0885			(33)
Party Wall 1			15.2400	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 288.8641 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	38.0600	0.0700	2.6642	
E7 Party floor between dwellings (in blocks of flats)	16.3400	0.0700	1.1438	
E16 Corner (normal)	12.0000	0.0900	1.0800	
E16 Corner (normal)	6.0000	0.0900	0.5400	
E17 Corner (inverted - internal area greater than external area)	9.0000	-0.0900	-0.8100	
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700	
E18 Party wall between dwellings	3.0000	0.0600	0.1800	
E18 Party wall between dwellings	3.0000	0.0600	0.1800	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.1600	0.0000	0.0000	
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	7.0600	0.0200	0.1412	
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740	
E3 Sill	6.5300	0.0500	0.3265	
E4 Jamb	27.6400	0.0500	1.3820	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.9317 (36)

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 38.0202 (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	35.7756	35.5646	35.3579	34.3867	34.2050	33.3592	33.3592	33.2026	33.6850	34.2050	34.5726	34.9569	(38)
Average = Sum(39)m / 12 =	73.7958	73.5848	73.3781	72.4070	72.2253	71.3794	71.3794	71.2228	71.7052	72.2253	72.5928	72.9771	(39)
												72.4061	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2038	1.2004	1.1970	1.1812	1.1782	1.1644	1.1644	1.1619	1.1697	1.1782	1.1842	1.1905	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												1.1812	
												31	

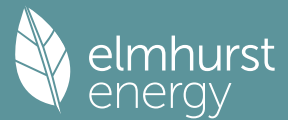
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0181 (42)
Hot water usage for mixer showers	58.0572	57.1847	55.9133	53.4808	51.6856	49.6836	48.5457	49.8075	51.1906	53.3401	55.8249	57.8347	(42a)
Hot water usage for baths	25.0897	24.7171	24.1924	23.2249	22.5004	21.6971	21.2632	21.7843	22.3516	23.2112	24.1986	25.0049	(42b)
Hot water usage for other uses	35.2978	34.0142	32.7307	31.4471	30.1636	28.8800	28.8800	30.1636	31.4471	32.7307	34.0142	35.2978	(42c)
Average daily hot water use (litres/day)													108.8778 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	118.4447	115.9160	112.8364	108.1528	104.3496	100.2608	98.6889	101.7553	104.9893	109.2819	114.0377	118.1374	(44)
Energy content (annual)	187.5874	165.0629	173.4253	148.0557	140.4746	123.2823	119.3557	125.9943	129.4623	148.2946	162.4677	184.9747	(45)
Distribution loss (46)m = 0.15 x (45)m	28.1381	24.7594	26.0138	22.2084	21.0712	18.4923	17.9034	18.8992	19.4194	22.2442	24.3701	27.7462	(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													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.2908	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	238.5463	211.0903	224.3842	197.3708	191.4335	172.5974	169.6465	176.9532	178.7774	199.2535	211.7827	235.9336	(62)
WWHRS	-26.5413	-23.4734	-24.5800	-20.3532	-18.9684	-16.2314	-15.2144	-16.1790	-16.7936	-19.7979	-22.4286	-26.0498	(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	212.0050	187.6169	199.8043	177.0176	172.4651	156.3660	154.4322	160.7743	161.9838	179.4556	189.3542	209.8838	(64)
Total per year (kWh/year)													2161.1586 (64)
Electric shower(s)													2161 (64)

12Total per year (kWh/year)													
Heat gains from water heating, kWh/month	75.1126	66.3903	70.4036	61.5573	59.4475	53.3201	52.2585	54.6328	55.3750	62.0477	66.3493	74.2438	(65)

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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	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510	88.9510 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	176.2133	178.0418	173.4339	163.6243	151.2415	139.6033	131.8283	129.9998	134.6076	144.4173	156.8001	168.4383 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257 (71)
Water heating gains (Table 5)	100.9577	98.7950	94.6285	85.4962	79.9026	74.0557	70.2399	73.4312	76.9097	83.3974	92.1518	99.7901 (72)
Total internal gains	422.3941	431.5904	413.2856	397.3087	376.3672	358.8472	344.2913	345.6541	356.7055	373.0378	397.1400	413.4514 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b g		Specific data or Table 6c FF		Access factor Table 6d		Gains W	
Northeast	8.6400		11.2829		0.6300		0.7000		0.7700		29.7926 (75)	
Southeast	1.3600		36.7938		0.6300		0.7000		0.7700		15.2928 (77)	
Southwest	3.3200		36.7938		0.6300		0.7000		0.7700		37.3323 (79)	
Solar gains	82.4176	150.2836	231.9098	331.4056	411.4161	426.1298	403.4733	341.0776	265.9389	173.1826	100.5195	69.3662 (83)
Total gains	504.8117	581.8740	645.1954	728.7143	787.7833	784.9770	747.7647	686.7317	622.6444	546.2204	497.6595	482.8176 (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	66.6531	66.8441	67.0325	67.9315	68.1024	68.9094	68.9094	69.0609	68.5963	68.1024	67.7576	67.4008
alpha	5.4435	5.4563	5.4688	5.5288	5.5402	5.5940	5.5940	5.6041	5.5731	5.5402	5.5172	5.4934
util living area	0.9954	0.9894	0.9734	0.9132	0.7724	0.5698	0.4181	0.4731	0.7365	0.9467	0.9896	0.9964 (86)
MIT	19.8731	20.0592	20.3262	20.6735	20.9020	20.9852	20.9978	20.9958	20.9438	20.6371	20.2000	19.8474 (87)
Th 2	19.9169	19.9197	19.9224	19.9351	19.9375	19.9486	19.9486	19.9506	19.9443	19.9375	19.9326	19.9276 (88)
util rest of house	0.9937	0.9855	0.9635	0.8830	0.7088	0.4819	0.3193	0.3674	0.6469	0.9210	0.9851	0.9950 (89)
MIT 2	18.6276	18.8656	19.2020	19.6258	19.8647	19.9416	19.9480	19.9494	19.9118	19.5966	19.0556	18.6027 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.2304	19.4433	19.7461	20.1329	20.3668	20.4467	20.4561	20.4559	20.4113	20.1002	19.6095	19.2052 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.2304	19.4433	19.7461	20.1329	20.3668	20.4467	20.4561	20.4559	20.4113	20.1002	19.6095	19.2052 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9922	0.9833	0.9615	0.8893	0.7359	0.5243	0.3672	0.4187	0.6886	0.9256	0.9833	0.9937 (94)
Useful gains	500.8797	572.1289	620.3737	648.0331	579.7095	411.5404	274.5973	287.5600	428.7450	505.5964	489.3484	479.7997 (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	1101.8038	1070.1680	971.9755	813.3395	625.9599	417.3349	275.2473	288.8706	452.5544	686.1577	908.1009	1095.0338 (97)
Space heating kWh	447.0876	334.6822	261.5917	119.0206	34.4103	0.0000	0.0000	0.0000	0.0000	134.3376	301.5018	457.7341 (98a)
Space heating requirement - total per year (kWh/year)												2090.3660
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	447.0876	334.6822	261.5917	119.0206	34.4103	0.0000	0.0000	0.0000	0.0000	134.3376	301.5018	457.7341 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2090.3660
Space heating per m ²												(98c) / (4) = 34.1006 (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	447.0876	334.6822	261.5917	119.0206	34.4103	0.0000	0.0000	0.0000	0.0000	134.3376	301.5018	457.7341 (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)	483.8610	362.2102	283.1079	128.8102	37.2406	0.0000	0.0000	0.0000	0.0000	145.3870	326.3007	495.3832 (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												

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Water heating requirement	212.0050	187.6169	199.8043	177.0176	172.4651	156.3660	154.4322	160.7743	161.9838	179.4556	189.3542	209.8838	(64)
Efficiency of water heater												80.3000	(216)
(217)m	85.9394	85.6066	84.9597	83.5495	81.6132	80.3000	80.3000	80.3000	80.3000	83.7692	85.3729	86.0043	(217)
Fuel for water heating, kWh/month	246.6912	219.1617	235.1753	211.8716	211.3200	194.7272	192.3190	200.2171	201.7232	214.2261	221.7967	244.0387	(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	18.4823	14.8272	13.3502	9.7809	7.5551	6.1726	6.8920	8.9585	11.6362	15.2673	17.2444	18.9959	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.5018	-24.4909	-37.0423	-43.9042	-49.3394	-46.7984	-46.2385	-42.6619	-36.6991	-28.9947	-18.5758	-14.1281	(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	-5.9370	-12.7648	-25.8882	-39.6481	-53.1748	-53.6927	-53.0505	-44.5647	-32.2111	-18.4925	-8.0033	-4.6739	(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												2262.3009	(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												2593.2678	(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)												149.1624	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-757.4765	(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												4333.2546	(238)

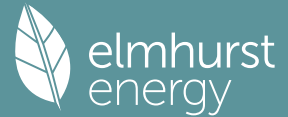
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2262.3009	0.2100	475.0832	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2593.2678	0.2100	544.5862	(264)
Space and water heating			1019.6694	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	149.1624	0.1443	21.5287	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.3748	0.1335	-54.1217	
PV Unit electricity exported	-352.1017	0.1253	-44.1302	
Total			-98.2519	(269)
Total CO2, kg/year			954.8755	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.5800	(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	2262.3009	1.1300	2556.4000	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2593.2678	1.1300	2930.3926	(278)
Space and water heating			5486.7926	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	149.1624	1.5338	228.7903	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.3748	1.4934	-605.3746	
PV Unit electricity exported	-352.1017	0.4600	-161.9789	
Total			-767.3535	(283)
Total Primary energy kWh/year			5078.3302	(286)
Target Primary Energy Rate (TPER)			82.8400	(287)

Full SAP Calculation Printout



Property Reference	1 Bed 3rd Floor Flat - NW			Issued on Date	17/06/2024
Assessment Reference	2 Bed 3rd Floor Flat	Prop Type Ref	1 Bed 3rd Floor Flat - NW		
Property	1 Bed 1st Floor Flat - NW, 1 Bed 1st Floor Flat - NW, North Hill , London, N10				
SAP Rating	82 B	DER	18.16	TER	19.42
Environmental	87 B	% DER < TER			6.49
CO ₂ Emissions (t/year)	0.97	DFEE	53.27	TFEE	57.57
Compliance Check	See BREL	% DFEE < TFEE			7.46
% DPER < TPER	0.83	DPER	102.69	TPER	103.55
Assessor Details	Miss Nimco Ali			Assessor ID	R572-0001
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	60.1800 (1b)	2.7000 (2b)	162.4860 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.1800		162.4860 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	162.4860 (5)

2. Ventilation rate

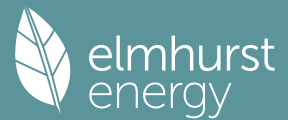
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (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
Glazing (Uw = 0.85)			15.1700	0.8221	12.4705		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
External Wall	63.6100	15.1700	48.4400	0.1600	7.7504	150.0000	7266.0000 (29a)
Corridor	31.9700	2.0000	29.9700	0.1800	5.3946	150.0000	4495.5000 (29a)
Roof	60.1800		60.1800	0.1000	6.0180	9.0000	541.6200 (30)
Total net area of external elements Aum(A, m ²)			155.7600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.6335		(33)
Party Wall 1			5.4000	0.0000	0.0000	70.0000	378.0000 (32)
Party Floor 1			60.1800			40.0000	2407.2000 (32d)
Internal Wall 1			58.3500			9.0000	525.1500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15613.4700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							259.4462 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E7 Party floor between dwellings (in blocks of flats)	18.1600	0.0900	1.6344
E7 Party floor between dwellings (in blocks of flats)	11.8400	0.1100	1.3024
E16 Corner (normal)	13.5000	0.0900	1.2150
E16 Corner (normal)	2.7000	0.1400	0.3780
E17 Corner (inverted - internal area greater than external area)	5.4000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E18 Party wall between dwellings	2.7000	0.0700	0.1890
E18 Party wall between dwellings	2.7000	0.1000	0.2700
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.0000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	2.0000	0.0800	0.1600
E14 Flat roof	11.8400	0.1600	1.8944
E15 Flat roof with parapet	23.5600	0.3000	7.0680
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.4000	0.2500	1.3500
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740
E3 Sill	6.5300	0.1000	0.6530
E4 Jamb	27.6400	0.0600	1.6584
E24 Eaves (insulation at ceiling level - inverted)	7.9700	0.1600	1.2752
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			19.1788 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	52.8123 (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	15.3036	15.1176	14.9316	14.0016	13.8156	12.8856	12.8856	12.6997	13.2576	13.8156	14.1876	14.5596	(38)
Average = Sum(39)m / 12 =	68.1159	67.9299	67.7439	66.8139	66.6279	65.6980	65.6980	65.5120	66.0699	66.6279	66.9999	67.3719	(39)
												66.7674	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1319	1.1288	1.1257	1.1102	1.1071	1.0917	1.0917	1.0886	1.0979	1.1071	1.1133	1.1195	(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												1.9867 (42)
Hot water usage for mixer showers												
	57.5303	56.6658	55.4059	52.9954	51.2165	49.2327	48.1052	49.3555	50.7260	52.8560	55.3183	57.3099 (42a)
Hot water usage for baths												
	24.8631	24.4939	23.9739	23.0152	22.2972	21.5012	21.0712	21.5876	22.1498	23.0016	23.9801	24.7791 (42b)
Hot water usage for other uses												
	34.9760	33.7041	32.4323	31.1604	29.8886	28.6167	28.6167	29.8886	31.1604	32.4323	33.7041	34.9760 (42c)
Average daily hot water use (litres/day)												107.8894 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	117.3695	114.8638	111.8121	107.1710	103.4024	99.3507	97.7931	100.8316	104.0362	108.2899	113.0025	117.0650 (44)
Energy conte	185.8845	163.5645	171.8510	146.7117	139.1994	122.1632	118.2723	124.8506	128.2871	146.9483	160.9928	183.2955 (45)
Energy content (annual)										Total = Sum(45)m =		1792.0210
Distribution loss (46)m = 0.15 x (45)m												
	27.8827	24.5347	25.7777	22.0068	20.8799	18.3245	17.7408	18.7276	19.2431	22.0423	24.1489	27.4943 (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	48.9948	49.8343	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month												
	236.8434	209.5919	222.8099	196.0268	190.1583	171.1581	168.1066	175.8095	177.6022	197.9073	210.3079	234.2544 (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												
	236.8434	209.5919	222.8099	196.0268	190.1583	171.1581	168.1066	175.8095	177.6022	197.9073	210.3079	234.2544 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2390.5762 (64)
Electric shower(s)												2391 (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												
	74.5463	65.8920	69.8802	61.1104	59.0235	52.8680	51.7841	54.2525	54.9842	61.6001	65.8589	73.6855 (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	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	87.4839	96.8572	87.4839	90.4001	87.4839	90.4001	87.4839	87.4839	90.4001	87.4839	90.4001	87.4839 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	173.4007	175.2000	170.6657	161.0127	148.8275	137.3751	129.7242	127.9248	132.4591	142.1122	154.2974	165.7498 (68)
Pumps, fans	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336 (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)	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688 (71)
Total internal gains	100.1967	98.0536	93.9250	84.8756	79.3327	73.4278	69.6023	72.9201	76.3670	82.7958	91.4706	99.0396 (72)
	416.8821	425.9117	407.8754	392.0891	371.4449	354.0037	339.6112	341.1296	352.0270	368.1927	391.9689	408.0741 (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		9.8400	11.2829	0.3200	0.7000	0.7700	17.2345 (75)
Southwest		3.7800	36.7938	0.3200	0.7000	0.7700	21.5898 (79)

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Northwest	1.5500		11.2829		0.3200		0.7000		0.7700		2.7148 (81)	
Solar gains	41.5391	77.3827	123.4792	182.4983	231.3409	241.5126	227.9147	189.6651	143.6318	90.2700	50.9609	34.7679 (83)
Total gains	458.4211	503.2944	531.3546	574.5874	602.7858	595.5162	567.5259	530.7947	495.6588	458.4627	442.9298	442.8420 (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	63.6720	63.8463	64.0216	64.9127	65.0939	66.0154	66.0154	66.2028	65.6437	65.0939	64.7325	64.3751
alpha	5.2448	5.2564	5.2681	5.3275	5.3396	5.4010	5.4010	5.4135	5.3762	5.3396	5.3155	5.2917
util living area	0.9949	0.9908	0.9816	0.9470	0.8536	0.6706	0.5027	0.5560	0.8059	0.9598	0.9898	0.9957 (86)
MIT	19.8176	19.9670	20.1997	20.5396	20.8169	20.9631	20.9934	20.9891	20.9015	20.5592	20.1419	19.7985 (87)
Th 2	19.9749	19.9774	19.9799	19.9925	19.9950	20.0076	20.0076	20.0102	20.0026	19.9950	19.9900	19.9849 (88)
util rest of house	0.9932	0.9877	0.9750	0.9276	0.8036	0.5812	0.3929	0.4425	0.7278	0.9411	0.9858	0.9943 (89)
MIT 2	18.9123	19.0623	19.2936	19.6300	19.8760	19.9917	20.0061	20.0073	19.9515	19.6560	19.2466	18.9013 (90)
Living area fraction	fLA = Living area / (4) =											0.3566 (91)
MIT	19.2351	19.3849	19.6167	19.9543	20.2115	20.3381	20.3582	20.3574	20.2903	19.9781	19.5659	19.2213 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.0851	19.2349	19.4667	19.8043	20.0615	20.1881	20.2082	20.2074	20.1403	19.8281	19.4159	19.0713 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9912	0.9847	0.9708	0.9233	0.8073	0.5983	0.4155	0.4657	0.7398	0.9372	0.9827	0.9925 (94)
Useful gains	454.3661	495.5981	515.8314	530.4927	486.6205	356.3083	235.8072	247.1937	366.6976	429.6513	435.2656	439.5373 (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	1007.0995	973.7686	878.4159	728.5610	557.1083	367.1236	237.0483	249.4283	399.0799	614.8482	825.1634	1001.9053 (97)
Space heating kWh	411.2336	321.3306	269.7629	142.6091	52.4429	0.0000	0.0000	0.0000	0.0000	137.7865	280.7264	418.4018 (98a)
Space heating requirement - total per year (kWh/year)												2034.2939
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	411.2336	321.3306	269.7629	142.6091	52.4429	0.0000	0.0000	0.0000	0.0000	137.7865	280.7264	418.4018 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2034.2939
Space heating per m2												(98c) / (4) = 33.8035 (99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	617.5607	486.1648	497.8909	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8684	0.9289	0.9031	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	536.2964	451.5862	449.6287	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	656.5609	625.9997	584.2465	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	86.5904	129.7637	100.1557	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) = 0.5982 (105)											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	12.9497	19.4063	14.9784	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	47.3345 (107)											

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)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	411.2336	321.3306	269.7629	142.6091	52.4429	0.0000	0.0000	0.0000	0.0000	137.7865	280.7264	418.4018 (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)	459.4789	359.0286	301.4110	159.3398	58.5955	0.0000	0.0000	0.0000	0.0000	153.9514	313.6608	467.4880 (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	236.8434	209.5919	222.8099	196.0268	190.1583	171.1581	168.1066	175.8095	177.6022	197.9073	210.3079	234.2544 (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	264.6295	234.1809	248.9496	219.0244	212.4674	191.2381	187.8286	196.4352	198.4382	221.1254	234.9808	261.7367 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	3.9723	5.9529	4.5946	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	19.5104	17.6223	19.5104	18.8810	19.5104	18.8810	19.5104	19.5104	18.8810	19.5104	18.8810	19.5104 (231)
Lighting	18.1774	14.5826	13.1300	9.6196	7.4305	6.0708	6.7783	8.8107	11.4443	15.0155	16.9600	18.6826 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												

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(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												2272.9540	(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												2671.0349	(219)
Space cooling fuel												14.5198	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)													
mechanical ventilation fans (SFP = 0.7250)												143.7189	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												229.7189	(231)
Electricity for lighting (calculated in Appendix L)												146.7023	(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												5334.9298	(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	2272.9540	0.2100	477.3203	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2671.0349	0.2100	560.9173	(264)
Space and water heating			1038.2377	(265)
Space cooling	14.5198	0.1138	1.6520	(266)
Pumps, fans and electric keep-hot	229.7189	0.1387	31.8648	(267)
Energy for lighting	146.7023	0.1443	21.1737	(268)
Total CO2, kg/year			1092.9282	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			18.1600	(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	2272.9540	1.1300	2568.4381	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2671.0349	1.1300	3018.2694	(278)
Space and water heating			5586.7074	(279)
Space cooling	14.5198	1.4194	20.6098	(280)
Pumps, fans and electric keep-hot	229.7189	1.5128	347.5187	(281)
Energy for lighting	146.7023	1.5338	225.0169	(282)
Total Primary energy kWh/year			6179.8529	(286)
Dwelling Primary energy Rate (DPER)			102.6900	(287)

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

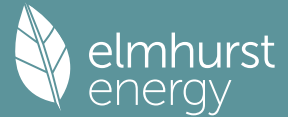
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	60.1800	2.7000	162.4860	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.1800			(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = (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)

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Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1231 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3731	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3451 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	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)
Effective ac	0.4400	0.4314	0.4228	0.3796	0.3710	0.3279	0.3279	0.3192	0.3451	0.3710	0.3882	0.4055 (22b)
	0.5968	0.5930	0.5894	0.5721	0.5688	0.5537	0.5537	0.5510	0.5595	0.5688	0.5754	0.5822 (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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			13.0400	1.1450	14.9313		(27)
External Wall	63.6100	13.0400	50.5700	0.1800	9.1026		(29a)
Corridor	31.9700	2.0000	29.9700	0.1800	5.3946		(29a)
Roof	60.1800		60.1800	0.1100	6.6198		(30)
Total net area of external elements Aum (A, m2)			155.7600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.0483		(33)
Party Wall 1			5.4000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							259.4462 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	18.1600	0.0700	1.2712
E7 Party floor between dwellings (in blocks of flats)	11.8400	0.0700	0.8288
E16 Corner (normal)	13.5000	0.0900	1.2150
E16 Corner (normal)	2.7000	0.0900	0.2430
E17 Corner (inverted - internal area greater than external area)	5.4000	-0.0900	-0.4860
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E18 Party wall between dwellings	2.7000	0.0600	0.1620
E18 Party wall between dwellings	2.7000	0.0600	0.1620
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.0000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	2.0000	0.1200	0.2400
E14 Flat roof	11.8400	0.0800	0.9472
E15 Flat roof with parapet	23.5600	0.5600	13.1936
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.4000	0.0200	0.1080
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740
E3 Sill	6.5300	0.0500	0.3265
E4 Jamb	27.6400	0.0500	1.3820
E24 Eaves (insulation at ceiling level - inverted)	7.9700	0.2400	1.9128
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			21.6371 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 59.6854 (37)

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

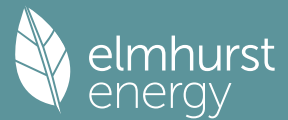
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	32.0009	31.7993	31.6018	30.6738	30.5002	29.6919	29.6919	29.5422	30.0032	30.5002	30.8514	31.2186 (38)
Average = Sum(39)m / 12 =	91.6863	91.4847	91.2871	90.3592	90.1855	89.3773	89.3773	89.2276	89.6886	90.1855	90.5368	90.9040 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.5235	1.5202	1.5169	1.5015	1.4986	1.4852	1.4852	1.4827	1.4903	1.4986	1.5044	1.5105 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.9867 (42)
Hot water usage for mixer showers	57.5303	56.6658	55.4059	52.9954	51.2165	49.2327	48.1052	49.3555	50.7260	52.8560	55.3183	57.3099	(42a)
Hot water usage for baths	24.8631	24.4939	23.9739	23.0152	22.2972	21.5012	21.0712	21.5876	22.1498	23.0016	23.9801	24.7791	(42b)
Hot water usage for other uses	34.9760	33.7041	32.4323	31.1604	29.8886	28.6167	28.6167	29.8886	31.1604	32.4323	33.7041	34.9760	(42c)
Average daily hot water use (litres/day)													107.8894 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	117.3695	114.8638	111.8121	107.1710	103.4024	99.3507	97.7931	100.8316	104.0362	108.2899	113.0025	117.0650	(44)
Energy conte	185.8845	163.5645	171.8510	146.7117	139.1994	122.1632	118.2723	124.8506	128.2871	146.9483	160.9928	183.2955	(45)
Energy content (annual)										Total =	Sum(45)m =	1792.0210	
Distribution loss (46)m = 0.15 x (45)m	27.8827	24.5347	25.7777	22.0068	20.8799	18.3245	17.7408	18.7276	19.2431	22.0423	24.1489	27.4943	(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	48.9948	49.8343	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	236.8434	209.5919	222.8099	196.0268	190.1583	171.1581	168.1066	175.8095	177.6022	197.9073	210.3079	234.2544	(62)
WWHRS	-26.3005	-23.2603	-24.3569	-20.1685	-18.7963	-16.0841	-15.0763	-16.0321	-16.6412	-19.6182	-22.2250	-25.8134	(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													

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210.5430	186.3316	198.4530	175.8583	171.3621	155.0740	153.0303	159.7774	160.9609	178.2891	188.0828	208.4410 (64)
Total per year (kWh/year) = Sum(64)m =											2146.2033 (64)
Electric shower(s)											2146 (64a)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month											
74.5463	65.8920	69.8802	61.1104	59.0235	52.8680	51.7841	54.2525	54.9842	61.6001	65.8589	73.6855 (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	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	87.5420	96.9215	87.5420	90.4600	87.5420	90.4600	87.5420	87.5420	90.4600	87.5420	90.4600	87.5420 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	173.4007	175.2000	170.6657	161.0127	148.8275	137.3751	129.7242	127.9248	132.4591	142.1122	154.2974	165.7498 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336 (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)												
	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688 (71)
Water heating gains (Table 5)												
	100.1967	98.0536	93.9250	84.8756	79.3327	73.4278	69.6023	72.9201	76.3670	82.7958	91.4706	99.0396 (72)
Total internal gains												
	416.9401	425.9759	407.9335	392.1491	371.5029	354.0637	339.6692	341.1877	352.0869	368.2507	392.0289	408.1321 (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	8.4600	11.2829	0.6300	0.7000	0.7700	29.1719 (75)
Southwest	3.2500	36.7938	0.6300	0.7000	0.7700	36.5452 (79)
Northwest	1.3300	11.2829	0.6300	0.7000	0.7700	4.5861 (81)
Solar gains						
	70.3032	130.9654	208.9764	308.8542	391.5092	408.7214
Total gains						
	487.2433	556.9413	616.9099	701.0033	763.0122	762.7850

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	47.3034	47.4076	47.5102	47.9982	48.0906	48.5255	48.5255	48.6069	48.3570	48.0906	47.9040	47.7105
alpha	4.1536	4.1605	4.1673	4.1999	4.2060	4.2350	4.2350	4.2405	4.2238	4.2060	4.1936	4.1807
util living area	0.9941	0.9891	0.9774	0.9384	0.8441	0.6787	0.5228	0.5861	0.8240	0.9607	0.9892	0.9951 (86)
MIT	19.3017	19.5032	19.8294	20.2908	20.6828	20.9113	20.9771	20.9635	20.7905	20.2874	19.7218	19.2724 (87)
Th 2	19.6699	19.6724	19.6748	19.6864	19.6886	19.6986	19.6986	19.7005	19.6948	19.6886	19.6842	19.6796 (88)
util rest of house	0.9920	0.9851	0.9689	0.9142	0.7840	0.5683	0.3778	0.4367	0.7341	0.9402	0.9846	0.9933 (89)
MIT 2	17.7424	18.0002	18.4139	18.9889	19.4331	19.6521	19.6925	19.6893	19.5589	18.9991	18.2882	17.7115 (90)
Living area fraction	fLA = Living area / (4) = 0.3566 (91)											
MIT	18.2984	18.5361	18.9187	19.4532	19.8787	20.1011	20.1506	20.1437	19.9981	19.4585	18.7994	18.2682 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.2984	18.5361	18.9187	19.4532	19.8787	20.1011	20.1506	20.1437	19.9981	19.4585	18.7994	18.2682 (93)

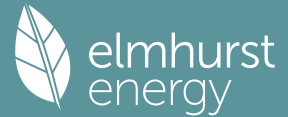
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9888	0.9804	0.9623	0.9089	0.7940	0.6049	0.4300	0.4903	0.7582	0.9354	0.9801	0.9905 (94)
Useful gains	481.7956	546.0105	593.6357	637.1127	605.8258	461.4335	311.8861	324.6871	451.2293	487.3687	468.7765	462.5584 (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	1283.4632	1247.4986	1133.6671	953.5754	737.6033	491.6775	317.3424	334.0399	528.9901	798.9077	1059.2262	1278.8512 (97)
Space heating kWh	596.4407	471.4000	401.7834	227.8532	98.0425	0.0000	0.0000	0.0000	0.0000	231.7850	425.1238	607.3218 (98a)
Space heating requirement - total per year (kWh/year)												3059.7503
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	596.4407	471.4000	401.7834	227.8532	98.0425	0.0000	0.0000	0.0000	0.0000	231.7850	425.1238	607.3218 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3059.7503
Space heating per m2											(98c) / (4) =	50.8433 (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	596.4407	471.4000	401.7834	227.8532	98.0425	0.0000	0.0000	0.0000	0.0000	231.7850	425.1238	607.3218 (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)												

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645.4985	510.1732	434.8305	246.5943	106.1066	0.0000	0.0000	0.0000	0.0000	250.8496	460.0907	657.2747	(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												
210.5430	186.3316	198.4530	175.8583	171.3621	155.0740	153.0303	159.7774	160.9609	178.2891	188.0828	208.4410	(64)
Efficiency of water heater												
(217)m	86.4835	86.2822	85.8598	84.9375	83.2301	80.3000	80.3000	80.3000	80.3000	84.9447	86.0726	80.3000 (216)
Fuel for water heating, kWh/month												86.5320 (217)
243.4488	215.9560	231.1363	207.0445	205.8895	193.1183	190.5732	198.9756	200.4495	209.8884	218.5165	240.8831	(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	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	18.1895	14.5923	13.1387	9.6260	7.4354	6.0748	6.7828	8.8166	11.4518	15.0254	16.9712	(232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-16.2096	-24.0623	-36.4020	-43.1558	-48.5087	-46.0156	-45.4664	-41.9452	-36.0753	-28.4930	-18.2490	-13.8774 (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	(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	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-5.8192	-12.5127	-25.3787	-38.8700	-52.1325	-52.6395	-52.0084	-43.6876	-31.5758	-18.1266	-7.8444	-4.5810 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1											3311.4181	(211)
Space heating fuel - main system 2											0.0000	(213)
Space heating fuel - secondary											0.0000	(215)
Efficiency of water heater											80.3000	(216)
Water heating fuel used											2555.8795	(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)											146.7996	(232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation											-743.6368	(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											5356.4604	(238)

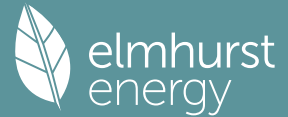
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3311.4181	0.2100	695.3978 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2555.8795	0.2100	536.7347 (264)
Space and water heating			1232.1325 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	146.7996	0.1443	21.1877 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-398.4604	0.1335	-53.1964
PV Unit electricity exported	-345.1764	0.1253	-43.2619
Total			-96.4584 (269)
Total CO2, kg/year			1168.7911 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			19.4200 (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	3311.4181	1.1300	3741.9024 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2555.8795	1.1300	2888.1439 (278)
Space and water heating			6630.0463 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	146.7996	1.5338	225.1662 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-398.4604	1.4934	-595.0409
PV Unit electricity exported	-345.1764	0.4600	-158.7919
Total			-753.8328 (283)
Total Primary energy kWh/year			6231.4805 (286)
Target Primary Energy Rate (TPER)			103.5500 (287)

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Property Reference	1 Bed 3rd Floor Flat - SE				Issued on Date	17/06/2024
Assessment Reference	1 Bed 3rd Floor Flat - SE	Prop Type Ref		1 Bed 3rd Floor Flat - SE		
Property	1 Bed 3rd Floor Flat - SE, 1 Bed 3rd Floor Flat - SE, North Hill , London, N10					
SAP Rating	81 B	DER	19.30	TER	20.88	
Environmental	86 B	% DER < TER				7.57
CO ₂ Emissions (t/year)	0.93	DFEE	56.99	TFEE	61.47	
Compliance Check	See BREL	% DFEE < TFEE				7.29
% DPER < TPER	2.05	DPER	109.22	TPER	111.51	
Assessor Details	Miss Nimco Ali				Assessor ID	R572-0001
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	53.8600 (1b)	3.0000 (2b)	161.5800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.8600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	161.5800 (5)

2. Ventilation rate

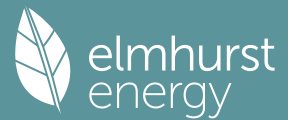
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (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
Glazing (Uw = 0.85)			15.1700	0.8221	12.4705		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
External Wall	68.9000	15.1700	53.7300	0.1600	8.5968	150.0000	8059.5000 (29a)
Corridor	21.7100	2.0000	19.7100	0.1800	3.5478	150.0000	2956.5000 (29a)
Roof	53.8600		53.8600	0.1000	5.3860	9.0000	484.7400 (30)
Total net area of external elements Aum(A, m ²)			144.4700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	32.0011		(33)
Party Wall 1			5.4000	0.0000	0.0000	70.0000	378.0000 (32)
Party Floor 1			61.3000			40.0000	2452.0000 (32d)
Internal Wall			42.7700			9.0000	384.9300 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14715.6700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							273.2208 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E7 Party floor between dwellings (in blocks of flats)	22.0000	0.0900	1.9800
E7 Party floor between dwellings (in blocks of flats)	8.0400	0.1100	0.8844
E16 Corner (normal)	12.0000	0.0900	1.0800
E16 Corner (normal)	5.4000	0.1400	0.7560
E17 Corner (inverted - internal area greater than external area)	8.1000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E18 Party wall between dwellings	2.7000	0.0700	0.1890
E18 Party wall between dwellings	2.7000	0.1000	0.2700
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.0000	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	3.5300	0.2500	0.8825
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740
E3 Sill	6.5300	0.1000	0.6530
E4 Jamb	27.6400	0.0600	1.6584
P4 Party wall - Roof (insulation at ceiling level)	2.0000	0.0800	0.1600
E14 Flat roof	8.0400	0.1600	1.2864
E15 Flat roof with parapet	25.5200	0.3000	7.6560
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			17.5867 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.5878 (37)

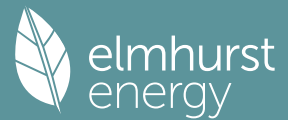
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	15.2183	15.0333	14.8483	13.9236	13.7386	12.8138	12.8138	12.6288	13.1837	13.7386	14.1085	14.4784 (38)
Average = Sum(39)m / 12 =	64.8061	64.6211	64.4361	63.5114	63.3264	62.4016	62.4016	62.2166	62.7715	63.3264	63.6963	64.0662 (39)
												63.4651
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2032	1.1998	1.1964	1.1792	1.1758	1.1586	1.1586	1.1552	1.1655	1.1758	1.1826	1.1895 (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												1.8039 (42)
Hot water usage for mixer showers	54.4648	53.6463	52.4535	50.1715	48.4874	46.6093	45.5418	46.7255	48.0230	50.0395	52.3706	54.2561 (42a)
Hot water usage for baths	23.5449	23.1952	22.7028	21.7948	21.1150	20.3612	19.9540	20.4429	20.9753	21.7820	22.7086	23.4653 (42b)
Hot water usage for other uses	33.1036	31.8998	30.6961	29.4923	28.2885	27.0848	27.0848	28.2885	29.4923	30.6961	31.8998	33.1036 (42c)
Average daily hot water use (litres/day)												102.1386 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	111.1132	108.7413	105.8524	101.4586	97.8909	94.0552	92.5806	95.4570	98.4907	102.5176	106.9790	110.8249 (44)
Energy content (annual)	175.9761	154.8461	162.6911	138.8918	131.7800	115.6519	111.9682	118.1957	121.4489	139.1154	152.4112	173.5250 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1696.5014
Water storage loss:	26.3964	23.2269	24.4037	20.8338	19.7670	17.3478	16.7952	17.7294	18.2173	20.8673	22.8617	26.0288 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	50.9589	46.0274	50.9589	49.3151	49.8841	46.3834	47.1780	48.6438	48.5707	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	226.9350	200.8735	213.6500	188.2069	181.6641	162.0353	159.1462	166.8395	170.0196	190.0743	201.7263	224.4839 (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	226.9350	200.8735	213.6500	188.2069	181.6641	162.0353	159.1462	166.8395	170.0196	190.0743	201.7263	224.4839 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2285.6547 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	71.2518	62.9932	66.8345	58.5103	56.2879	50.0501	49.0239	51.4610	52.5244	58.9956	63.0055	70.4368 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.3110	87.8087	79.3110	81.9547	79.3110	81.9547	79.3110	79.3110	81.9547	79.3110	81.9547	79.3110 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.2430	158.8747	154.7629	146.0093	134.9596	124.5743	117.6363	116.0046	120.1165	128.8700	139.9198	150.3050 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194 (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)	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554 (71)
Water heating gains (Table 5)	95.7685	93.7398	89.8314	81.2643	75.6558	69.5140	65.8924	69.1680	72.9506	79.2951	87.5076	94.6731 (72)
Total internal gains	385.3809	393.4815	376.9636	362.2867	342.9846	326.1014	312.8980	314.5420	325.0801	340.5345	362.4405	377.3475 (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	9.8400	11.2829	0.3200	0.7000	0.7700	17.2345 (75)						
Southeast	1.5500	36.7938	0.3200	0.7000	0.7700	8.8529 (77)						
Southwest	3.7800	36.7938	0.3200	0.7000	0.7700	21.5898 (79)						

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Solar gains	47.6772	86.9365	134.1560	191.7126	237.9973	246.5090	233.4026	197.3077	153.8412	100.1832	58.1488	40.1272 (83)
Total gains	433.0581	480.4180	511.1195	553.9993	580.9820	572.6103	546.3006	511.8497	478.9213	440.7177	420.5893	417.4747 (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	63.0757	63.2562	63.4378	64.3615	64.5495	65.5061	65.5061	65.7008	65.1201	64.5495	64.1746	63.8041
alpha	5.2050	5.2171	5.2292	5.2908	5.3033	5.3671	5.3671	5.3801	5.3413	5.3033	5.2783	5.2536
util living area	0.9949	0.9904	0.9802	0.9434	0.8470	0.6635	0.4963	0.5481	0.7971	0.9573	0.9896	0.9958 (86)
MIT	19.8030	19.9619	20.2028	20.5464	20.8212	20.9640	20.9936	20.9895	20.9050	20.5630	20.1349	19.7833 (87)
Th 2	19.9174	19.9202	19.9229	19.9367	19.9394	19.9533	19.9533	19.9560	19.9477	19.9394	19.9339	19.9284 (88)
util rest of house	0.9931	0.9870	0.9728	0.9218	0.7929	0.5695	0.3817	0.4295	0.7134	0.9365	0.9852	0.9943 (89)
MIT 2	18.8479	19.0074	19.2465	19.5856	19.8266	19.9385	19.9519	19.9535	19.9007	19.6095	19.1906	18.8370 (90)
Living area fraction									fLA = Living area / (4) =			0.3684 (91)
MIT	19.1997	19.3590	19.5988	19.9395	20.1930	20.3163	20.3356	20.3351	20.2707	19.9608	19.5385	19.1856 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.0497	19.2090	19.4488	19.7895	20.0430	20.1663	20.1856	20.1851	20.1207	19.8108	19.3885	19.0356 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9911	0.9839	0.9687	0.9182	0.7988	0.5896	0.4076	0.4563	0.7287	0.9333	0.9822	0.9925 (94)
Useful gains	429.1862	472.7057	495.0961	508.6974	464.1172	337.5987	222.6475	233.5314	348.9886	411.3293	413.1047	414.3499 (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	955.8702	924.6616	834.3693	691.6097	528.3328	347.3442	223.7484	235.4969	377.9267	583.2856	782.7294	950.4593 (97)
Space heating kWh	391.8529	303.7144	252.4192	131.6968	47.7764	0.0000	0.0000	0.0000	0.0000	127.9355	266.1298	398.8654 (98a)
Space heating requirement - total per year (kWh/year)												1920.3905
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	391.8529	303.7144	252.4192	131.6968	47.7764	0.0000	0.0000	0.0000	0.0000	127.9355	266.1298	398.8654 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1920.3905
Space heating per m2										(98c) / (4) =		35.6552 (99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	586.5751	461.7719	472.8465	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8736	0.9324	0.9082	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	512.4597	430.5350	429.4513	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	633.7754	605.0027	565.7592	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	87.3474	129.8039	101.4131	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.6313 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	13.7849	20.4852	16.0047	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												50.2747 (107)

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)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	391.8529	303.7144	252.4192	131.6968	47.7764	0.0000	0.0000	0.0000	0.0000	127.9355	266.1298	398.8654 (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)	437.8245	339.3457	282.0327	147.1473	53.3815	0.0000	0.0000	0.0000	0.0000	142.9447	297.3517	445.6597 (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	226.9350	200.8735	213.6500	188.2069	181.6641	162.0353	159.1462	166.8395	170.0196	190.0743	201.7263	224.4839 (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	253.5587	224.4397	238.7151	210.2870	202.9767	181.0450	177.8170	186.4129	189.9660	212.3735	225.3925	250.8201 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	4.2285	6.2838	4.9094	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	19.4423	17.5608	19.4423	18.8151	19.4423	18.8151	19.4423	19.4423	18.8151	19.4423	18.8151	19.4423 (231)
Lighting	16.4793	13.2203	11.9034	8.7209	6.7363	5.5036	6.1451	7.9876	10.3751	13.6127	15.3755	16.9373 (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)

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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	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	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	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													2145.6877	(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													2553.8042	(219)
Space cooling fuel													15.4217	(221)
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)														
mechanical ventilation fans (SFP = 0.7250)													142.9175	(230a)
central heating pump													41.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													228.9175	(231)
Electricity for lighting (calculated in Appendix L)													132.9971	(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													5076.8282	(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	2145.6877	0.2100	450.5944	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2553.8042	0.2100	536.2989	(264)
Space and water heating			986.8933	(265)
Space cooling	15.4217	0.1138	1.7548	(266)
Pumps, fans and electric keep-hot	228.9175	0.1387	31.7537	(267)
Energy for lighting	132.9971	0.1443	19.1956	(268)
Total CO2, kg/year			1039.5973	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			19.3000	(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	2145.6877	1.1300	2424.6271	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2553.8042	1.1300	2885.7987	(278)
Space and water heating			5310.4258	(279)
Space cooling	15.4217	1.4195	21.8904	(280)
Pumps, fans and electric keep-hot	228.9175	1.5128	346.3064	(281)
Energy for lighting	132.9971	1.5338	203.9954	(282)
Total Primary energy kWh/year			5882.6180	(286)
Dwelling Primary energy Rate (DPER)			109.2200	(287)

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

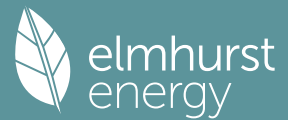
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	53.8600	(1b)	x	3.0000 (2b) = 161.5800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.8600			(4)
Dwelling volume			(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =	161.5800 (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)

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Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
20.0000 / (5) = 0.1238 (8)
Yes
Blower Door
5.0000 (17)
0.3738 (18)
1 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
(21) = (18) x (20) = 0.3457 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4408	0.4322	0.4235	0.3803	0.3717	0.3285	0.3285	0.3198	0.3457	0.3717	0.3890	0.4062 (22b)
	0.5972	0.5934	0.5897	0.5723	0.5691	0.5539	0.5539	0.5511	0.5598	0.5691	0.5756	0.5825 (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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			11.4700	1.1450	13.1336		(27)
External Wall	68.9000	11.4700	57.4300	0.1800	10.3374		(29a)
Corridor	21.7100	2.0000	19.7100	0.1800	3.5478		(29a)
Roof	53.8600		53.8600	0.1100	5.9246		(30)
Total net area of external elements Aum(A, m2)			144.4700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.9434		(33)
Party Wall 1			5.4000	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 273.2208 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	22.0000	0.0700	1.5400
E7 Party floor between dwellings (in blocks of flats)	8.0400	0.0700	0.5628
E16 Corner (normal)	12.0000	0.0900	1.0800
E16 Corner (normal)	5.4000	0.0900	0.4860
E17 Corner (inverted - internal area greater than external area)	8.1000	-0.0900	-0.7290
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E18 Party wall between dwellings	2.7000	0.0600	0.1620
E18 Party wall between dwellings	2.7000	0.0600	0.1620
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.0000	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	3.5300	0.0200	0.0706
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740
E3 Sill	6.5300	0.0500	0.3265
E4 Jamb	27.6400	0.0500	1.3820
P4 Party wall - Roof (insulation at ceiling level)	2.0000	0.1200	0.2400
E14 Flat roof	8.0400	0.0800	0.6432
E15 Flat roof with parapet	25.5200	0.5600	14.2912

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 20.3483 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 55.2917 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	31.8416	31.6404	31.4432	30.5170	30.3437	29.5370	29.5370	29.3876	29.8477	30.3437	30.6942	31.0607 (38)
Average = Sum(39)m / 12 =	87.1333	86.9321	86.7349	85.8087	85.6354	84.8287	84.8287	84.6793	85.1394	85.6354	85.9859	86.3524 (39)
												85.8078

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.6178	1.6140	1.6104	1.5932	1.5900	1.5750	1.5750	1.5722	1.5808	1.5900	1.5965	1.6033 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

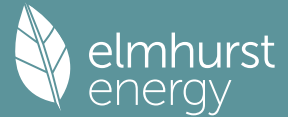
4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8039 (42)

Hot water usage for mixer showers	54.4648	53.6463	52.4535	50.1715	48.4874	46.6093	45.5418	46.7255	48.0230	50.0395	52.3706	54.2561 (42a)
Hot water usage for baths	23.5449	23.1952	22.7028	21.7948	21.1150	20.3612	19.9540	20.4429	20.9753	21.7820	22.7086	23.4653 (42b)
Hot water usage for other uses	33.1036	31.8998	30.6961	29.4923	28.2885	27.0848	27.0848	28.2885	29.4923	30.6961	31.8998	33.1036 (42c)
Average daily hot water use (litres/day)												102.1386 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	111.1132	108.7413	105.8524	101.4586	97.8909	94.0552	92.5806	95.4570	98.4907	102.5176	106.9790	110.8249 (44)
Energy content (annual)	175.9761	154.8461	162.6911	138.8918	131.7800	115.6519	111.9682	118.1957	121.4489	139.1154	152.4112	173.5250 (45)
Distribution loss (46)m = 0.15 x (45)m	26.3964	23.2269	24.4037	20.8338	19.7670	17.3478	16.7952	17.7294	18.2173	20.8673	22.8617	26.0288 (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	49.8841	46.3834	47.1780	48.6438	48.5707	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	226.9350	200.8735	213.6500	188.2069	181.6641	162.0353	159.1462	166.8395	170.0196	190.0743	201.7263	224.4839 (62)
WWHRS	-24.8990	-22.0209	-23.0590	-19.0938	-17.7947	-15.2271	-14.2729	-15.1778	-15.7545	-18.5728	-21.0407	-24.4379 (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	202.0360	178.8526	190.5910	169.1131	163.8694	146.8082	144.8733	151.6617	154.2651	171.5015	180.6855	200.0460 (64)
Total per year (kWh/year) = Sum(64)m =												2054.3035 (64)

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12Total per year (kWh/year)												2054 (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	71.2518	62.9932	66.8345	58.5103	56.2879	50.0501	49.0239	51.4610	52.5244	58.9956	63.0055	70.4368 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan 90.1943	Feb 90.1943	Mar 90.1943	Apr 90.1943	May 90.1943	Jun 90.1943	Jul 90.1943	Aug 90.1943	Sep 90.1943	Oct 90.1943	Nov 90.1943	Dec 90.1943 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.4566	87.9698	79.4566	82.1051	79.4566	82.1051	79.4566	79.4566	82.1051	79.4566	82.1051	79.4566 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.2430	158.8747	154.7629	146.0093	134.9596	124.5743	117.6363	116.0046	120.1165	128.8700	139.9198	150.3050 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194 (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)	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554 (71)
Water heating gains (Table 5)	95.7685	93.7398	89.8314	81.2643	75.6558	69.5140	65.8924	69.1680	72.9506	79.2951	87.5076	94.6731 (72)
Total internal gains	385.5264	393.6426	377.1091	362.4370	343.1302	326.2517	313.0435	314.6875	325.2304	340.6800	362.5908	377.4930 (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					7.4400	11.2829	0.6300	0.7000	0.7700		25.6547 (75)	
Southeast					1.1700	36.7938	0.6300	0.7000	0.7700		13.1563 (77)	
Southwest					2.8600	36.7938	0.6300	0.7000	0.7700		32.1598 (79)	
Solar gains	70.9707	129.4109	199.7001	285.3771	354.2750	366.9451	347.4354	293.7057	229.0030	149.1294	86.5584	59.7320 (83)
Total gains	456.4971	523.0535	576.8092	647.8141	697.4051	693.1969	660.4789	608.3932	554.2334	489.8094	449.1492	437.2250 (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 46.9130	Feb 47.0216	Mar 47.1285	Apr 47.6372	May 47.7336	Jun 48.1876	Jul 48.1876	Aug 48.2726	Sep 48.0117	Oct 47.7336	Nov 47.5390	Dec 47.3372
tau	4.1275	4.1348	4.1419	4.1758	4.1822	4.2125	4.2125	4.2182	4.2008	4.1822	4.1693	4.1558
util living area	0.9943	0.9892	0.9782	0.9425	0.8565	0.6990	0.5417	0.6013	0.8305	0.9613	0.9894	0.9952 (86)
MIT	19.2800	19.4837	19.8074	20.2625	20.6566	20.8990	20.9733	20.9590	20.7802	20.2758	19.7059	19.2514 (87)
Th 2	19.6003	19.6031	19.6057	19.6183	19.6207	19.6317	19.6317	19.6338	19.6275	19.6207	19.6159	19.6109 (88)
util rest of house	0.9921	0.9852	0.9694	0.9183	0.7957	0.5824	0.3849	0.4414	0.7366	0.9399	0.9846	0.9934 (89)
MIT 2	17.6600	17.9205	18.3312	18.8995	19.3475	19.5804	19.6251	19.6221	19.4892	18.9297	18.2138	17.6305 (90)
Living area fraction	18.2567	18.4963	18.8750	19.4015	19.8297	20.0662	20.1217	20.1146	19.9648	19.4255	18.7634	18.2276 (91)
MIT	18.2567	18.4963	18.8750	19.4015	19.8297	20.0662	20.1217	20.1146	19.9648	19.4255	18.7634	18.2276 (92)
Temperature adjustment	18.2567	18.4963	18.8750	19.4015	19.8297	20.0662	20.1217	20.1146	19.9648	19.4255	18.7634	18.2276 (93)

8. Space heating requirement

Utilisation	Jan 0.9890	Feb 0.9805	Mar 0.9632	Apr 0.9135	May 0.8063	Jun 0.6225	Jul 0.4434	Aug 0.5011	Sep 0.7634	Oct 0.9359	Nov 0.9803	Dec 0.9907 (94)
Useful gains	451.4676	512.8797	555.5597	591.7613	562.3386	431.5128	292.8640	304.8356	423.1118	458.3932	440.3017	433.1573 (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	1216.0958	1181.9561	1073.3401	901.1234	696.1915	463.6871	298.7439	314.5459	499.3249	755.7789	1002.8913	1211.3141 (97)
Space heating kWh	568.8834	449.6194	385.2286	222.7408	99.5866	0.0000	0.0000	0.0000	0.0000	221.2550	405.0645	578.9487 (98a)
Space heating requirement - total per year (kWh/year)												2931.3267
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	568.8834	449.6194	385.2286	222.7408	99.5866	0.0000	0.0000	0.0000	0.0000	221.2550	405.0645	578.9487 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2931.3267
Space heating per m2												(98c) / (4) = 54.4249 (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 568.8834	Feb 449.6194	Mar 385.2286	Apr 222.7408	May 99.5866	Jun 0.0000	Jul 0.0000	Aug 0.0000	Sep 0.0000	Oct 221.2550	Nov 405.0645	Dec 578.9487 (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)	615.6747	486.6010	416.9140	241.0614	107.7777	0.0000	0.0000	0.0000	0.0000	239.4534	438.3815	626.5678 (211)
Space heating efficiency (main heating system 2)												

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Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
	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	202.0360	178.8526	190.5910	169.1131	163.8694	146.8082	144.8733	151.6617	154.2651	171.5015	180.6855	200.0460 (64)
Efficiency of water heater (217)m	86.4729	86.2706	85.8565	84.9725	83.3478	80.3000	80.3000	80.3000	80.3000	84.9283	86.0570	80.3000 (216)
Fuel for water heating, kWh/month	233.6408	207.3158	221.9879	199.0209	196.6092	182.8247	180.4150	188.8688	192.1110	201.9368	209.9604	86.5204 (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	16.5095	13.2445	11.9252	8.7369	6.7487	5.5137	6.1564	8.0023	10.3942	13.6377	15.4037	16.9684 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-14.5561	-21.6342	-32.7707	-38.9066	-43.7879	-41.5654	-41.0771	-37.8730	-32.5338	-25.6487	-16.3991	-12.4594 (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	-5.1593	-11.0998	-22.5219	-34.5050	-46.2842	-46.7291	-46.1612	-38.7668	-28.0127	-16.0750	-6.9540	-4.0605 (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												3172.4315 (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												2445.9038 (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)												133.2411 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-665.5414 (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												5172.0352 (238)

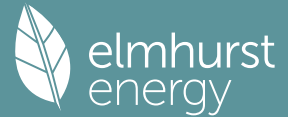
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3172.4315	0.2100	666.2106 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2445.9038	0.2100	513.6398 (264)
Space and water heating			1179.8504 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	133.2411	0.1443	19.2308 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-359.2121	0.1335	-47.9454
PV Unit electricity exported	-306.3293	0.1253	-38.3917
Total			-86.3371 (269)
Total CO2, kg/year			1124.6734 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			20.8800 (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	3172.4315	1.1300	3584.8476 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2445.9038	1.1300	2763.8713 (278)
Space and water heating			6348.7190 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	133.2411	1.5338	204.3697 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-359.2121	1.4932	-536.3872
PV Unit electricity exported	-306.3293	0.4600	-140.9160
Total			-677.3032 (283)
Total Primary energy kWh/year			6005.8863 (286)
Target Primary Energy Rate (TPER)			111.5100 (287)

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Property Reference	1 Bed Ground Floor Flat				Issued on Date	17/06/2024
Assessment Reference	1 Bed Ground Floor Flat		Prop Type Ref	1 Bed Ground Floor Flat		
Property	1 Bed Ground Floor Flat, 1 Bed Ground Floor Flat, North Hill , London, N10					
SAP Rating	82 B	DER	16.96	TER	18.08	
Environmental	88 B	% DER < TER				6.19
CO ₂ Emissions (t/year)	0.82	DFEE	50.30	TFEE	48.90	
Compliance Check	See BREL	% DFEE < TFEE				-2.88
% DPER < TPER	-0.14	DPER	96.57	TPER	96.44	
Assessor Details	Miss Nimco Ali				Assessor ID	R572-0001
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	54.4300 (1b)	3.3000 (2b)	179.6190 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.4300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	179.6190 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	1	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.2764	0.2729	0.2695	0.2521	0.2487	0.2313	0.2313	0.2278	0.2382	0.2487	0.2556	0.2625 (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
Glazing (Uw = 0.85)			11.8900	0.8221	9.7742		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
External Wall	70.7200	11.8900	58.8300	0.1600	9.4128	150.0000	8824.5000 (29a)
Corridor	39.4400	2.0000	37.4400	0.1800	6.7392	150.0000	5616.0000 (29a)
Total net area of external elements Aum(A, m ²)			110.1600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.9262		(33)
Party Floor 1			54.4300			40.0000	2177.2000 (32d)
Party Ceiling 1			54.4300			30.0000	1632.9000 (32b)
Internal Wall			56.1300			9.0000	505.1700 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	18755.7700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		344.5852 (35)

List of Thermal Bridges

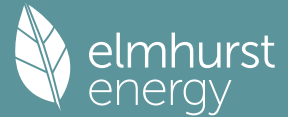
K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	42.8600	0.0900	3.8574

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E7 Party floor between dwellings (in blocks of flats)						23.9000	0.1100	2.6290				
E16 Corner (normal)						16.5000	0.0900	1.4850				
E16 Corner (normal)						6.6000	0.1400	0.9240				
E17 Corner (inverted - internal area greater than external area)						6.6000	0.0000	0.0000				
E2 Other lintels (including other steel lintels)						6.1200	0.0500	0.3060				
E3 Sill						5.1700	0.1000	0.5170				
E4 Jamb						22.8200	0.0600	1.3692				
E17 Corner (inverted - internal area greater than external area)						3.3000	-0.0900	-0.2970				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												10.7906 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 38.7168 (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	16.3838	16.1782	15.9726	14.9445	14.7389	13.7109	13.7109	13.5053	14.1221	14.7389	15.1501	15.5613 (38)
Average = Sum(39)m / 12 =	55.1006	54.8949	54.6893	53.6613	53.4557	52.4277	52.4277	52.2220	52.8389	53.4557	53.8669	54.2781 (39)
												53.6099
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0123	1.0085	1.0048	0.9859	0.9821	0.9632	0.9632	0.9594	0.9708	0.9821	0.9897	0.9972 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.9849
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.8206 (42)
Hot water usage for mixer showers												
	54.7457	53.9229	52.7241	50.4303	48.7375	46.8497	45.7767	46.9665	48.2707	50.2976	52.6407	54.5359 (42a)
Hot water usage for baths												
	23.6657	23.3142	22.8192	21.9067	21.2233	20.4656	20.0564	20.5478	21.0830	21.8937	22.8251	23.5856 (42b)
Hot water usage for other uses												
	33.2752	32.0652	30.8552	29.6451	28.4351	27.2251	27.2251	28.4351	29.6451	30.8552	32.0652	33.2752 (42c)
Average daily hot water use (litres/day)												102.6656 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	111.6865	109.3023	106.3985	101.9821	98.3959	94.5405	93.0582	95.9495	98.9988	103.0465	107.5310	111.3967 (44)
Energy content (annual)	176.8841	155.6450	163.5305	139.6083	132.4599	116.2485	112.5458	118.8055	122.0755	139.8331	153.1976	174.4203 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1705.2541
	26.5326	23.3467	24.5296	20.9413	19.8690	17.4373	16.8819	17.8208	18.3113	20.9750	22.9796	26.1630 (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	50.1415	46.6227	47.4214	48.8948	48.8213	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month												
	227.8430	201.6724	214.4894	188.9234	182.6014	162.8712	159.9672	167.7003	170.8968	190.7920	202.5126	225.3792 (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												
	227.8430	201.6724	214.4894	188.9234	182.6014	162.8712	159.9672	167.7003	170.8968	190.7920	202.5126	225.3792 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2295.6490 (64)
Electric shower(s)												2296 (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												
	71.5537	63.2588	67.1136	58.7485	56.5783	50.3083	49.2768	51.7265	52.7954	59.2342	63.2670	70.7345 (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	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	81.0500	89.7339	81.0500	83.7517	81.0500	83.7517	81.0500	81.0500	83.7517	81.0500	83.7517	81.0500 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	158.7154	160.3624	156.2121	147.3766	136.2233	125.7408	118.7379	117.0909	121.2412	130.0768	141.2300	151.7125 (68)
Pumps, fans	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032 (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)	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256 (71)
Total internal gains	96.1743	94.1351	90.2065	81.5952	76.0461	69.8727	66.2323	69.5249	73.3270	79.6159	87.8708	95.0732 (72)
	389.2493	397.5410	380.7781	366.0330	346.6290	329.6747	316.3298	317.9754	328.6295	344.0522	366.1620	381.1453 (73)
6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	g											
	Specific data											
	or Table 6c											
	FF											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northeast	6.5600											11.4897 (75)
Southeast	1.5500											8.8529 (77)
Southwest	3.7800											21.5898 (79)
Solar gains	41.9324	75.2428	113.0875	157.1121	191.4875	196.9246	187.0174	160.3289	128.1690	85.8925	50.9203	35.4357 (83)
Total gains	431.1817	472.7838	493.8656	523.1452	538.1165	526.5993	503.3472	478.3043	456.7984	429.9447	417.0824	416.5810 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	94.5532	94.9074	95.2642	97.0893	97.4627	99.3738	99.3738	99.7651	98.6004	97.4627	96.7187	95.9859
alpha	7.3035	7.3272	7.3509	7.4726	7.4975	7.6249	7.6249	7.6510	7.5734	7.4975	7.4479	7.3991
util living area	0.9979	0.9952	0.9882	0.9539	0.8445	0.6296	0.4576	0.5009	0.7640	0.9628	0.9943	0.9983 (86)
MIT	20.2427	20.3608	20.5280	20.7669	20.9337	20.9938	20.9995	20.9990	20.9757	20.7796	20.4819	20.2316 (87)
Th 2	20.0731	20.0762	20.0794	20.0951	20.0983	20.1141	20.1141	20.1173	20.1078	20.0983	20.0920	20.0857 (88)
util rest of house	0.9970	0.9931	0.9827	0.9334	0.7890	0.5464	0.3659	0.4056	0.6808	0.9418	0.9913	0.9976 (89)
MIT 2	19.3941	19.5139	19.6812	19.9207	20.0605	20.1120	20.1140	20.1171	20.0978	19.9387	19.6478	19.3937 (90)
Living area fraction									fLA = Living area / (4) =			0.4196 (91)
MIT	19.7502	19.8693	20.0365	20.2757	20.4269	20.4820	20.4856	20.4872	20.4662	20.2915	19.9978	19.7453 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.6002	19.7193	19.8865	20.1257	20.2769	20.3320	20.3356	20.3372	20.3162	20.1415	19.8478	19.5953 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9963	0.9921	0.9813	0.9342	0.8010	0.5672	0.3889	0.4295	0.7014	0.9430	0.9903	0.9971 (94)
Useful gains	429.6023	469.0300	484.6220	488.7450	431.0215	298.7103	195.7582	205.4238	320.3884	405.4539	413.0280	415.3666 (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	843.0485	813.5029	732.1008	602.3879	458.4852	300.5157	195.8478	205.6074	328.4558	510.0484	686.6867	835.6286 (97)
Space heating kWh	307.6039	231.4858	184.1242	81.8229	20.4330	0.0000	0.0000	0.0000	0.0000	77.8183	197.0343	312.6750 (98a)
Space heating requirement - total per year (kWh/year)												1412.9975
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	307.6039	231.4858	184.1242	81.8229	20.4330	0.0000	0.0000	0.0000	0.0000	77.8183	197.0343	312.6750 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1412.9975
Space heating per m2										(98c) / (4) =		25.9599 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	492.8200	387.9647	396.8876	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9418	0.9791	0.9686	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	464.1195	379.8522	384.4064	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	578.5142	553.3766	525.1678	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	82.3642	129.1021	104.7265	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.6981 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	14.3755	22.5330	18.2786	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												55.1871 (107)

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)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	307.6039	231.4858	184.1242	81.8229	20.4330	0.0000	0.0000	0.0000	0.0000	77.8183	197.0343	312.6750 (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)	343.6916	258.6434	205.7254	91.4222	22.8302	0.0000	0.0000	0.0000	0.0000	86.9479	220.1501	349.3575 (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	227.8430	201.6724	214.4894	188.9234	182.6014	162.8712	159.9672	167.7003	170.8968	190.7920	202.5126	225.3792 (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	254.5732	225.3323	239.6529	211.0876	204.0239	181.9790	178.7344	187.3746	190.9462	213.1755	226.2711	251.8204 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	4.4097	6.9120	5.6069	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	19.1689	17.3139	19.1689	18.5506	19.1689	18.5506	19.1689	19.1689	18.5506	19.1689	18.5506	19.1689 (231)
Lighting	16.8406	13.5101	12.1644	8.9122	6.8840	5.6243	6.2798	8.1627	10.6026	13.9112	15.7126	17.3086 (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)

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Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													1578.7682	(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													2564.9709	(219)
Space cooling fuel													16.9285	(221)
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6375)														
mechanical ventilation fans (SFP = 0.6375)													139.6987	(230a)
central heating pump													41.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													225.6987	(231)
Electricity for lighting (calculated in Appendix L)													135.9132	(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													4522.2795	(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	1578.7682	0.2100	331.5413	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2564.9709	0.2100	538.6439	(264)
Space and water heating			870.1852	(265)
Space cooling	16.9285	0.1137	1.9244	(266)
Pumps, fans and electric keep-hot	225.6987	0.1387	31.3072	(267)
Energy for lighting	135.9132	0.1443	19.6165	(268)
Total CO2, kg/year			923.0332	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			16.9600	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1578.7682	1.1300	1784.0081	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2564.9709	1.1300	2898.4172	(278)
Space and water heating			4682.4252	(279)
Space cooling	16.9285	1.4191	24.0228	(280)
Pumps, fans and electric keep-hot	225.6987	1.5128	341.4370	(281)
Energy for lighting	135.9132	1.5338	208.4682	(282)
Total Primary energy kWh/year			5256.3531	(286)
Dwelling Primary energy Rate (DPER)			96.5700	(287)

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

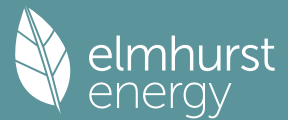
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	54.4300	(1b)	x 3.3000	(2b) = 179.6190 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.4300			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 179.6190 (5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	
Pressure test	20.0000 / (5) =	0.1113 (8)
Pressure Test Method	Yes	
Measured/design AP50	Blower Door	5.0000 (17)

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Infiltration rate													0.3613 (18)
Number of sides sheltered													1 (19)
Shelter factor													(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor													(21) = (18) x (20) = 0.3342 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4262	0.4178	0.4095	0.3677	0.3593	0.3175	0.3175	0.3092	0.3342	0.3593	0.3760	0.3927	(22b)
	0.5908	0.5873	0.5838	0.5676	0.5646	0.5504	0.5504	0.5478	0.5559	0.5646	0.5707	0.5771	(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			2.0000	1.0000	2.0000			(26)
TER Opening Type (Uw = 1.20)			11.6000	1.1450	13.2824			(27)
External Wall	70.7200	11.6000	59.1200	0.1800	10.6416			(29a)
Corridor	39.4400	2.0000	37.4400	0.1800	6.7392			(29a)
Total net area of external elements Aum(A, m2)			110.1600					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 32.6632			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 354.5852 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element				
E7 Party floor between dwellings (in blocks of flats)	42.8600	0.0700	3.0002	
E7 Party floor between dwellings (in blocks of flats)	23.9000	0.0700	1.6730	
E16 Corner (normal)	16.5000	0.0900	1.4850	
E16 Corner (normal)	6.6000	0.0900	0.5940	
E17 Corner (inverted - internal area greater than external area)	6.6000	-0.0900	-0.5940	
E2 Other lintels (including other steel lintels)	6.1200	0.0500	0.3060	
E3 Sill	5.1700	0.0500	0.2585	
E4 Jamb	22.8200	0.0500	1.1410	
E17 Corner (inverted - internal area greater than external area)	3.3000	-0.0900	-0.2970	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.5667 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 40.2299 (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	35.0197	34.8107	34.6058	33.6435	33.4635	32.6254	32.6254	32.4702	32.9482	33.4635	33.8277	34.2085	(38)
Average = Sum(39)m / 12 =	75.2496	75.0406	74.8357	73.8735	73.6934	72.8553	72.8553	72.7001	73.1781	73.6934	74.0576	74.4384	(39)
													73.8726

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.3825	1.3787	1.3749	1.3572	1.3539	1.3385	1.3385	1.3357	1.3444	1.3539	1.3606	1.3676	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

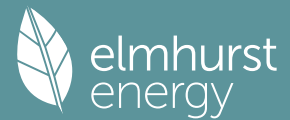
Assumed occupancy													1.8206 (42)
Hot water usage for mixer showers													
	54.7457	53.9229	52.7241	50.4303	48.7375	46.8497	45.7767	46.9665	48.2707	50.2976	52.6407	54.5359	(42a)
Hot water usage for baths													
	23.6657	23.3142	22.8192	21.9067	21.2233	20.4656	20.0564	20.5478	21.0830	21.8937	22.8251	23.5856	(42b)
Hot water usage for other uses													
	33.2752	32.0652	30.8552	29.6451	28.4351	27.2251	27.2251	28.4351	29.6451	30.8552	32.0652	33.2752	(42c)
Average daily hot water use (litres/day)													102.6656 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	111.6865	109.3023	106.3985	101.9821	98.3959	94.5405	93.0582	95.9495	98.9988	103.0465	107.5310	111.3967	(44)
Energy conte	176.8841	155.6450	163.5305	139.6083	132.4599	116.2485	112.5458	118.8055	122.0755	139.8331	153.1976	174.4203	(45)
Energy content (annual)										Total = Sum(45)m =			1705.2541
Distribution loss (46)m = 0.15 x (45)m													
	26.5326	23.3467	24.5296	20.9413	19.8690	17.4373	16.8819	17.8208	18.3113	20.9750	22.9796	26.1630	(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	50.1415	46.6227	47.4214	48.8948	48.8213	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
	227.8430	201.6724	214.4894	188.9234	182.6014	162.8712	159.9672	167.7003	170.8968	190.7920	202.5126	225.3792	(62)
WWHRS	-25.0274	-22.1345	-23.1779	-19.1922	-17.8865	-15.3056	-14.3466	-15.2561	-15.8358	-18.6686	-21.1493	-24.5640	(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													
	202.8155	179.5379	191.3114	169.7312	164.7149	147.5656	145.6207	152.4442	155.0611	172.1234	181.3634	200.8153	(64)
12Total per year (kWh/year)													2063.1046 (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													
	71.5537	63.2588	67.1136	58.7485	56.5783	50.3083	49.2768	51.7265	52.7954	59.2342	63.2670	70.7345	(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	
	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	80.1971	88.7896	80.1971	82.8703	80.1971	82.8703	80.1971	80.1971	82.8703	80.1971	82.8703	80.1971	(67)

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Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	158.7154	160.3624	156.2121	147.3766	136.2233	125.7408	118.7379	117.0909	121.2412	130.0768	141.2300	151.7125 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032 (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)	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256 (71)
Water heating gains (Table 5)	96.1743	94.1351	90.2065	81.5952	76.0461	69.8727	66.2323	69.5249	73.3270	79.6159	87.8708	95.0732 (72)
Total internal gains	388.3964	396.5968	379.9252	365.1517	345.7761	328.7934	315.4769	317.1225	327.7481	343.1993	365.2807	380.2924 (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											6.4000	11.2829		0.6300	0.7000	0.7700		22.0686 (75)				
Southeast											1.5100	36.7938		0.6300	0.7000	0.7700		16.9795 (77)				
Southwest											3.6900	36.7938		0.6300	0.7000	0.7700		41.4928 (79)				
Solar gains											80.5409	144.5212	217.2107	301.7703	367.7961	378.2393	359.2102	307.9488	246.1782	164.9765	97.8043	68.0624 (83)
Total gains											468.9373	541.1179	597.1360	666.9219	713.5722	707.0327	674.6871	625.0712	573.9263	508.1758	463.0850	448.3548 (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	71.2446	71.4430	71.6386	72.5718	72.7491	73.5860	73.5860	73.7431	73.2614	72.7491	72.3913	72.0210
alpha	5.7496	5.7629	5.7759	5.8381	5.8499	5.9057	5.9057	5.9162	5.8841	5.8499	5.8261	5.8014
util living area	0.9978	0.9946	0.9855	0.9469	0.8362	0.6391	0.4720	0.5288	0.7948	0.9676	0.9947	0.9983 (86)
MIT	19.8687	20.0385	20.2869	20.6224	20.8724	20.9792	20.9970	20.9944	20.9297	20.6045	20.1818	19.8460 (87)
Th 2	19.7768	19.7797	19.7826	19.7963	19.7988	19.8108	19.8108	19.8130	19.8062	19.7988	19.7937	19.7883 (88)
util rest of house	0.9968	0.9920	0.9783	0.9210	0.7682	0.5305	0.3463	0.3959	0.6932	0.9461	0.9917	0.9975 (89)
MIT 2	18.4936	18.7121	19.0275	19.4441	19.7090	19.8024	19.8102	19.8118	19.7697	19.4347	18.9061	18.4731 (90)
Living area fraction	FLA = Living area / (4) =	FLA = Living area / (4) =	FLA = Living area / (4) =	FLA = Living area / (4) =	FLA = Living area / (4) =	FLA = Living area / (4) =	FLA = Living area / (4) =	FLA = Living area / (4) =	FLA = Living area / (4) =	FLA = Living area / (4) =	FLA = Living area / (4) =	FLA = Living area / (4) =
MIT	19.0706	19.2687	19.5560	19.9385	20.1972	20.2962	20.3082	20.3081	20.2565	19.9256	19.4415	19.0492 (92)
Temperature adjustment	adjusted MIT	adjusted MIT	adjusted MIT	adjusted MIT	adjusted MIT	adjusted MIT	adjusted MIT	adjusted MIT	adjusted MIT	adjusted MIT	adjusted MIT	adjusted MIT
adjusted MIT	19.0706	19.2687	19.5560	19.9385	20.1972	20.2962	20.3082	20.3081	20.2565	19.9256	19.4415	19.0492 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9959	0.9905	0.9765	0.9246	0.7929	0.5763	0.3993	0.4522	0.7349	0.9490	0.9905	0.9968 (94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1111.4816	1078.2351	977.0544	815.4550	626.1851	415.0003	270.1640	284.1159	450.5192	687.2330	913.9790	1105.3526 (97)
Space heating kWh	479.4691	364.3831	293.0823	143.1355	44.9318	0.0000	0.0000	0.0000	0.0000	152.5087	327.8063	489.8650 (98a)
Space heating requirement - total per year (kWh/year)	2295.1818											
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	479.4691	364.3831	293.0823	143.1355	44.9318	0.0000	0.0000	0.0000	0.0000	152.5087	327.8063	489.8650 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2295.1818											
Space heating per m2	(98c) / (4) = 42.1676 (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
479.4691	364.3831	293.0823	143.1355	44.9318	0.0000	0.0000	0.0000	0.0000	0.0000	152.5087	327.8063	489.8650 (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)	518.9059	394.3540	317.1886	154.9085	48.6275	0.0000	0.0000	0.0000	0.0000	165.0527	354.7687	530.1569 (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	202.8155	179.5379	191.3114	169.7312	164.7149	147.5656	145.6207	152.4442	155.0611	172.1234	181.3634	200.8153 (64)
Water heating requirement	86.1571	85.8646	85.2923	84.0184	82.0001	80.3000	80.3000	80.3000	80.3000	84.1231	85.6333	80.3000 (216)
Efficiency of water heater (217)m	235.4020	209.0942	224.3011	202.0166	200.8715	183.7679	181.3458	189.8433	193.1022	204.6090	211.7908	86.2154 (217)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement (221)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Pumps and Fa	16.6634	13.3680	12.0364	8.8184	6.8116	5.5651	6.2137	8.0768	10.4910	13.7648	15.5473	17.1265 (232)
Lighting												

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Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-14.7055	-21.8538	-33.0992	-39.2913	-44.2155	-41.9687	-41.4748	-38.2419	-32.8545	-25.9060	-16.5663	-12.5875	(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	-5.2186	-11.2267	-22.7785	-34.8972	-46.8097	-47.2602	-46.6866	-39.2090	-28.3328	-16.2593	-7.0339	-4.1072	(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												2483.9630	(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												2469.0673	(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)												134.4829	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-672.5848	(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												4500.9285	(238)

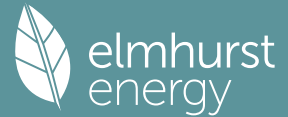
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2483.9630	0.2100	521.6322	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2469.0673	0.2100	518.5041	(264)
Space and water heating			1040.1364	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	134.4829	0.1443	19.4100	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-362.7651	0.1335	-48.4207	
PV Unit electricity exported	-309.8197	0.1253	-38.8293	
Total			-87.2500	(269)
Total CO2, kg/year			984.2257	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			18.0800	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2483.9630	1.1300	2806.8782	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2469.0673	1.1300	2790.0461	(278)
Space and water heating			5596.9243	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	134.4829	1.5338	206.2744	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-362.7651	1.4932	-541.6967	
PV Unit electricity exported	-309.8197	0.4600	-142.5221	
Total			-684.2188	(283)
Total Primary energy kWh/year			5249.0807	(286)
Target Primary Energy Rate (TPER)			96.4400	(287)

Full SAP Calculation Printout



Property Reference	2 Bed 1st Floor Flat - NW				Issued on Date	17/06/2024
Assessment Reference	1 Bed 1st Floor Flat - NW	Prop Type Ref		2 Bed 1st Floor Flat - NW		
Property	1 Bed 1st Floor Flat - NW, 1 Bed 1st Floor Flat - NW, North Hill , London, N10					
SAP Rating	84 B	DER	13.64	TER	14.40	
Environmental	89 B	% DER < TER				5.28
CO ₂ Emissions (t/year)	0.98	DFEE	42.42	TFEE	41.47	
Compliance Check	See BREL	% DFEE < TFEE				-2.29
% DPER < TPER	-2.78	DPER	78.43	TPER	76.31	
Assessor Details	Miss Nimco Ali				Assessor ID	R572-0001
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	81.2900	3.0000	243.8700
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.2900		
Dwelling volume			

2. Ventilation rate

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

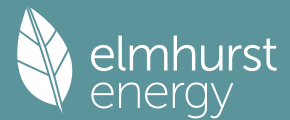
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (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
Glazing (Uw = 0.85)			14.9900	0.8221	12.3225		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
Exposed Floor to Corridor			7.8600	0.1400	1.1004		(28b)
External Wall	79.2000	14.9900	64.2100	0.1600	10.2736	150.0000	9631.5000 (29a)
Corridor	35.4600	2.0000	33.4600	0.1800	6.0228	150.0000	5019.0000 (29a)
Total net area of external elements Aum(A, m ²)			122.5200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.7193		(33)
Party Wall 1			15.2400	0.0000	0.0000	70.0000	1066.8000 (32)
Party Floor 1			73.4300			40.0000	2937.2000 (32d)
Party Ceiling 1			81.2900			30.0000	2438.7000 (32b)
Internal Wall			78.1800			9.0000	703.6200 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		21796.8200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							268.1365 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	36.5800	0.0900	3.2922
E7 Party floor between dwellings (in blocks of flats)	15.2400	0.1100	1.6764
E16 Corner (normal)	9.0000	0.0900	0.8100
E16 Corner (normal)	6.0000	0.1400	0.8400
E17 Corner (inverted - internal area greater than external area)	3.0000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E2 Other lintels (including other steel lintels)	7.4200	0.0500	0.3710
E3 Sill	6.4700	0.1000	0.6470
E4 Jamb	32.3800	0.0600	1.9428
E18 Party wall between dwellings	6.0000	0.0700	0.4200
E18 Party wall between dwellings	3.0000	0.1000	0.3000
E20 Exposed floor (normal)	3.5700	0.2600	0.9282
P7 Party Wall - Exposed floor (normal)	4.9700	0.2000	0.9940
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	6.5600	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	10.7800	0.2500	2.6950
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			14.6466 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	46.3659 (37)

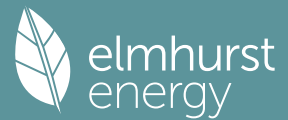
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.9687	22.6895	22.4104	21.0146	20.7354	19.3397	19.3397	19.0605	19.8980	20.7354	21.2937	21.8520 (38)
Average = Sum(39)m / 12 =	69.3346	69.0554	68.7763	67.3805	67.1014	65.7056	65.7056	65.4264	66.2639	67.1014	67.6597	68.2180 (39)
												67.3107
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8529	0.8495	0.8461	0.8289	0.8255	0.8083	0.8083	0.8049	0.8152	0.8255	0.8323	0.8392 (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												2.4869 (42)
Hot water usage for mixer showers												
Hot water usage for baths	65.9165	64.9260	63.4825	60.7206	58.6824	56.4094	55.1175	56.5500	58.1204	60.5609	63.3821	65.6640 (42a)
Hot water usage for other uses	28.4695	28.0467	27.4513	26.3535	25.5314	24.6199	24.1276	24.7188	25.3625	26.3379	27.4583	28.3733 (42b)
Average daily hot water use (litres/day)	40.0982	38.6400	37.1819	35.7238	34.2657	32.8076	32.8076	34.2657	35.7238	37.1819	38.6400	40.0982 (42c)
												123.6214 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	134.4842	131.6127	128.1157	122.7979	118.4795	113.8369	112.0526	115.5345	119.2068	124.0807	129.4804	134.1354 (44)
Energy content (annual)	212.9901	187.4147	196.9090	168.1041	159.4962	139.9758	135.5179	143.0559	146.9939	168.3764	184.4686	210.0236 (45)
Distribution loss (46)m = 0.15 x (45)m												2053.3262
Water storage loss:	31.9485	28.1122	29.5363	25.2156	23.9244	20.9964	20.3277	21.4584	22.0491	25.2565	27.6703	31.5035 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	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	263.9490	233.4421	247.8679	217.4192	210.4551	189.2908	186.4768	194.0148	196.3089	219.3353	233.7837	260.9825 (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	263.9490	233.4421	247.8679	217.4192	210.4551	189.2908	186.4768	194.0148	196.3089	219.3353	233.7837	260.9825 (64)
12Total per year (kWh/year)												2653.3262 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	83.5589	73.8222	78.2120	68.2234	65.7722	58.8707	57.7994	60.3058	61.2042	68.7249	73.6646	82.5726 (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	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	116.6876	129.1899	116.6876	120.5772	116.6876	120.5772	116.6876	116.6876	120.5772	116.6876	120.5772	116.6876 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	222.1155	224.4203	218.6122	206.2472	190.6387	175.9689	166.1686	163.8637	169.6719	182.0368	197.6454	212.3151 (68)
Pumps, fans	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344 (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)	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753 (71)
Total internal gains	112.3104	109.8545	105.1236	94.7547	88.4035	81.7649	77.6874	81.0562	85.0059	92.3721	102.3119	110.9847 (72)
	514.4167	526.7680	503.7266	484.8824	459.0331	438.6143	420.8469	421.9108	435.5583	454.3999	483.8377	503.2907 (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	6.5600	11.2829	0.3200	0.7000	0.7700	11.4897 (75)						
Southwest	3.7800	36.7938	0.3200	0.7000	0.7700	21.5898 (79)						
Northwest	4.6500	11.2829	0.3200	0.7000	0.7700	8.1444 (81)						

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Solar gains	41.2238	76.7410	122.3230	180.5995	228.7886	238.7915	225.3692	187.6357	142.2230	89.4858	50.5642	34.5105 (83)
Total gains	555.6405	603.5090	626.0496	665.4818	687.8217	677.4057	646.2161	609.5466	577.7813	543.8856	534.4020	537.8012 (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	87.3254	87.6784	88.0343	89.8579	90.2317	92.1485	92.1485	92.5417	91.3721	90.2317	89.4872	88.7548
alpha	6.8217	6.8452	6.8690	6.9905	7.0154	7.1432	7.1432	7.1694	7.0915	7.0154	6.9658	6.9170
util living area	0.9965	0.9930	0.9844	0.9446	0.8288	0.6128	0.4466	0.4922	0.7544	0.9556	0.9915	0.9972 (86)
MIT	20.2058	20.3259	20.4986	20.7536	20.9287	20.9928	20.9993	20.9987	20.9717	20.7647	20.4582	20.1965 (87)
Th 2	20.2077	20.2106	20.2136	20.2284	20.2313	20.2462	20.2462	20.2491	20.2402	20.2313	20.2254	20.2195 (88)
util rest of house	0.9954	0.9906	0.9790	0.9262	0.7823	0.5443	0.3705	0.4127	0.6858	0.9369	0.9882	0.9962 (89)
MIT 2	19.4849	19.6064	19.7790	20.0344	20.1859	20.2431	20.2460	20.2488	20.2261	20.0508	19.7505	19.4855 (90)
Living area fraction									FLA = Living area / (4) =			0.3731 (91)
MIT	19.7539	19.8748	20.0475	20.3027	20.4630	20.5228	20.5271	20.5286	20.5043	20.3171	20.0146	19.7507 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.6039	19.7248	19.8975	20.1527	20.3130	20.3728	20.3771	20.3786	20.3543	20.1671	19.8646	19.6007 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9942	0.9888	0.9763	0.9241	0.7876	0.5560	0.3838	0.4265	0.6967	0.9351	0.9862	0.9952 (94)
Useful gains	552.4130	596.7497	611.2308	614.9742	541.7476	376.6334	248.0100	259.9701	402.5229	508.5673	527.0484	535.2324 (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	1061.0889	1023.7358	921.4278	758.2131	577.9472	379.3084	248.1743	260.3049	414.4362	641.9676	863.6458	1050.6075 (97)
Space heating kWh	378.4549	286.9347	230.7865	103.1320	26.9325	0.0000	0.0000	0.0000	0.0000	99.2498	242.3501	383.4390 (98a)
Space heating requirement - total per year (kWh/year)												1751.2796
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	378.4549	286.9347	230.7865	103.1320	26.9325	0.0000	0.0000	0.0000	0.0000	99.2498	242.3501	383.4390 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1751.2796
Space heating per m2										(98c) / (4) =		21.5436 (99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	617.6325	486.2213	497.2409	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9395	0.9766	0.9645	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	580.2934	474.8455	479.5934	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	736.0272	702.4691	661.6533	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	112.1283	169.3519	135.4525	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.7135 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	20.0007	30.2079	24.1612	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												74.3699 (107)

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)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	378.4549	286.9347	230.7865	103.1320	26.9325	0.0000	0.0000	0.0000	0.0000	99.2498	242.3501	383.4390 (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)	422.8546	320.5974	257.8621	115.2313	30.0922	0.0000	0.0000	0.0000	0.0000	110.8936	270.7822	428.4235 (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	263.9490	233.4421	247.8679	217.4192	210.4551	189.2908	186.4768	194.0148	196.3089	219.3353	233.7837	260.9825 (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	294.9151	260.8292	276.9474	242.9265	235.1454	211.4981	208.3540	216.7763	219.3396	245.0673	261.2108	291.6006 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	6.1352	9.2662	7.4114	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	25.6241	23.1443	25.6241	24.7975	25.6241	24.7975	25.6241	25.6241	24.7975	25.6241	24.7975	25.6241 (231)
Lighting	26.3000	21.0988	18.9972	13.9181	10.7508	8.7835	9.8072	12.7478	16.5581	21.7251	24.5385	27.0310 (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)

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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	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	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	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													1956.7369	(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													2964.6103	(219)
Space cooling fuel													22.8128	(221)
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)														
mechanical ventilation fans (SFP = 0.7250)													215.7030	(230a)
central heating pump													41.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													301.7030	(231)
Electricity for lighting (calculated in Appendix L)													212.2561	(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													5458.1192	(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	1956.7369	0.2100	410.9148	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2964.6103	0.2100	622.5682	(264)
Space and water heating			1033.4829	(265)
Space cooling	22.8128	0.1137	2.5949	(266)
Pumps, fans and electric keep-hot	301.7030	0.1387	41.8499	(267)
Energy for lighting	212.2561	0.1443	30.6351	(268)
Total CO2, kg/year			1108.5628	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			13.6400	(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	1956.7369	1.1300	2211.1127	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2964.6103	1.1300	3350.0096	(278)
Space and water heating			5561.1223	(279)
Space cooling	22.8128	1.4193	32.3785	(280)
Pumps, fans and electric keep-hot	301.7030	1.5128	456.4163	(281)
Energy for lighting	212.2561	1.5338	325.5655	(282)
Total Primary energy kWh/year			6375.4827	(286)
Dwelling Primary energy Rate (DPER)			78.4300	(287)

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

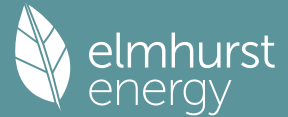
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	81.2900	3.0000	243.8700	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.2900			(4)
Dwelling volume				(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)

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Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
30.0000 / (5) = 0.1230 (8)
Yes
Blower Door
5.0000 (17)
0.3730 (18)
1 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3450 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4399	0.4313	0.4227	0.3795	0.3709	0.3278	0.3278	0.3192	0.3450	0.3709	0.3882	0.4054	(22b)
	0.5968	0.5930	0.5893	0.5720	0.5688	0.5537	0.5537	0.5509	0.5595	0.5688	0.5753	0.5822	(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			2.0000	1.0000	2.0000			(26)
TER Opening Type (Uw = 1.20)			14.9900	1.1450	17.1641			(27)
Exposed Floor to Corridor			7.8600	0.1300	1.0218			(28b)
External Wall	79.2000	14.9900	64.2100	0.1800	11.5578			(29a)
Corridor	35.4600	2.0000	33.4600	0.1800	6.0228			(29a)
Total net area of external elements Aum(A, m2)			122.5200					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.7665			(33)
Party Wall 1			15.2400	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 278.1365 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	36.5800	0.0700	2.5606	
E7 Party floor between dwellings (in blocks of flats)	15.2400	0.0700	1.0668	
E16 Corner (normal)	9.0000	0.0900	0.8100	
E16 Corner (normal)	6.0000	0.0900	0.5400	
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700	
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700	
E2 Other lintels (including other steel lintels)	7.4200	0.0500	0.3710	
E3 Sill	6.4700	0.0500	0.3235	
E4 Jamb	32.3800	0.0500	1.6190	
E18 Party wall between dwellings	6.0000	0.0600	0.3600	
E18 Party wall between dwellings	3.0000	0.0600	0.1800	
E20 Exposed floor (normal)	3.5700	0.3200	1.1424	
P7 Party Wall - Exposed floor (normal)	4.9700	0.1600	0.7952	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	6.5600	0.0000	0.0000	
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	10.7800	0.0200	0.2156	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.4441 (36)

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 47.2106 (37)

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

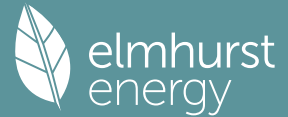
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	48.0261	47.7237	47.4273	46.0351	45.7746	44.5620	44.5620	44.3374	45.0291	45.7746	46.3015	46.8524	(38)
Heat transfer coeff	95.2367	94.9343	94.6379	93.2457	92.9852	91.7726	91.7726	91.5481	92.2397	92.9852	93.5122	94.0631	(39)
Average = Sum(39)m / 12 =												93.2444	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	1.1716	1.1678	1.1642	1.1471	1.1439	1.1290	1.1290	1.1262	1.1347	1.1439	1.1504	1.1571	(40)
HLP (average)												1.1471	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4869 (42)
Hot water usage for mixer showers													
65.9165	64.9260	63.4825	60.7206	58.6824	56.4094	55.1175	56.5500	58.1204	60.5609	63.3821	65.6640		(42a)
Hot water usage for baths													
28.4695	28.0467	27.4513	26.3535	25.5314	24.6199	24.1276	24.7188	25.3625	26.3379	27.4583	28.3733		(42b)
Hot water usage for other uses													
40.0982	38.6400	37.1819	35.7238	34.2657	32.8076	32.8076	34.2657	35.7238	37.1819	38.6400	40.0982		(42c)
Average daily hot water use (litres/day)												123.6214	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	134.4842	131.6127	128.1157	122.7979	118.4795	113.8369	112.0526	115.5345	119.2068	124.0807	129.4804	134.1354	(44)
Energy conte	212.9901	187.4147	196.9090	168.1041	159.4962	139.9758	135.5179	143.0559	146.9939	168.3764	184.4686	210.0236	(45)
Energy content (annual)												2053.3262	
Distribution loss (46)m = 0.15 x (45)m													
31.9485	28.1122	29.5363	25.2156	23.9244	20.9964	20.3277	21.4584	22.0491	25.2565	27.6703	31.5035		(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													
263.9490	233.4421	247.8679	217.4192	210.4551	189.2908	186.4768	194.0148	196.3089	219.3353	233.7837	260.9825		(62)
WWHRS	-30.1343	-26.6510	-27.9074	-23.1084	-21.5362	-18.4287	-17.2740	-18.3691	-19.0671	-22.4780	-25.4648	-29.5763	(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													
233.8147	206.7911	219.9605	194.3108	188.9189	170.8621	169.2028	175.6457	177.2419	196.8573	208.3189	231.4063		(64)
Total per year (kWh/year) = Sum(64)m =												2373.3309	(64)
12Total per year (kWh/year)												2373	(64)

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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	83.5589	73.8222	78.2120	68.2234	65.7722	58.8707	57.7994	60.3058	61.2042	68.7249	73.6646	82.5726 (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	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	113.9982	126.2123	113.9982	117.7982	113.9982	117.7982	113.9982	113.9982	117.7982	113.9982	117.7982	113.9982	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	222.1155	224.4203	218.6122	206.2472	190.6387	175.9689	166.1686	163.8637	169.6719	182.0368	197.6454	212.3151	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	(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)	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	(71)
Water heating gains (Table 5)	112.3104	109.8545	105.1236	94.7547	88.4035	81.7649	77.6874	81.0562	85.0059	92.3721	102.3119	110.9847	(72)
Total internal gains	511.7273	523.7904	501.0372	482.1033	456.3437	435.8352	418.1575	419.2214	432.7792	451.7104	481.0587	500.6013	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	6.5600	11.2829	0.6300	0.7000	0.7700	22.6203 (75)
Southwest	3.7800	36.7938	0.6300	0.7000	0.7700	42.5049 (79)
Northwest	4.6500	11.2829	0.6300	0.7000	0.7700	16.0342 (81)

Solar gains	81.1593	151.0838	240.8234	355.5552	450.4275	470.1207	443.6956	369.4079	280.0015	176.1751	99.5484	67.9425 (83)
Total gains	592.8867	674.8742	741.8606	837.6585	906.7712	905.9559	861.8530	788.6293	712.7807	627.8855	580.6071	568.5438 (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	65.9460	66.1560	66.3632	67.3541	67.5428	68.4352	68.4352	68.6031	68.0887	67.5428	67.1622	66.7688
alpha	5.3964	5.4104	5.4242	5.4903	5.5029	5.5623	5.5623	5.5735	5.5392	5.5029	5.4775	5.4513
util living area	0.9969	0.9933	0.9833	0.9413	0.8255	0.6266	0.4648	0.5263	0.7953	0.9653	0.9933	0.9976 (86)
MIT	19.7941	19.9640	20.2235	20.5883	20.8591	20.9761	20.9961	20.9927	20.9156	20.5625	20.1244	19.7746 (87)
Th 2	19.9428	19.9458	19.9487	19.9626	19.9652	19.9773	19.9773	19.9795	19.9726	19.9652	19.9599	19.9544 (88)
util rest of house	0.9958	0.9908	0.9770	0.9191	0.7686	0.5361	0.3588	0.4137	0.7121	0.9476	0.9903	0.9967 (89)
MIT 2	18.5503	18.7688	19.0992	19.5559	19.8539	19.9651	19.9762	19.9773	19.9195	19.5361	18.9848	18.5339 (90)
Living area fraction												0.3731 (91)
MIT	19.0144	19.2147	19.5187	19.9411	20.2289	20.3423	20.3568	20.3561	20.2911	19.9191	19.4100	18.9969 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0144	19.2147	19.5187	19.9411	20.2289	20.3423	20.3568	20.3561	20.2911	19.9191	19.4100	18.9969 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9944	0.9885	0.9736	0.9186	0.7844	0.5694	0.3986	0.4560	0.7402	0.9466	0.9882	0.9955	(94)
Useful gains	589.5761	667.0873	722.2690	769.4674	711.2592	515.8424	343.4979	359.5983	527.6122	594.3878	573.7510	565.9822	(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	1401.3522	1358.9605	1232.0643	1029.5332	793.0623	526.9858	344.7668	362.1742	571.0678	866.5368	1151.1344	1391.8371	(97)
Space heating kWh	603.9614	464.9388	379.2877	187.2474	60.8615	0.0000	0.0000	0.0000	0.0000	202.4788	415.7161	614.4360	(98a)
Space heating requirement - total per year (kWh/year)												2928.9277	
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	603.9614	464.9388	379.2877	187.2474	60.8615	0.0000	0.0000	0.0000	0.0000	202.4788	415.7161	614.4360	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2928.9277	
Space heating per m2											(98c) / (4) =	36.0306	(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	603.9614	464.9388	379.2877	187.2474	60.8615	0.0000	0.0000	0.0000	0.0000	202.4788	415.7161	614.4360 (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)	653.6378	503.1805	410.4845	202.6487	65.8675	0.0000	0.0000	0.0000	0.0000	219.1330	449.9092	664.9741 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	

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Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	233.8147	206.7911	219.9605	194.3108	188.9189	170.8621	169.2028	175.6457	177.2419	196.8573	208.3189	231.4063	(64)
Efficiency of water heater	86.3199	86.0625	85.5374	84.3021	82.2385	80.3000	80.3000	80.3000	80.3000	84.4419	85.8313	86.3694	(216)
Fuel for water heating, kWh/month	270.8700	240.2801	257.1513	230.4933	229.7208	212.7797	210.7134	218.7368	220.7246	233.1276	242.7073	267.9263	(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	23.6866	19.0023	17.1094	12.5351	9.6825	7.9107	8.8327	11.4810	14.9127	19.5663	22.1001	24.3449	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.6517	-32.0086	-48.2168	-56.8952	-63.6956	-60.3023	-59.5580	-55.0580	-47.5363	-37.7663	-24.3222	-18.5495	(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)	-8.1045	-17.3963	-35.2353	-53.9036	-72.2486	-72.9591	-72.1092	-60.6132	-43.8456	-25.2066	-10.9243	-6.3838	(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												3169.8352	(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												2835.2313	(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)												191.1643	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1004.4905	(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												5277.7403	(238)

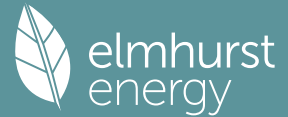
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3169.8352	0.2100	665.6654	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2835.2313	0.2100	595.3986	(264)
Space and water heating			1261.0640	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	191.1643	0.1443	27.5909	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-525.5604	0.1336	-70.2172	
PV Unit electricity exported	-478.9301	0.1254	-60.0374	
Total			-130.2545	(269)
Total CO2, kg/year			1170.3296	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.4000	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	3169.8352	1.1300	3581.9138	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2835.2313	1.1300	3203.8114	(278)
Space and water heating			6785.7252	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	191.1643	1.5338	293.2142	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-525.5604	1.4937	-785.0419	
PV Unit electricity exported	-478.9301	0.4601	-220.3659	
Total			-1005.4078	(283)
Total Primary energy kWh/year			6203.6324	(286)
Target Primary Energy Rate (TPER)			76.3100	(287)

Full SAP Calculation Printout



Property Reference	2 Bed 1st Floor Flat - NW			Issued on Date	17/06/2024
Assessment Reference	2 Bed 2nd Floor Flat	Prop Type Ref	2 Bed 1st Floor Flat - NW		
Property	1 Bed 1st Floor Flat - NW, 1 Bed 1st Floor Flat - NW, North Hill , London, N10				
SAP Rating	84 B	DER	13.95	TER	14.89
Environmental	88 B	% DER < TER			6.31
CO ₂ Emissions (t/year)	1	DFEE	43.73	TFEE	43.70
Compliance Check	See BREL	% DFEE < TFEE			-0.07
% DPER < TPER	-1.45	DPER	80.12	TPER	78.98
Assessor Details	Miss Nimco Ali			Assessor ID	R572-0001
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	81.2900 (1b)	3.0000 (2b)	243.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.2900		243.8700 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	243.8700 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	1	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1388 (21)

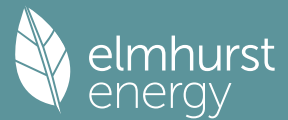
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (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
Glazing (Uw = 0.85)			14.9900	0.8221	12.3225		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
External Wall	79.2000	14.9900	64.2100	0.1600	10.2736	150.0000	9631.5000 (29a)
Corridor	35.4600	2.0000	33.4600	0.1800	6.0228	150.0000	5019.0000 (29a)
Terrace Roof	23.1900		23.1900	0.1400	3.2466	9.0000	208.7100 (30)
Total net area of external elements Aum(A, m ²)			137.8500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.8655		(33)
Party Wall 1			15.2400	0.0000	0.0000	70.0000	1066.8000 (32)
Party Floor 1			81.2900			40.0000	3251.6000 (32d)
Party Ceiling 1			58.1000			30.0000	1743.0000 (32b)
Internal Wall 1			78.1800			9.0000	703.6200 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	21624.2300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		266.0134 (35)
List of Thermal Bridges		

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K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	34.8300	0.0900	3.1347
E7 Party floor between dwellings (in blocks of flats)	23.6400	0.1100	2.6004
E16 Corner (normal)	9.0000	0.0900	0.8100
E16 Corner (normal)	6.0000	0.1400	0.8400
E17 Corner (inverted - internal area greater than external area)	3.0000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E2 Other lintels (including other steel lintels)	7.4200	0.0500	0.3710
E3 Sill	6.4700	0.1000	0.6470
E4 Jamb	32.3800	0.0600	1.9428
E18 Party wall between dwellings	6.0000	0.0700	0.4200
E18 Party wall between dwellings	3.0000	0.1000	0.3000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.5200	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.3900	0.2500	1.3475
P4 Party wall - Roof (insulation at ceiling level)	2.6400	0.0800	0.2112
E24 Eaves (insulation at ceiling level - inverted)	12.5800	0.1600	2.0128
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			14.3674 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	48.2329 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	22.9687	22.6895	22.4104	21.0146	20.7354	19.3397	19.3397	19.0605	19.8980	20.7354	21.2937	21.8520	(38)
Average = Sum(39)m / 12 =	71.2016	70.9224	70.6433	69.2475	68.9684	67.5726	67.5726	67.2934	68.1309	68.9684	69.5267	70.0850	(39)
												69.1777	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8759	0.8725	0.8690	0.8519	0.8484	0.8313	0.8313	0.8278	0.8381	0.8484	0.8553	0.8622	(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													2.4869 (42)
Hot water usage for mixer showers	65.9165	64.9260	63.4825	60.7206	58.6824	56.4094	55.1175	56.5500	58.1204	60.5609	63.3821	65.6640	(42a)
Hot water usage for baths	28.4695	28.0467	27.4513	26.3535	25.5314	24.6199	24.1276	24.7188	25.3625	26.3379	27.4583	28.3733	(42b)
Hot water usage for other uses	40.0982	38.6400	37.1819	35.7238	34.2657	32.8076	32.8076	34.2657	35.7238	37.1819	38.6400	40.0982	(42c)
Average daily hot water use (litres/day)	31.9485	28.1122	29.5363	25.2156	23.9244	20.9964	20.3277	21.4584	22.0491	25.2565	27.6703	31.5035	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	134.4842	131.6127	128.1157	122.7979	118.4795	113.8369	112.0526	115.5345	119.2068	124.0807	129.4804	134.1354	(44)
Energy content (annual)	212.9901	187.4147	196.9090	168.1041	159.4962	139.9758	135.5179	143.0559	146.9939	168.3764	184.4686	210.0236	(45)
Distribution loss (46)m = 0.15 x (45)m	31.9485	28.1122	29.5363	25.2156	23.9244	20.9964	20.3277	21.4584	22.0491	25.2565	27.6703	31.5035	(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	263.9490	233.4421	247.8679	217.4192	210.4551	189.2908	186.4768	194.0148	196.3089	219.3353	233.7837	260.9825	(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	263.9490	233.4421	247.8679	217.4192	210.4551	189.2908	186.4768	194.0148	196.3089	219.3353	233.7837	260.9825	(64)
12Total per year (kWh/year)												2653.3262	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	83.5589	73.8222	78.2120	68.2234	65.7722	58.8707	57.7994	60.3058	61.2042	68.7249	73.6646	82.5726	(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	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	116.6876	129.1899	116.6876	120.5772	116.6876	120.5772	116.6876	116.6876	120.5772	116.6876	120.5772	116.6876	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	222.1155	224.4203	218.6122	206.2472	190.6387	175.9689	166.1686	163.8637	169.6719	182.0368	197.6454	212.3151	(68)
Pumps, fans	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	(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)	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	(71)
Total internal gains	112.3104	109.8545	105.1236	94.7547	88.4035	81.7649	77.6874	81.0562	85.0059	92.3721	102.3119	110.9847	(72)
	514.4167	526.7680	503.7266	484.8824	459.0331	438.6143	420.8469	421.9108	435.5583	454.3999	483.8377	503.2907	(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	6.5600	11.2829	0.3200	0.7000	0.7700	11.4897 (75)
Southwest	3.7800	36.7938	0.3200	0.7000	0.7700	21.5898 (79)
Northwest	4.6500	11.2829	0.3200	0.7000	0.7700	8.1444 (81)

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Solar gains	41.2238	76.7410	122.3230	180.5995	228.7886	238.7915	225.3692	187.6357	142.2230	89.4858	50.5642	34.5105 (83)
Total gains	555.6405	603.5090	626.0496	665.4818	687.8217	677.4057	646.2161	609.5466	577.7813	543.8856	534.4020	537.8012 (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	84.3623	84.6944	85.0290	86.7429	87.0940	88.8930	88.8930	89.2618	88.1646	87.0940	86.3946	85.7064
alpha	6.6242	6.6463	6.6686	6.7829	6.8063	6.9262	6.9262	6.9508	6.8776	6.8063	6.7596	6.7138
util living area	0.9965	0.9931	0.9851	0.9483	0.8395	0.6278	0.4589	0.5056	0.7679	0.9584	0.9918	0.9972 (86)
MIT	20.1628	20.2847	20.4622	20.7262	20.9152	20.9904	20.9990	20.9982	20.9650	20.7404	20.4227	20.1530 (87)
Th 2	20.1880	20.1910	20.1939	20.2086	20.2116	20.2263	20.2263	20.2293	20.2204	20.2116	20.2057	20.1998 (88)
util rest of house	0.9954	0.9909	0.9799	0.9307	0.7935	0.5567	0.3789	0.4221	0.6986	0.9406	0.9886	0.9962 (89)
MIT 2	19.4261	19.5495	19.7270	19.9919	20.1570	20.2222	20.2261	20.2288	20.2027	20.0112	19.6992	19.4262 (90)
Living area fraction									fLA = Living area / (4) =			0.3731 (91)
MIT	19.7010	19.8238	20.0013	20.2659	20.4399	20.5089	20.5145	20.5159	20.4871	20.2833	19.9692	19.6974 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.5510	19.6738	19.8513	20.1159	20.2899	20.3589	20.3645	20.3659	20.3371	20.1333	19.8192	19.5474 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9942	0.9890	0.9771	0.9282	0.7985	0.5691	0.3933	0.4370	0.7097	0.9385	0.9866	0.9952 (94)
Useful gains	552.4155	596.8699	611.7442	617.7286	549.2152	385.5350	254.1329	266.3932	410.0291	510.4378	527.2337	535.2273 (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	1085.8944	1047.7953	943.1778	776.6711	592.4305	389.1409	254.3750	266.8757	424.9402	657.4949	884.3216	1075.6212 (97)
Space heating kWh	396.9083	303.0219	246.5866	114.4386	32.1522	0.0000	0.0000	0.0000	0.0000	109.4105	257.1033	402.0530 (98a)
Space heating requirement - total per year (kWh/year)												1861.6743
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	396.9083	303.0219	246.5866	114.4386	32.1522	0.0000	0.0000	0.0000	0.0000	109.4105	257.1033	402.0530 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1861.6743
Space heating per m2										(98c) / (4) =		22.9016 (99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	635.1823	500.0371	511.4301	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9283	0.9707	0.9565	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	589.6633	485.3625	489.1717	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	736.0272	702.4691	661.6533	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	105.3820	161.5273	128.3263	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.7135 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	18.7974	28.8122	22.8900	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												70.4996 (107)

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)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	396.9083	303.0219	246.5866	114.4386	32.1522	0.0000	0.0000	0.0000	0.0000	109.4105	257.1033	402.0530 (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)	443.4730	338.5719	275.5158	127.8643	35.9242	0.0000	0.0000	0.0000	0.0000	122.2464	287.2662	449.2213 (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	263.9490	233.4421	247.8679	217.4192	210.4551	189.2908	186.4768	194.0148	196.3089	219.3353	233.7837	260.9825 (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	294.9151	260.8292	276.9474	242.9265	235.1454	211.4981	208.3540	216.7763	219.3396	245.0673	261.2108	291.6006 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	5.7661	8.8381	7.0215	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	25.6241	23.1443	25.6241	24.7975	25.6241	24.7975	25.6241	25.6241	24.7975	25.6241	24.7975	25.6241 (231)
Lighting	26.3000	21.0988	18.9972	13.9181	10.7508	8.7835	9.8072	12.7478	16.5581	21.7251	24.5385	27.0310 (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)

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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													2080.0831	(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													2964.6103	(219)
Space cooling fuel													21.6257	(221)
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)														
mechanical ventilation fans (SFP = 0.7250)													215.7030	(230a)
central heating pump													41.0000	(230c)
main heating flue fan													45.0000	(230e)
Total electricity for the above, kWh/year													301.7030	(231)
Electricity for lighting (calculated in Appendix L)													212.2561	(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													5580.2781	(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	2080.0831	0.2100	436.8174	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2964.6103	0.2100	622.5682	(264)
Space and water heating			1059.3856	(265)
Space cooling	21.6257	0.1137	2.4594	(266)
Pumps, fans and electric keep-hot	301.7030	0.1387	41.8499	(267)
Energy for lighting	212.2561	0.1443	30.6351	(268)
Total CO2, kg/year			1134.3300	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			13.9500	(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	2080.0831	1.1300	2350.4939	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2964.6103	1.1300	3350.0096	(278)
Space and water heating			5700.5035	(279)
Space cooling	21.6257	1.4192	30.6920	(280)
Pumps, fans and electric keep-hot	301.7030	1.5128	456.4163	(281)
Energy for lighting	212.2561	1.5338	325.5655	(282)
Total Primary energy kWh/year			6513.1773	(286)
Dwelling Primary energy Rate (DPER)			80.1200	(287)

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

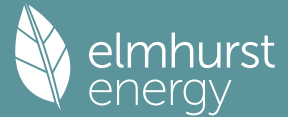
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	81.2900	(1b)	x	3.0000 (2b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.2900		=	243.8700 (1b) - (3b)
Dwelling volume			=	243.8700 (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)

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Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure Test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
30.0000 / (5) = 0.1230 (8)
Yes
Blower Door
5.0000 (17)
0.3730 (18)
1 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
(21) = (18) x (20) = 0.3450 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4399	0.4313	0.4227	0.3795	0.3709	0.3278	0.3278	0.3192	0.3450	0.3709	0.3882	0.4054 (22b)
	0.5968	0.5930	0.5893	0.5720	0.5688	0.5537	0.5537	0.5509	0.5595	0.5688	0.5753	0.5822 (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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			14.9900	1.1450	17.1641		(27)
External Wall	79.2000	14.9900	64.2100	0.1800	11.5578		(29a)
Corridor	35.4600	2.0000	33.4600	0.1800	6.0228		(29a)
Terrace Roof	23.1900		23.1900	0.1100	2.5509		(30)
Total net area of external elements Aum(A, m2)			137.8500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.2956		(33)
Party Wall 1			15.2400	0.0000	0.0000		(32)

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

273.1607 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	34.8300	0.0700	2.4381
E7 Party floor between dwellings (in blocks of flats)	23.6400	0.0700	1.6548
E16 Corner (normal)	9.0000	0.0900	0.8100
E16 Corner (normal)	6.0000	0.0900	0.5400
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E2 Other lintels (including other steel lintels)	7.4200	0.0500	0.3710
E3 Sill	6.4700	0.0500	0.3235
E4 Jamb	32.3800	0.0500	1.6190
E18 Party wall between dwellings	6.0000	0.0600	0.3600
E18 Party wall between dwellings	3.0000	0.0600	0.1800
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.5200	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.3900	0.0200	0.1078
P4 Party wall - Roof (insulation at ceiling level)	2.6400	0.1200	0.3168
E24 Eaves (insulation at ceiling level - inverted)	12.5800	0.2400	3.0192
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.2002 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	50.4958 (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
	48.0261	47.7237	47.4273	46.0351	45.7746	44.5620	44.5620	44.3374	45.0291	45.7746	46.3015	46.8524 (38)
Heat transfer coeff	98.5219	98.2195	97.9231	96.5309	96.2704	95.0578	95.0578	94.8333	95.5249	96.2704	96.7974	97.3483 (39)
Average = Sum(39)m / 12 =												96.5296

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.2120	1.2083	1.2046	1.1875	1.1843	1.1694	1.1694	1.1666	1.1751	1.1843	1.1908	1.1975 (40)
HLP (average)												1.1875
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4869 (42)
Hot water usage for mixer showers													
65.9165	64.9260	63.4825	60.7206	58.6824	56.4094	55.1175	56.5500	58.1204	60.5609	63.3821	65.6640	(42a)	
Hot water usage for baths													
28.4695	28.0467	27.4513	26.3535	25.5314	24.6199	24.1276	24.7188	25.3625	26.3379	27.4583	28.3733	(42b)	
Hot water usage for other uses													
40.0982	38.6400	37.1819	35.7238	34.2657	32.8076	32.8076	34.2657	35.7238	37.1819	38.6400	40.0982	(42c)	
Average daily hot water use (litres/day)												123.6214 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	134.4842	131.6127	128.1157	122.7979	118.4795	113.8369	112.0526	115.5345	119.2068	124.0807	129.4804	134.1354 (44)	
Energy content	212.9901	187.4147	196.9090	168.1041	159.4962	139.9758	135.5179	143.0559	146.9939	168.3764	184.4686	210.0236 (45)	
Energy content (annual)										Total = Sum(45)m =		2053.3262	
Distribution loss (46)m = 0.15 x (45)m													
31.9485	28.1122	29.5363	25.2156	23.9244	20.9964	20.3277	21.4584	22.0491	25.2565	27.6703	31.5035	(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													
263.9490	233.4421	247.8679	217.4192	210.4551	189.2908	186.4768	194.0148	196.3089	219.3353	233.7837	260.9825	(62)	
WWHRS	-30.1343	-26.6510	-27.9074	-23.1084	-21.5362	-18.4287	-17.2740	-18.3691	-19.0671	-22.4780	-25.4648	-29.5763 (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													
233.8147	206.7911	219.9605	194.3108	188.9189	170.8621	169.2028	175.6457	177.2419	196.8573	208.3189	231.4063	(64)	
Total per year (kWh/year) = Sum(64)m =								2373.3309					(64)
12Total per year (kWh/year)												2373 (64)	

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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	83.5589	73.8222	78.2120	68.2234	65.7722	58.8707	57.7994	60.3058	61.2042	68.7249	73.6646	82.5726 (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	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	113.9982	126.2123	113.9982	117.7982	113.9982	117.7982	113.9982	113.9982	117.7982	113.9982	117.7982	113.9982	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	222.1155	224.4203	218.6122	206.2472	190.6387	175.9689	166.1686	163.8637	169.6719	182.0368	197.6454	212.3151	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	(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)	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	(71)
Water heating gains (Table 5)	112.3104	109.8545	105.1236	94.7547	88.4035	81.7649	77.6874	81.0562	85.0059	92.3721	102.3119	110.9847	(72)
Total internal gains	511.7273	523.7904	501.0372	482.1033	456.3437	435.8352	418.1575	419.2214	432.7792	451.7104	481.0587	500.6013	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	6.5600	11.2829	0.6300	0.7000	0.7700	22.6203 (75)
Southwest	3.7800	36.7938	0.6300	0.7000	0.7700	42.5049 (79)
Northwest	4.6500	11.2829	0.6300	0.7000	0.7700	16.0342 (81)

Solar gains	81.1593	151.0838	240.8234	355.5552	450.4275	470.1207	443.6956	369.4079	280.0015	176.1751	99.5484	67.9425 (83)
Total gains	592.8867	674.8742	741.8606	837.6585	906.7712	905.9559	861.8530	788.6293	712.7807	627.8855	580.6071	568.5438 (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	62.6066	62.7993	62.9894	63.8979	64.0708	64.8881	64.8881	65.0417	64.5708	64.0708	63.7220	63.3614
alpha	5.1738	5.1866	5.1993	5.2599	5.2714	5.3259	5.3259	5.3361	5.3047	5.2714	5.2481	5.2241
util living area	0.9967	0.9930	0.9834	0.9438	0.8352	0.6428	0.4799	0.5424	0.8067	0.9663	0.9931	0.9974 (86)
MIT	19.7180	19.8914	20.1595	20.5391	20.8314	20.9681	20.9943	20.9896	20.8971	20.5181	20.0617	19.6978 (87)
Th 2	19.9104	19.9134	19.9163	19.9300	19.9326	19.9446	19.9446	19.9468	19.9400	19.9326	19.9274	19.9220 (88)
util rest of house	0.9956	0.9905	0.9770	0.9223	0.7791	0.5492	0.3677	0.4239	0.7237	0.9491	0.9901	0.9964 (89)
MIT 2	18.4317	18.6548	18.9963	19.4723	19.7976	19.9281	19.9430	19.9436	19.8740	19.4583	18.8833	18.4142 (90)
Living area fraction	fLA = Living area / (4) =											0.3731 (91)
MIT	18.9117	19.1162	19.4303	19.8703	20.1833	20.3161	20.3353	20.3339	20.2557	19.8538	19.3230	18.8931 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9117	19.1162	19.4303	19.8703	20.1833	20.3161	20.3353	20.3339	20.2557	19.8538	19.3230	18.8931 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9940	0.9880	0.9733	0.9209	0.7935	0.5833	0.4098	0.4684	0.7509	0.9475	0.9877	0.9951	(94)
Useful gains	589.3301	666.7538	722.0735	771.3727	719.5598	528.4859	353.2045	369.4086	535.2467	594.8914	573.4712	565.7708	(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	1439.5682	1396.3097	1266.1746	1058.9760	816.6929	543.3594	355.0673	373.0614	588.0257	890.8623	1183.1499	1430.3509	(97)
Space heating kWh	632.5771	490.2616	404.8112	207.0744	72.2670	0.0000	0.0000	0.0000	0.0000	220.2023	438.9687	643.2476	(98a)
Space heating requirement - total per year (kWh/year)												3109.4099	
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	632.5771	490.2616	404.8112	207.0744	72.2670	0.0000	0.0000	0.0000	0.0000	220.2023	438.9687	643.2476	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3109.4099	
Space heating per m2											(98c) / (4) =	38.2508	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												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
632.5771	490.2616	404.8112	207.0744	72.2670	0.0000	0.0000	0.0000	0.0000	0.0000	220.2023	438.9687	643.2476 (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)	684.6073	530.5861	438.1074	224.1065	78.2111	0.0000	0.0000	0.0000	0.0000	238.3142	475.0743	696.1554 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)

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Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	233.8147	206.7911	219.9605	194.3108	188.9189	170.8621	169.2028	175.6457	177.2419	196.8573	208.3189	231.4063	(64)
Efficiency of water heater	86.4027	86.1624	85.6698	84.5180	82.5084	80.3000	80.3000	80.3000	80.3000	84.6222	85.9379	80.3000	(216)
Fuel for water heating, kWh/month	270.6104	240.0015	256.7539	229.9045	228.9691	212.7797	210.7134	218.7368	220.7246	232.6308	242.4063	267.6751	(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	23.6866	19.0023	17.1094	12.5351	9.6825	7.9107	8.8327	11.4810	14.9127	19.5663	22.1001	24.3449	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.6517	-32.0086	-48.2168	-56.8952	-63.6956	-60.3023	-59.5580	-55.0580	-47.5363	-37.7663	-24.3222	-18.5495	(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)	-8.1045	-17.3963	-35.2353	-53.9036	-72.2486	-72.9591	-72.1092	-60.6132	-43.8456	-25.2066	-10.9243	-6.3838	(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												3365.1622	(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												2831.9062	(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)												191.1643	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1004.4905	(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												5469.7422	(238)

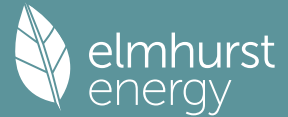
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3365.1622	0.2100	706.6841 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2831.9062	0.2100	594.7003 (264)
Space and water heating			1301.3844 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	191.1643	0.1443	27.5909 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-525.5604	0.1336	-70.2172
PV Unit electricity exported	-478.9301	0.1254	-60.0374
Total			-130.2545 (269)
Total CO2, kg/year			1210.6500 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.8900 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3365.1622	1.1300	3802.6333 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2831.9062	1.1300	3200.0540 (278)
Space and water heating			7002.6873 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	191.1643	1.5338	293.2142 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-525.5604	1.4937	-785.0419
PV Unit electricity exported	-478.9301	0.4601	-220.3659
Total			-1005.4078 (283)
Total Primary energy kWh/year			6420.5945 (286)
Target Primary Energy Rate (TPER)			78.9800 (287)

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Property Reference	2 Bed Ground Floor Flat				Issued on Date	17/06/2024
Assessment Reference	2 Bed Ground Floor Flat		Prop Type Ref	2 Bed Ground Floor Flat		
Property	2B Ground Floor Flat, 2B Ground Floor Flat, North Hill , London, N10					
SAP Rating	82 B	DER	16.29	TER	17.81	
Environmental	87 B	% DER < TER				8.53
CO ₂ Emissions (t/year)	1.02	DFEE	52.92	TFEE	54.03	
Compliance Check	See BREL	% DFEE < TFEE				2.07
% DPER < TPER	1.94	DPER	92.91	TPER	94.75	
Assessor Details	Miss Nimco Ali				Assessor ID	R572-0001
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	71.3500	3.3000	235.4550
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.3500		
Dwelling volume			235.4550

2. Ventilation rate

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

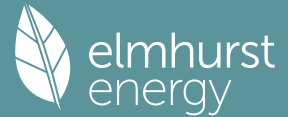
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (25)

3. Heat losses and heat loss parameter

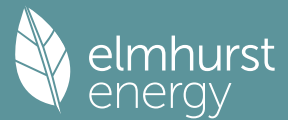
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Glazing (Uw = 0.85)			14.9900	0.8221	12.3225		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
Exposed Floor			27.6600	0.1400	3.8724	110.0000	3042.6000 (28b)
External Wall	77.6800	14.9900	62.6900	0.1600	10.0304	150.0000	9403.5000 (29a)
Corridor	51.1500	2.0000	49.1500	0.1800	8.8470	150.0000	7372.5000 (29a)
Total net area of external elements Aum(A, m ²)			156.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.0723		(33)
Party Floor 1			43.6900			40.0000	1747.6000 (32d)
Party Ceiling 1			71.3500			30.0000	2140.5000 (32b)
Internal Wall			74.2800			9.0000	668.5200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	24375.2200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							341.6289 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E20 Exposed floor (normal)						10.5800	0.2000	2.1160				
E20 Exposed floor (normal)						5.7400	0.2600	1.4924				
E7 Party floor between dwellings (in blocks of flats)						36.1400	0.0900	3.2526				
E7 Party floor between dwellings (in blocks of flats)						15.5000	0.1100	1.7050				
E16 Corner (normal)						13.2000	0.0900	1.1880				
E16 Corner (normal)						6.6000	0.1400	0.9240				
E17 Corner (inverted - internal area greater than external area)						6.6000	0.0000	0.0000				
E2 Other lintels (including other steel lintels)						7.4200	0.0500	0.3710				
E3 Sill						6.4700	0.1000	0.6470				
E4 Jamb						32.3800	0.0600	1.9428				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												13.6388 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 50.7111 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.1761	21.9066	21.6371	20.2895	20.0199	18.6723	18.6723	18.4028	19.2114	20.0199	20.5590	21.0980 (38)
Average = Sum(39)m / 12 =	72.8872	72.6177	72.3482	71.0006	70.7311	69.3835	69.3835	69.1139	69.9225	70.7311	71.2701	71.8092 (39)
												70.9332
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0215	1.0178	1.0140	0.9951	0.9913	0.9724	0.9724	0.9687	0.9800	0.9913	0.9989	1.0064 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.9942
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.2784 (42)
Hot water usage for mixer showers												
	62.4217	61.4837	60.1167	57.5013	55.5711	53.4187	52.1952	53.5518	55.0389	57.3500	60.0216	62.1826 (42a)
Hot water usage for baths												
	26.9666	26.5661	26.0021	24.9623	24.1836	23.3202	22.8539	23.4139	24.0237	24.9475	26.0088	26.8755 (42b)
Hot water usage for other uses												
	37.9636	36.5831	35.2026	33.8221	32.4416	31.0611	31.0611	32.4416	33.8221	35.2026	36.5831	37.9636 (42c)
Average daily hot water use (litres/day)												117.0654 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	127.3520	124.6329	121.3215	116.2857	112.1964	107.8000	106.1102	109.4074	112.8847	117.5002	122.6136	127.0216 (44)
Energy content (annual)	201.6944	177.4756	186.4666	159.1892	151.0379	132.5527	128.3311	135.4692	139.1982	159.4466	174.6855	198.8852 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1944.4321
	30.2542	26.6213	27.9700	23.8784	22.6557	19.8829	19.2497	20.3204	20.8797	23.9170	26.2028	29.8328 (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	252.6533	223.5030	237.4255	208.5043	201.9968	181.8678	179.2900	186.4281	188.5132	210.4055	224.0006	249.8441 (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	252.6533	223.5030	237.4255	208.5043	201.9968	181.8678	179.2900	186.4281	188.5132	210.4055	224.0006	249.8441 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2544.4321 (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	79.8031	70.5175	74.7399	65.2592	62.9598	56.4025	55.4098	57.7832	58.6122	65.7557	70.4117	78.8690 (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	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	102.9148	113.9414	102.9148	106.3453	102.9148	106.3453	102.9148	102.9148	106.3453	102.9148	106.3453	102.9148 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.4271	202.5069	197.2659	186.1083	172.0239	158.7865	149.9432	147.8634	153.1044	164.2620	178.3464	191.5838 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922 (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)	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379 (71)
Water heating gains (Table 5)	107.2622	104.9367	100.4568	90.6378	84.6234	78.3369	74.4756	77.6656	81.4058	88.3814	97.7940	106.0068 (72)
Total internal gains	470.7809	481.5618	460.8142	443.2681	419.7388	400.6454	384.5102	385.6205	398.0322	415.7348	442.6624	460.6820 (73)
6. Solar gains												
[Jan]												
				Area	Solar flux		g	FF		Access		Gains
				m2	Table 6a		W/m2	Specific data		factor		W
								or Table 6b		Table 6d		
Northeast				6.5600	11.2829		0.3200	0.7000		0.7700		11.4897 (75)
Southwest				3.7800	36.7938		0.3200	0.7000		0.7700		21.5898 (79)
Northwest				4.6500	11.2829		0.3200	0.7000		0.7700		8.1444 (81)
Solar gains	41.2238	76.7410	122.3230	180.5995	228.7886	238.7915	225.3692	187.6357	142.2230	89.4858	50.5642	34.5105 (83)
Total gains	512.0047	558.3027	583.1372	623.8675	648.5274	639.4369	609.8794	573.2562	540.2552	505.2206	493.2267	495.1925 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	92.8955	93.2403	93.5876	95.3639	95.7273	97.5866	97.5866	97.9671	96.8343	95.7273	95.0033	94.2901	
alpha	7.1930	7.2160	7.2392	7.3576	7.3818	7.5058	7.5058	7.5311	7.4556	7.3818	7.3336	7.2860	
util living area	0.9989	0.9975	0.9936	0.9721	0.8868	0.6801	0.4992	0.5517	0.8263	0.9796	0.9970	0.9991 (86)	
MIT	20.1626	20.2732	20.4422	20.6991	20.9015	20.9890	20.9990	20.9980	20.9570	20.7132	20.4061	20.1539 (87)	
Th 2	20.0654	20.0686	20.0717	20.0874	20.0906	20.1064	20.1064	20.1095	20.1000	20.0906	20.0843	20.0780 (88)	
util rest of house	0.9983	0.9963	0.9905	0.9582	0.8382	0.5924	0.3987	0.4467	0.7467	0.9666	0.9953	0.9987 (89)	
MIT 2	19.3086	19.4213	19.5915	19.8533	20.0311	20.1025	20.1062	20.1091	20.0808	19.8726	19.5671	19.3103 (90)	
Living area fraction									FLA = Living area / (4) =				0.3417 (91)
MIT	19.6004	19.7124	19.8822	20.1423	20.3285	20.4054	20.4113	20.4129	20.3802	20.1598	19.8538	19.5985 (92)	
Temperature adjustment												-0.1500	
adjusted MIT	19.4504	19.5624	19.7322	19.9923	20.1785	20.2554	20.2613	20.2629	20.2302	20.0098	19.7038	19.4485 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9979	0.9955	0.9890	0.9563	0.8435	0.6075	0.4162	0.4649	0.7594	0.9650	0.9944	0.9983 (94)
Useful gains	510.9120	555.7728	576.7301	596.6309	547.0380	388.4483	253.8233	266.5246	410.2708	487.5580	490.4680	494.3551 (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	1104.2702	1064.7501	957.3264	787.5615	599.6952	392.3907	254.0304	266.9770	428.6372	665.5648	898.2755	1094.9854 (97)
Space heating kWh	441.4585	342.0328	283.1637	137.4700	39.1769	0.0000	0.0000	0.0000	0.0000	132.4370	293.6215	446.8690 (98a)
Space heating requirement - total per year (kWh/year)												2116.2293
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	441.4585	342.0328	283.1637	137.4700	39.1769	0.0000	0.0000	0.0000	0.0000	132.4370	293.6215	446.8690 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2116.2293
Space heating per m2										(98c) / (4) =		29.6598 (99)

8c. Space cooling requirement

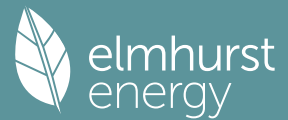
Calculated for June, July and August. See Table 10b													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W													
	0.0000	0.0000	0.0000	0.0000	0.0000	652.2044	513.4375	525.2659	0.0000	0.0000	0.0000	0.0000 (100)	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9110	0.9640	0.9449	0.0000	0.0000	0.0000	0.0000 (101)	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	594.1594	494.9382	496.3132	0.0000	0.0000	0.0000	0.0000 (102)	
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	699.6908	667.6454	626.4570	0.0000	0.0000	0.0000	0.0000 (103)	
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	75.9826	128.4942	96.8269	0.0000	0.0000	0.0000	0.0000 (104)	
Cooled fraction									fc = cooled area / (4) =				0.7708 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)	
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	14.6428	24.7624	18.6597	0.0000	0.0000	0.0000	0.0000 (107)	
Space cooling requirement												58.0648 (107)	

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)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	441.4585	342.0328	283.1637	137.4700	39.1769	0.0000	0.0000	0.0000	0.0000	132.4370	293.6215	446.8690 (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)	493.2497	382.1595	316.3840	153.5978	43.7731	0.0000	0.0000	0.0000	0.0000	147.9743	328.0687	499.2950 (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	252.6533	223.5030	237.4255	208.5043	201.9968	181.8678	179.2900	186.4281	188.5132	210.4055	224.0006	249.8441 (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	282.2942	249.7240	265.2798	232.9657	225.6948	203.2042	200.3240	208.2995	210.6293	235.0900	250.2800	279.1554 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	4.4916	7.5958	5.7238	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	24.9919	22.5734	24.9919	24.1857	24.9919	24.1857	24.9919	24.9919	24.1857	24.9919	24.1857	24.9919 (231)
Lighting	22.1523	17.7714	16.0012	11.7231	9.0553	7.3982	8.2605	10.7374	13.9468	18.2989	20.6686	22.7680 (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)

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	Air changes per hour
Pressure test		/ (5) =	0.1274 (8)
			Yes

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

Blower Door
5.0000 (17)
0.3774 (18)
1 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor
(20) = 1 - [0.075 x (19)] = 0.9250 (20)
(21) = (18) x (20) = 0.3491 (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	0.4451	0.4364	0.4277	0.3840	0.3753	0.3317	0.3317	0.3229	0.3491	0.3753	0.3927	0.4102	(22b)
Effective ac	0.5991	0.5952	0.5914	0.5737	0.5704	0.5550	0.5550	0.5521	0.5609	0.5704	0.5771	0.5841	(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			2.0000	1.0000	2.0000			(26)
TER Opening Type (Uw = 1.20)			14.9900	1.1450	17.1641			(27)
Exposed Floor			27.6600	0.1300	3.5958			(28b)
External Wall	77.6800	14.9900	62.6900	0.1800	11.2842			(29a)
Corridor	51.1500	2.0000	49.1500	0.1800	8.8470			(29a)
Total net area of external elements Aum(A, m2)			156.4900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 42.8911			(33)

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

351.6289 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E20 Exposed floor (normal)	10.5800	0.3200	3.3856	
E20 Exposed floor (normal)	5.7400	0.3200	1.8368	
E7 Party floor between dwellings (in blocks of flats)	36.1400	0.0700	2.5298	
E7 Party floor between dwellings (in blocks of flats)	15.5000	0.0700	1.0850	
E16 Corner (normal)	13.2000	0.0900	1.1880	
E16 Corner (normal)	6.6000	0.0900	0.5940	
E17 Corner (inverted - internal area greater than external area)	6.6000	-0.0900	-0.5940	
E2 Other lintels (including other steel lintels)	7.4200	0.0500	0.3710	
E3 Sill	6.4700	0.0500	0.3235	
E4 Jamb	32.3800	0.0500	1.6190	

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

12.3387 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 55.2298 (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	46.5472	46.2483	45.9554	44.5793	44.3218	43.1233	43.1233	42.9014	43.5850	44.3218	44.8427	45.3872	(38)
Heat transfer coeff	101.7770	101.4781	101.1852	99.8091	99.5516	98.3531	98.3531	98.1312	98.8148	99.5516	100.0725	100.6170	(39)
Average = Sum(39)m / 12 =												99.8079	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4264	1.4223	1.4182	1.3989	1.3953	1.3785	1.3785	1.3753	1.3849	1.3953	1.4026	1.4102	(40)
HLP (average)												1.3988	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

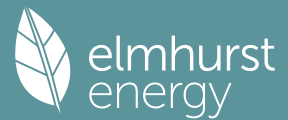
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2784 (42)
Hot water usage for mixer showers	62.4217	61.4837	60.1167	57.5013	55.5711	53.4187	52.1952	53.5518	55.0389	57.3500	60.0216	62.1826	(42a)
Hot water usage for baths	26.9666	26.5661	26.0021	24.9623	24.1836	23.3202	22.8539	23.4139	24.0237	24.9475	26.0088	26.8755	(42b)
Hot water usage for other uses	37.9636	36.5831	35.2026	33.8221	32.4416	31.0611	31.0611	32.4416	33.8221	35.2026	36.5831	37.9636	(42c)
Average daily hot water use (litres/day)												117.0654	(43)
Daily hot water use	127.3520	124.6329	121.3215	116.2857	112.1964	107.8000	106.1102	109.4074	112.8847	117.5002	122.6136	127.0216	(44)
Energy conte	201.6944	177.4756	186.4666	159.1892	151.0379	132.5527	128.3311	135.4692	139.1982	159.4466	174.6855	198.8852	(45)
Energy content (annual)										Total = Sum(45)m =		1944.4321	
Distribution loss (46)m = 0.15 x (45)m	30.2542	26.6213	27.9700	23.8784	22.6557	19.8829	19.2497	20.3204	20.8797	23.9170	26.2028	29.8328	(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													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	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	252.6533	223.5030	237.4255	208.5043	201.9968	181.8678	179.2900	186.4281	188.5132	210.4055	224.0006	249.8441	(62)
WWHRS	-28.5366	-25.2380	-26.4278	-21.8833	-20.3944	-17.4516	-16.3581	-17.3952	-18.0561	-21.2862	-24.1147	-28.0082	(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	224.1167	198.2650	210.9977	186.6211	181.6024	164.4162	162.9319	169.0328	170.4571	189.1193	199.8859	221.8359	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2279.2818	(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	79.8031	70.5175	74.7399	65.2592	62.9598	56.4025	55.4098	57.7832	58.6122	65.7557	70.4117	78.8690	(65)

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

Metabolic gains (Table 5), Watts

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.3667	112.2274	101.3667	104.7456	101.3667	104.7456	101.3667	101.3667	104.7456	101.3667	104.7456	101.3667	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.4271	202.5069	197.2659	186.1083	172.0239	158.7865	149.9432	147.8634	153.1044	164.2620	178.3464	191.5838	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	(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)	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	(71)
Water heating gains (Table 5)	107.2622	104.9367	100.4568	90.6378	84.6234	78.3369	74.4756	77.6656	81.4058	88.3814	97.7940	106.0068	(72)
Total internal gains	469.2328	479.8478	459.2661	441.6684	418.1907	399.0457	382.9621	384.0724	396.4325	414.1867	441.0627	459.1339	(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				6.5600	11.2829	0.6300		0.7000		0.7700		22.6203 (75)	
Southwest				3.7800	36.7938	0.6300		0.7000		0.7700		42.5049 (79)	
Northwest				4.6500	11.2829	0.6300		0.7000		0.7700		16.0342 (81)	
Solar gains	81.1593	151.0838	240.8234	355.5552	450.4275	470.1207	443.6956	369.4079	280.0015	176.1751	99.5484	67.9425 (83)	
Total gains	550.3921	630.9316	700.0895	797.2235	868.6182	869.1664	826.6577	753.4802	676.4340	590.3618	540.6111	527.0764 (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	68.4741	68.6758	68.8746	69.8242	70.0048	70.8578	70.8578	71.0181	70.5268	70.0048	69.6404	69.2635	
alpha	5.5649	5.5784	5.5916	5.6549	5.6670	5.7239	5.7239	5.7345	5.7018	5.6670	5.6427	5.6176	
util living area	0.9987	0.9970	0.9916	0.9654	0.8757	0.6886	0.5173	0.5860	0.8541	0.9818	0.9970	0.9990	(86)
MIT	19.7404	19.8989	20.1524	20.5184	20.8184	20.9659	20.9943	20.9891	20.8854	20.4988	20.0639	19.7225	(87)
Th 2	19.7431	19.7463	19.7494	19.7642	19.7670	19.7799	19.7799	19.7823	19.7749	19.7670	19.7614	19.7555	(88)
util rest of house	0.9981	0.9955	0.9872	0.9466	0.8147	0.5744	0.3774	0.4383	0.7610	0.9683	0.9953	0.9985	(89)
MIT 2	18.3062	18.5109	18.8356	19.2991	19.6324	19.7655	19.7788	19.7799	19.7099	19.2858	18.7336	18.2923	(90)
Living area fraction									fLA = Living area / (4) =			0.3417	(91)
MIT	18.7963	18.9852	19.2855	19.7158	20.0376	20.1757	20.1942	20.1931	20.1116	19.7003	19.1881	18.7810	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7963	18.9852	19.2855	19.7158	20.0376	20.1757	20.1942	20.1931	20.1116	19.7003	19.1881	18.7810	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9974	0.9941	0.9849	0.9457	0.8300	0.6135	0.4257	0.4896	0.7904	0.9674	0.9941	0.9980	(94)
Ext temp.	548.9616	627.2342	689.5387	753.9148	720.9772	533.1993	351.9276	368.8883	534.6757	571.0911	537.4195	526.0011	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Space heating kWh	1475.3869	1429.3380	1293.7065	1079.5112	830.0226	548.3838	353.4971	372.2178	594.0306	905.9490	1209.6880	1467.0992	(97)
Space heating requirement - total per year (kWh/year)	689.2604	539.0138	449.5008	234.4294	81.1298	0.0000	0.0000	0.0000	0.0000	249.1343	484.0333	700.1770	(98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)	689.2604	539.0138	449.5008	234.4294	81.1298	0.0000	0.0000	0.0000	0.0000	249.1343	484.0333	700.1770	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3426.6788	
Space heating per m ²										(98c) / (4) =		48.0263	(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	
Space heating efficiency (main heating system 1)	689.2604	539.0138	449.5008	234.4294	81.1298	0.0000	0.0000	0.0000	0.0000	249.1343	484.0333	700.1770	(98)
Space heating fuel (main heating system)	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 efficiency (main heating system 2)	745.9528	583.3482	486.4728	253.7115	87.8028	0.0000	0.0000	0.0000	0.0000	269.6259	523.8456	757.7674	(211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	224.1167	198.2650	210.9977	186.6211	181.6024	164.4162	162.9319	169.0328	170.4571	189.1193	199.8859	221.8359	(64)
Efficiency of water heater	86.6236	86.4113	85.9591	84.8713	82.7726	80.3000	80.3000	80.3000	80.3000	84.9729	86.2018	86.6668	(216)
Fuel for water heating, kWh/month	258.7246	229.4432	245.4629	219.8872	219.3992	204.7524	202.9040	210.5017	212.2753	222.5643	231.8814	255.9642	(219)

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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	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	7.3041	(231)
Lighting	21.0620	16.8967	15.2136	11.1461	8.6096	7.0341	7.8540	10.2089	13.2603	17.3983	19.6513	21.6474	21.6474	(232)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-19.1078	-28.3048	-42.7265	-50.5316	-56.6806	-53.7104	-53.0556	-48.9970	-42.2244	-33.4519	-21.4868	-16.3643	-16.3643	(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	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	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	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-7.0098	-15.0589	-30.5212	-46.7190	-62.6406	-63.2560	-62.5116	-52.5301	-37.9834	-21.8208	-9.4498	-5.5201	-5.5201	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													3708.5268	(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													2713.7604	(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)													169.9823	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-881.6631	(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													5796.6065	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3708.5268	0.2100	778.7906	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2713.7604	0.2100	569.8897	(264)
Space and water heating			1348.6803	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	169.9823	0.1443	24.5337	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-466.6418	0.1336	-62.3232	
PV Unit electricity exported	-415.0213	0.1253	-52.0204	
Total			-114.3436	(269)
Total CO2, kg/year			1270.7997	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			17.8100	(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	3708.5268	1.1300	4190.6353	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2713.7604	1.1300	3066.5493	(278)
Space and water heating			7257.1846	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	169.9823	1.5338	260.7246	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-466.6418	1.4935	-696.9504	
PV Unit electricity exported	-415.0213	0.4601	-190.9397	
Total			-887.8900	(283)
Total Primary energy kWh/year			6760.1199	(286)
Target Primary Energy Rate (TPER)			94.7500	(287)

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Property Reference	3 Bed Basement Flat			Issued on Date	17/06/2024
Assessment Reference	3 Bed Basement Flat	Prop Type Ref	3 Bed Basement Flat		
Property	3B Basement Flat, 3B Basement Flat, North Hill , London, N10				
SAP Rating	85 B	DER	11.21	TER	12.32
Environmental	89 B	% DER < TER			9.01
CO ₂ Emissions (t/year)	1.33	DFEE	40.77	TFEE	42.82
Compliance Check	See BREL	% DFEE < TFEE			4.79
% DPER < TPER	-0.22	DPER	65.20	TPER	65.06
Assessor Details	Miss Nimco Ali			Assessor ID	R572-0001
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	135.6200 (1b)	2.8500 (2b)	386.5170 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	135.6200		386.5170 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	386.5170 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	1	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												77.4000 (23c)
Effective ac	0.2899	0.2864	0.2830	0.2656	0.2622	0.2448	0.2448	0.2413	0.2518	0.2622	0.2691	0.2760 (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
Glazing (Uw = 0.85)			18.4500	0.8221	15.1668		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
Basement Floor			71.3500	0.1000	7.1350	110.0000	7848.5000 (28)
External Wall	128.1600	18.4500	109.7100	0.1600	17.5536	150.0000	16456.5000 (29a)
Corridor	15.8500	2.0000	13.8500	0.1800	2.4930	150.0000	2077.5000 (29a)
Exposed Ceiling to Corridor	24.0500		24.0500	0.1600	3.8480	9.0000	216.4500 (30)
Terrace Roof	2.7400		2.7400	0.1400	0.3836	9.0000	24.6600 (30)
Total net area of external elements Aum(A, m ²)			242.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.5800		(33)
Party Ceiling 1			44.5600			30.0000	1336.8000 (32b)
Internal Wall			118.3900			9.0000	1065.5100 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	29025.9200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							214.0239 (35)
List of Thermal Bridges							

elmhurst
energy

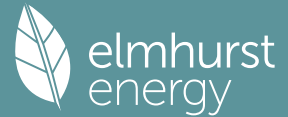
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	36.9777	36.5353	36.0928	33.8806	33.4382	31.2260	31.2260	30.7835	32.1109	33.4382	34.3231	35.2080 (38)
Heat transfer coeff	102.6484	102.2060	101.7636	99.5514	99.1089	96.8967	96.8967	96.4543	97.7816	99.1089	99.9938	100.8787 (39)
Average = Sum(39)m / 12 =												99.4407
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.7569	0.7536	0.7504	0.7340	0.7308	0.7145	0.7145	0.7112	0.7210	0.7308	0.7373	0.7438 (40)
HLP (average)												0.7332
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy													2.9082 (42)
Hot water usage for mixer showers	72.9814	71.8847	70.2864	67.2286	64.9719	62.4553	61.0249	62.6110	64.3497	67.0518	70.1753	72.7018	(42a)
Hot water usage for baths	31.5076	31.0397	30.3807	29.1658	28.2560	27.2472	26.7023	27.3567	28.0691	29.1485	30.3885	31.4011	(42b)
Hot water usage for other uses	44.4133	42.7982	41.1832	39.5682	37.9532	36.3381	36.3381	37.9532	39.5682	41.1832	42.7982	44.4133	(42c)
Average daily hot water use (litres/day)												136.8747	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	148.9023	145.7226	141.8504	135.9625	131.1811	126.0407	124.0654	127.9209	131.9870	137.3835	143.3621	148.5162	(44)
Energy content (annual)	235.8249	207.5070	218.0188	186.1259	176.5950	154.9817	150.0463	158.3927	162.7532	186.4281	204.2456	232.5404	(45)
Distribution loss (46)m = 0.15 x (45)m	35.3737	31.1261	32.7028	27.9189	26.4892	23.2473	22.5069	23.7589	24.4130	27.9642	30.6368	34.8811	(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	286.7838	253.5344	268.9777	235.4410	227.5539	204.2968	201.0052	209.3516	212.0682	237.3870	253.5607	283.4994	(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	286.7838	253.5344	268.9777	235.4410	227.5539	204.2968	201.0052	209.3516	212.0682	237.3870	253.5607	283.4994	(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	91.1515	80.5029	85.2310	74.2156	71.4575	63.8602	62.6301	65.4053	66.4442	74.7271	80.2404	90.0594	(65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	170.7080	188.9982	170.7080	176.3983	170.7080	176.3983	170.7080	170.7080	176.3983	170.7080	176.3983	170.7080 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	304.3743	307.5328	299.5736	282.6294	261.2404	241.1378	227.7080	224.5495	232.5087	249.4529	270.8419	290.9445 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412 (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)	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295 (71)
Water heating gains (Table 5)	122.5155	119.7960	114.5578	103.0773	96.0451	88.6947	84.1803	87.9104	92.2836	100.4396	111.4450	121.0476 (72)
Total internal gains	667.2214	685.9506	654.4630	631.7285	597.6171	572.8543	549.2198	549.7915	567.8142	590.2241	628.3088	652.3238 (73)

[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				11.3900	11.2829	0.3200	0.7000	0.7700	19.9493 (75)			
Southwest				3.7800	36.7938	0.3200	0.7000	0.7700	21.5898 (79)			
Northwest				3.2800	11.2829	0.3200	0.7000	0.7700	5.7448 (81)			
Solar gains	47.2839	89.0765	144.5476	217.0987	277.8507	291.0969	274.2999	226.6439	169.3041	104.5607	58.1894	39.4595 (83)

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Total gains 714.5053 775.0271 799.0106 848.8272 875.4678 863.9513 823.5197 776.4353 737.1183 694.7848 686.4982 691.7832 (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	78.5473	78.8873	79.2303	80.9909	81.3525	83.2098	83.2098	83.5915	82.4568	81.3525	80.6326	79.9253
alpha	6.2365	6.2592	6.2820	6.3994	6.4235	6.5473	6.5473	6.5728	6.4971	6.4235	6.3755	6.3284
util living area	0.9975	0.9952	0.9902	0.9660	0.8865	0.6926	0.5143	0.5652	0.8254	0.9727	0.9943	0.9980 (86)
MIT	20.0283	20.1512	20.3350	20.6249	20.8579	20.9787	20.9973	20.9952	20.9351	20.6536	20.3107	20.0226 (87)
Th 2	20.2909	20.2937	20.2966	20.3109	20.3137	20.3281	20.3281	20.3309	20.3223	20.3137	20.3080	20.3023 (88)
util rest of house	0.9968	0.9939	0.9873	0.9557	0.8542	0.6293	0.4375	0.4861	0.7711	0.9624	0.9925	0.9974 (89)
MIT 2	19.3893	19.5140	19.6989	19.9942	20.2104	20.3169	20.3272	20.3292	20.2832	20.0267	19.6849	19.3930 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	19.5929	19.7171	19.9016	20.1952	20.4167	20.5278	20.5407	20.5415	20.4909	20.2265	19.8843	19.5937 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.4429	19.5671	19.7516	20.0452	20.2667	20.3778	20.3907	20.3915	20.3409	20.0765	19.7343	19.4437 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9957	0.9922	0.9844	0.9509	0.8517	0.6342	0.4448	0.4933	0.7727	0.9580	0.9905	0.9965 (94)
Useful gains	711.4639	768.9510	786.5815	807.1525	745.6092	547.8931	366.2760	383.0542	569.5970	665.5884	680.0080	689.3495 (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	1554.3969	1499.0615	1348.5267	1109.5167	849.0375	559.8534	367.3081	384.9940	610.2488	939.2063	1263.3565	1537.7595 (97)
Space heating kWh	627.1421	490.6342	418.0872	217.7022	76.9507	0.0000	0.0000	0.0000	0.0000	203.5717	420.0109	631.2170 (98a)
Space heating requirement - total per year (kWh/year)												3085.3161
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	627.1421	490.6342	418.0872	217.7022	76.9507	0.0000	0.0000	0.0000	0.0000	203.5717	420.0109	631.2170 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3085.3161
Space heating per m2										(98c) / (4) =		22.7497 (99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	910.8291	717.0357	733.0525	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8716	0.9374	0.9135	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	793.8568	672.1826	669.6698	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	919.4997	876.6876	825.5523	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	90.4629	152.1517	115.9766	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			0.7005 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	15.8420	26.6451	20.3100	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												62.7971 (107)

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)

Cooling System Energy Efficiency Ratio (see Table 10c)

3.2600 (209)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	627.1421	490.6342	418.0872	217.7022	76.9507	0.0000	0.0000	0.0000	0.0000	203.5717	420.0109	631.2170 (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)	700.7175	548.1947	467.1366	243.2427	85.9784	0.0000	0.0000	0.0000	0.0000	227.4544	469.2859	705.2704 (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	286.7838	253.5344	268.9777	235.4410	227.5539	204.2968	201.0052	209.3516	212.0682	237.3870	253.5607	283.4994 (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	320.4288	283.2787	300.5337	263.0625	254.2501	228.2646	224.5868	233.9124	236.9478	265.2369	283.3080	316.7591 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	4.8595	8.1733	6.2301	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	42.3474	38.2493	42.3474	40.9814	42.3474	40.9814	42.3474	42.3474	40.9814	42.3474	40.9814	42.3474 (231)
Lighting	43.4528	34.8594	31.3870	22.9955	17.7624	14.5120	16.2034	21.0618	27.3572	35.8942	40.5424	44.6604 (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)												

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(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												3447.2806	(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												3210.5695	(219)
Space cooling fuel												19.2629	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.8750)													
mechanical ventilation fans (SFP = 0.8750)												412.6069	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												498.6069	(231)
Electricity for lighting (calculated in Appendix L)												350.6886	(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												7526.4085	(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	3447.2806	0.2100	723.9289	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3210.5695	0.2100	674.2196	(264)
Space and water heating			1398.1485	(265)
Space cooling	19.2629	0.1136	2.1881	(266)
Pumps, fans and electric keep-hot	498.6069	0.1387	69.1629	(267)
Energy for lighting	350.6886	0.1443	50.6152	(268)
Total CO2, kg/year			1520.1148	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.2100	(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	3447.2806	1.1300	3895.4271	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3210.5695	1.1300	3627.9435	(278)
Space and water heating			7523.3706	(279)
Space cooling	19.2629	1.4188	27.3300	(280)
Pumps, fans and electric keep-hot	498.6069	1.5128	754.2925	(281)
Energy for lighting	350.6886	1.5338	537.8979	(282)
Total Primary energy kWh/year			8842.8910	(286)
Dwelling Primary energy Rate (DPER)			65.2000	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET EMISSIONS

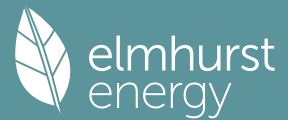
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	135.6200	(1b) x 2.8500	(2b) = 386.5170	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	135.6200			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	386.5170	(5)

2. Ventilation rate

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

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.1035 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3535 (18)
Number of sides sheltered 1 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3270 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	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)
Effective ac	0.4169	0.4087	0.4005	0.3597	0.3515	0.3106	0.3106	0.3025	0.3270	0.3515	0.3678	0.3842	(22b)
	0.5869	0.5835	0.5802	0.5647	0.5618	0.5482	0.5482	0.5457	0.5535	0.5618	0.5677	0.5738	(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			2.0000	1.0000	2.0000			(26)
TER Opening Type (Uw = 1.20)			18.4500	1.1450	21.1260			(27)
Basement Floor			71.3500	0.1300	9.2755			(28)
External Wall	128.1600	18.4500	109.7100	0.1800	19.7478			(29a)
Corridor	15.8500	2.0000	13.8500	0.1800	2.4930			(29a)
Exposed Ceiling to Corridor	24.0500		24.0500	0.1100	2.6455			(30)
Terrace Roof	2.7400		2.7400	0.1100	0.3014			(30)
Total net area of external elements Aum(A, m2)			242.1500					(31)
Fabric heat loss, W/K = Sum (A x U)					57.5892			(33)
								(26)...(30) + (32) =

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 217.3095 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	8.8400	0.0500	0.4420	
E3 Sill	7.8900	0.0500	0.3945	
E4 Jamb	32.4600	0.0500	1.6230	
E5 Ground floor (normal)	44.9700	0.1600	7.1952	
E5 Ground floor (normal)	5.5600	0.1600	0.8896	
E7 Party floor between dwellings (in blocks of flats)	44.9700	0.0700	3.1479	
E7 Party floor between dwellings (in blocks of flats)	5.5600	0.0700	0.3892	
E16 Corner (normal)	17.1000	0.0900	1.5390	
E16 Corner (normal)	5.7000	0.0900	0.5130	
E17 Corner (inverted - internal area greater than external area)	5.7000	-0.0900	-0.5130	
E17 Corner (inverted - internal area greater than external area)	5.7000	-0.0900	-0.5130	
E14 Flat roof	3.6700	0.0800	0.2936	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 15.4010 (36)

Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 72.9902 (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	74.8596	74.4291	74.0073	72.0256	71.6549	69.9290	69.9290	69.6093	70.5938	71.6549	72.4049	73.1890	(38)
Average = Sum(39)m / 12 =	147.8497	147.4193	146.9974	145.0158	144.6450	142.9191	142.9191	142.5995	143.5839	144.6450	145.3951	146.1792	(39)
												145.0140	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0902	1.0870	1.0839	1.0693	1.0665	1.0538	1.0538	1.0515	1.0587	1.0665	1.0721	1.0779	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

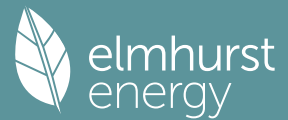
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9082 (42)
Hot water usage for mixer showers	72.9814	71.8847	70.2864	67.2286	64.9719	62.4553	61.0249	62.6110	64.3497	67.0518	70.1753	72.7018	(42a)
Hot water usage for baths	31.5076	31.0397	30.3807	29.1658	28.2560	27.2472	26.7023	27.3567	28.0691	29.1485	30.3885	31.4011	(42b)
Hot water usage for other uses	44.4133	42.7982	41.1832	39.5682	37.9532	36.3381	36.3381	37.9532	39.5682	41.1832	42.7982	44.4133	(42c)
Average daily hot water use (litres/day)													136.8747 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	148.9023	145.7226	141.8504	135.9625	131.1811	126.0407	124.0654	127.9209	131.9870	137.3835	143.3621	148.5162	(44)
Energy content (annual)	235.8249	207.5070	218.0188	186.1259	176.5950	154.9817	150.0463	158.3927	162.7532	186.4281	204.2456	232.5404	(45)
Distribution loss (46)m = 0.15 x (45)m	35.3737	31.1261	32.7028	27.9189	26.4892	23.2473	22.5069	23.7589	24.4130	27.9642	30.6368	34.8811	(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	286.7838	253.5344	268.9777	235.4410	227.5539	204.2968	201.0052	209.3516	212.0682	237.3870	253.5607	283.4994	(62)
WWHRS	-33.3641	-29.5074	-30.8985	-25.5852	-23.8445	-20.4039	-19.1254	-20.3379	-21.1106	-24.8871	-28.1941	-32.7462	(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	253.4197	224.0270	238.0792	209.8558	203.7094	183.8929	181.8798	189.0137	190.9576	212.4999	225.3666	250.7531	(64)
Total per year (kWh/year)													2563.4548 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower (s) (kWh/year) = Sum(64a)m =													0.0000 (64a)

Heat gains from water heating, kWh/month	91.1515	80.5029	85.2310	74.2156	71.4575	63.8602	62.6301	65.4053	66.4442	74.7271	80.2404	90.0594	(65)
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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	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	165.7367	183.4942	165.7367	171.2612	165.7367	171.2612	165.7367	165.7367	171.2612	165.7367	171.2612	165.7367	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	304.3743	307.5328	299.5736	282.6294	261.2404	241.1378	227.7080	224.5495	232.5087	249.4529	270.8419	290.9445	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	(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)	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	(71)
Water heating gains (Table 5)	122.5155	119.7960	114.5578	103.0773	96.0451	88.6947	84.1803	87.9104	92.2836	100.4396	111.4450	121.0476	(72)
Total internal gains	662.2500	680.4466	649.4916	626.5915	592.6457	567.7173	544.2485	544.8201	562.6771	585.2528	623.1717	647.3524	(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					11.3900	11.2829		0.6300	0.7000	0.7700		39.2752 (75)	
Southwest					3.7800	36.7938		0.6300	0.7000	0.7700		42.5049 (79)	
Northwest					3.2800	11.2829		0.6300	0.7000	0.7700		11.3101 (81)	
Solar gains	93.0902	175.3693	284.5782	427.4131	547.0186	573.0971	540.0279	446.2051	333.3174	205.8539	114.5604	77.6858 (83)	
Total gains	755.3402	855.8159	934.0698	1054.0046	1139.6644	1140.8144	1084.2764	991.0252	895.9945	791.1067	737.7322	725.0382 (84)	

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	55.3706	55.5323	55.6917	56.4527	56.5974	57.2809	57.2809	57.4093	57.0157	56.5974	56.3054	56.0034	
alpha	4.6914	4.7022	4.7128	4.7635	4.7732	4.8187	4.8187	4.8273	4.8010	4.7732	4.7537	4.7336	
util living area	0.9973	0.9947	0.9884	0.9628	0.8876	0.7260	0.5615	0.6283	0.8664	0.9774	0.9947	0.9978	(86)
MIT	19.4688	19.6407	19.9204	20.3369	20.7008	20.9223	20.9820	20.9701	20.8074	20.3444	19.8471	19.4501	(87)
Th 2	20.0089	20.0115	20.0140	20.0260	20.0282	20.0387	20.0387	20.0407	20.0347	20.0282	20.0237	20.0190	(88)
util rest of house	0.9965	0.9931	0.9847	0.9501	0.8489	0.6431	0.4477	0.5126	0.8062	0.9674	0.9928	0.9972	(89)
MIT 2	18.2112	18.4327	18.7909	19.3221	19.7553	19.9883	20.0318	20.0278	19.8851	19.3396	18.7058	18.1943	(90)
Living area fraction	18.6120	18.8177	19.1508	19.6455	20.0566	20.2860	20.3346	20.3281	20.1790	19.6598	19.0695	18.5945	(91)
MIT	18.6120	18.8177	19.1508	19.6455	20.0566	20.2860	20.3346	20.3281	20.1790	19.6598	19.0695	18.5945	(92)
Temperature adjustment	18.6120	18.8177	19.1508	19.6455	20.0566	20.2860	20.3346	20.3281	20.1790	19.6598	19.0695	18.5945	(93)
adjusted MIT	18.6120	18.8177	19.1508	19.6455	20.0566	20.2860	20.3346	20.3281	20.1790	19.6598	19.0695	18.5945	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9949	0.9904	0.9802	0.9438	0.8502	0.6659	0.4839	0.5490	0.8166	0.9623	0.9902	0.9958	(94)
Useful gains	751.4605	847.5871	915.5945	994.8195	968.9205	759.6850	524.6966	544.0596	731.6799	761.3018	730.4931	721.9654	(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	2116.0271	2051.7358	1859.6375	1558.2675	1208.7437	812.6341	533.7507	560.1420	872.8517	1310.4582	1740.3080	2104.1756	(97)
Space heating kWh	1015.2375	809.1880	702.3680	405.6825	178.4284	0.0000	0.0000	0.0000	0.0000	408.5724	727.0667	1028.3644	(98a)
Space heating requirement - total per year (kWh/year)												5274.9080	
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	1015.2375	809.1880	702.3680	405.6825	178.4284	0.0000	0.0000	0.0000	0.0000	408.5724	727.0667	1028.3644	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5274.9080	
Space heating per m2										(98c) / (4) =		38.8948	(99)

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

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

Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1015.2375	809.1880	702.3680	405.6825	178.4284	0.0000	0.0000	0.0000	0.0000	0.0000	408.5724	727.0667	1028.3644	(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)	1098.7419	875.7445	760.1385	439.0503	193.1044	0.0000	0.0000	0.0000	0.0000	442.1779	786.8688	1112.9485	(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)

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	5708.7749	1.1300	6450.9156 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	3035.3843	1.1300	3429.9843 (278)
Space and water heating			9880.8999 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	277.9247	1.5338	426.2903 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-813.4643	1.4948	-1215.9990
PV Unit electricity exported	-862.3753	0.4606	-397.1995
Total			-1613.1985 (283)
Total Primary energy kWh/year			8824.0924 (286)
Target Primary Energy Rate (TPER)			65.0600 (287)



Appendix B

BRUKL - Be Lean

Project name

North Hill Highgate

As designed

Date: Mon Jun 17 08:57:47 2024

Administrative information

Building Details

Address:

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v7.2.0

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

Foundation area [m²]: 1162.42The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	16.22
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	13.14
Target primary energy rate (TPER), kWh _{PE} /m ² annum	175.77
Building primary energy rate (BPER), kWh _{PE} /m ² annum	142.29
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

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

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.21	0.21	00 Ground Floor - Kitchen_W_6
Floors	0.18	0.1	0.13	00 Ground Floor - Hydro Pool_S_3
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.12	0.12	00 Ground Floor - Kitchen_R_4
Windows** and roof windows	1.6	1.3	1.3	00 Ground Floor - Kitchen_G_7
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

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

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

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

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

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

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	5

Building services

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

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

1- VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	6.5	-	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

2- Communal ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	-	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Communal ASHP

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.86	0
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1			
00 Ground Floor - Nurse Station	-	-	-	-	1	-	-	-	-		0.85	N/A
00 Ground Floor - Kitchen	-	-	-	-	1	-	-	-	1		-	N/A
00 Ground Floor - Chefs Office	-	-	-	-	1	-	-	-	-		0.85	N/A
00 Ground Floor - Foyer & Central Hub	-	-	-	-	1	-	-	-	-		0.85	N/A
00 Ground Floor - Restaurant	-	-	-	-	1	-	-	-	-		0.85	N/A
00 Ground Floor - Salon	-	-	-	-	1	-	-	-	-		0.85	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		
00 Ground Floor - Photocopy	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - Admin	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - Manager	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - Private Dining	-	-	-	-	1	-	-	-	-	0.85	N/A
01 1st Floor - Dining	-	-	-	-	1	-	-	-	-	0.85	N/A
01 1st Floor - Nurse Station	-	-	-	-	1	-	-	-	-	0.85	N/A
01 1st Floor - Laundry	-	-	0.5	-	-	-	-	-	-	-	N/A
01 1st Floor - Green Room	-	-	-	-	1	-	-	-	-	0.85	N/A
01 1st Floor - Gym & Physio Room	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Nurse Station	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Lounge	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Dining	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Staff Room	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Consult Room 2	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Consult Room 1	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - Ensuite 5	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Ensuite 6	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Ensuite 8	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Ensuite 7	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Kitchen Staff Change	-	-	0.5	-	-	-	-	-	-	-	N/A
00 Ground Floor - Reception	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - WCs	-	-	0.5	-	-	-	-	-	-	-	N/A
00 Ground Floor - Visitor WC	-	-	0.5	-	-	-	-	-	-	-	N/A
00 Ground Floor - Corridor	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - Female & Male Changing Room	-	-	0.5	-	-	-	-	-	-	-	N/A
00 Ground Floor - Hydro Pool Room	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - Ensuite 1	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Ensuite 2	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Ensuite 4	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Ensuite 3	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - AWC	-	-	0.5	-	-	-	-	-	-	-	N/A
01 1st Floor - Corridor	-	-	-	-	1	-	-	-	-	0.85	N/A
01 1st Floor - Ensuite 9	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 8	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 7	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 6	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 5	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 10	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 11	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 2	0.3	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 1	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 3	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 4	0.2	-	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
02 2nd Floor - Corridor	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Ensuite 6	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 5	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 8	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - AWC	-	-	0.5	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 9	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Female Staff Change	-	-	0.5	-	-	-	-	-	-	-	N/A
02 2nd Floor - WC	-	-	0.5	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 11	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 10	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 7	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 12	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 13	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Male Staff Change	-	-	0.5	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 1	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 2	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 3	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 4	0.2	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
00 Ground Floor - Nurse Station		110	-	-
00 Ground Floor - Kitchen		110	-	-
00 Ground Floor - Chefs Office		110	-	-
00 Ground Floor - Foyer & Central Hub		110	110	1.227
00 Ground Floor - Restaurant		110	-	-
00 Ground Floor - Salon		110	110	1.364
00 Ground Floor - Photocopy		110	-	-
00 Ground Floor - Admin		110	-	-
00 Ground Floor - Manager		110	-	-
00 Ground Floor - Private Dining		110	-	-
01 1st Floor - Dining		110	-	-
01 1st Floor - Media		110	-	-
01 1st Floor - Nurse Station		110	-	-
01 1st Floor - Laundry		110	-	-
01 1st Floor - Green Room		110	-	-
01 1st Floor - Gym & Physio Room		110	-	-
02 2nd Floor - Nurse Station		110	-	-
02 2nd Floor - Lounge		110	-	-
02 2nd Floor - Dining		110	-	-
02 2nd Floor - Staff Room		110	-	-
02 2nd Floor - Consult Room 2		110	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
02 2nd Floor - Comms		110	-	-
02 2nd Floor - Consult Room 1		110	-	-
00 Ground Floor - Corridor		110	-	-
00 Ground Floor - Stairs 2		110	-	-
00 Ground Floor - Ensuite 5		110	-	-
00 Ground Floor - Bedrooms 3		110	-	-
00 Ground Floor - Ensuite 6		110	-	-
00 Ground Floor - Ensuite 8		110	-	-
00 Ground Floor - Sluice		110	-	-
00 Ground Floor - Med Store		110	-	-
00 Ground Floor - Ensuite 7		110	-	-
00 Ground Floor - Hoist		110	-	-
00 Ground Floor - Staff Entrance		110	-	-
00 Ground Floor - Kitchen Store		110	-	-
00 Ground Floor - Kitchen Staff Change		110	-	-
00 Ground Floor - Reception		110	110	1.227
00 Ground Floor - Store		110	-	-
00 Ground Floor - WCs		110	-	-
00 Ground Floor - Bedrooms 1		110	-	-
00 Ground Floor - Bedroom 2		110	-	-
00 Ground Floor - Visitor WC		110	-	-
00 Ground Floor - Lobby		110	-	-
00 Ground Floor - Stairs 1		110	-	-
00 Ground Floor - Corridor		110	-	-
00 Ground Floor - Female & Male Changing Room		110	-	-
00 Ground Floor - Hydro Pool Room		110	-	-
00 Ground Floor - Ensuite 1		110	-	-
00 Ground Floor - Ensuite 2		110	-	-
00 Ground Floor - Ensuite 4		110	-	-
00 Ground Floor - Ensuite 3		110	-	-
00 Ground Floor - Hydro Pool		110	-	-
01 1st Floor - AWC		110	-	-
01 1st Floor - Corridor		110	-	-
01 1st Floor - Bedrooms 2		110	-	-
01 1st Floor - Ensuite 9		110	-	-
01 1st Floor - Ensuite 8		110	-	-
01 1st Floor - Store		110	-	-
01 1st Floor - Ensuite 7		110	-	-
01 1st Floor - Ensuite 6		110	-	-
01 1st Floor - Ensuite 5		110	-	-
01 1st Floor - Stairs 2		110	-	-
01 1st Floor - Bedrooms 1		110	-	-
01 1st Floor - COSHH		110	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
01 1st Floor - Sluice		110	-	-
01 1st Floor - Med Store		110	-	-
01 1st Floor - Linen & Store		110	-	-
01 1st Floor - Female & Male Changing		110	-	-
01 1st Floor - Stairs 1		110	-	-
01 1st Floor - Ensuite 10		110	-	-
01 1st Floor - Ensuite 11		110	-	-
01 1st Floor - Hoist Store		110	-	-
01 1st Floor - Ensuite 2		110	-	-
01 1st Floor - Ensuite 1		110	-	-
01 1st Floor - Ensuite 3		110	-	-
01 1st Floor - Ensuite 4		110	-	-
01 1st Floor - Bedroom 3		110	-	-
02 2nd Floor - Bedrooms 1		110	-	-
02 2nd Floor - Corridor		110	-	-
02 2nd Floor - Store 1		110	-	-
02 2nd Floor - Store 3		110	-	-
02 2nd Floor - Bedrooms 2		110	-	-
02 2nd Floor - Ensuite 6		110	-	-
02 2nd Floor - Ensuite 5		110	-	-
02 2nd Floor - Stairs 2		110	-	-
02 2nd Floor - Bedrooms 3		110	-	-
02 2nd Floor - Ensuite 8		110	-	-
02 2nd Floor - AWC		110	-	-
02 2nd Floor - Ensuite 9		110	-	-
02 2nd Floor - Linen & Store		110	-	-
02 2nd Floor - Hoist		110	-	-
02 2nd Floor - Female Staff Change		110	-	-
02 2nd Floor - Lobby & Roof Hatch		110	-	-
02 2nd Floor - WC		110	-	-
02 2nd Floor - Ensuite 11		110	-	-
02 2nd Floor - Ensuite 10		110	-	-
02 2nd Floor - Ensuite 7		110	-	-
02 2nd Floor - Sluice		110	-	-
02 2nd Floor - Med Store		110	-	-
02 2nd Floor - Store 2		110	-	-
02 2nd Floor - Ensuite 12		110	-	-
02 2nd Floor - Ensuite 13		110	-	-
02 2nd Floor - Stairs 1		110	-	-
02 2nd Floor - Male Staff Change		110	-	-
02 2nd Floor - Bedrooms 4		110	-	-
02 2nd Floor - Ensuite 1		110	-	-
02 2nd Floor - Ensuite 2		110	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
02 2nd Floor - Ensuite 3		110	-	-
02 2nd Floor - Ensuite 4		110	-	-
02 2nd Floor - Bedroom 4		110	-	-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00 Ground Floor - Nurse Station	N/A	N/A
00 Ground Floor - Kitchen	NO (-70.2%)	NO
00 Ground Floor - Chefs Office	N/A	N/A
00 Ground Floor - Foyer & Central Hub	NO (-34.8%)	NO
00 Ground Floor - Restaurant	NO (-42.3%)	NO
00 Ground Floor - Salon	NO (-68.5%)	NO
00 Ground Floor - Photocopy	N/A	N/A
00 Ground Floor - Admin	NO (-34.6%)	NO
00 Ground Floor - Manager	NO (-32.5%)	NO
00 Ground Floor - Private Dining	NO (-46.7%)	NO
01 1st Floor - Dining	NO (-42.9%)	NO
01 1st Floor - Media	NO (-57.8%)	NO
01 1st Floor - Nurse Station	N/A	N/A
01 1st Floor - Laundry	N/A	N/A
01 1st Floor - Green Room	NO (-68.7%)	NO
01 1st Floor - Gym & Physio Room	NO (-64.9%)	NO
02 2nd Floor - Nurse Station	N/A	N/A
02 2nd Floor - Lounge	NO (-73.7%)	NO
02 2nd Floor - Dining	NO (-63%)	NO
02 2nd Floor - Staff Room	NO (-77.3%)	NO
02 2nd Floor - Consult Room 2	NO (-82.4%)	NO
02 2nd Floor - Comms	N/A	N/A
02 2nd Floor - Consult Room 1	NO (-75.8%)	NO
00 Ground Floor - Ensuite 5	N/A	N/A
00 Ground Floor - Bedrooms 3	NO (-28.4%)	NO
00 Ground Floor - Ensuite 6	N/A	N/A
00 Ground Floor - Ensuite 8	N/A	N/A
00 Ground Floor - Ensuite 7	N/A	N/A
00 Ground Floor - Reception	N/A	N/A
00 Ground Floor - Bedrooms 1	NO (-57.5%)	NO
00 Ground Floor - Bedroom 2	NO (-70.9%)	NO
00 Ground Floor - Hydro Pool Room	NO (-65.5%)	NO
00 Ground Floor - Ensuite 1	NO (-76.5%)	NO
00 Ground Floor - Ensuite 2	N/A	N/A
00 Ground Floor - Ensuite 4	N/A	N/A
00 Ground Floor - Ensuite 3	NO (-86.2%)	NO
00 Ground Floor - Hydro Pool	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01 1st Floor - Bedrooms 2	NO (-50.1%)	NO
01 1st Floor - Ensuite 9	N/A	N/A
01 1st Floor - Ensuite 8	N/A	N/A
01 1st Floor - Ensuite 7	N/A	N/A
01 1st Floor - Ensuite 6	N/A	N/A
01 1st Floor - Ensuite 5	N/A	N/A
01 1st Floor - Bedrooms 1	NO (-71.7%)	NO
01 1st Floor - Ensuite 10	N/A	N/A
01 1st Floor - Ensuite 11	N/A	N/A
01 1st Floor - Ensuite 2	N/A	N/A
01 1st Floor - Ensuite 1	NO (-75.4%)	NO
01 1st Floor - Ensuite 3	N/A	N/A
01 1st Floor - Ensuite 4	N/A	N/A
01 1st Floor - Bedroom 3	NO (-39.2%)	NO
02 2nd Floor - Bedrooms 1	NO (-78.4%)	NO
02 2nd Floor - Bedrooms 2	NO (-68.8%)	NO
02 2nd Floor - Ensuite 6	N/A	N/A
02 2nd Floor - Ensuite 5	N/A	N/A
02 2nd Floor - Bedrooms 3	NO (-68.9%)	NO
02 2nd Floor - Ensuite 8	N/A	N/A
02 2nd Floor - Ensuite 9	N/A	N/A
02 2nd Floor - Ensuite 11	N/A	N/A
02 2nd Floor - Ensuite 10	N/A	N/A
02 2nd Floor - Ensuite 7	N/A	N/A
02 2nd Floor - Ensuite 12	N/A	N/A
02 2nd Floor - Ensuite 13	N/A	N/A
02 2nd Floor - Bedrooms 4	NO (-53.7%)	NO
02 2nd Floor - Ensuite 1	NO (-75.4%)	NO
02 2nd Floor - Ensuite 2	N/A	N/A
02 2nd Floor - Ensuite 3	N/A	N/A
02 2nd Floor - Ensuite 4	N/A	N/A
02 2nd Floor - Bedroom 4	NO (-87.4%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	3487.3	3487.3
External area [m ²]	4331.3	4331.3
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	1078.67	1563.83
Average U-value [W/m ² K]	0.25	0.36
Alpha value* [%]	30.41	23.46

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

Building Use

% Area	Building Type
1	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
93	Residential Institutions: Hospitals and Care Homes
4	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
2	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	9.81	11.07
Cooling	7.02	8.43
Auxiliary	12.47	11.17
Lighting	11.41	11
Hot water	55.41	77.08
Equipment*	52.97	52.97
TOTAL **	96.11	118.76

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

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

Energy Production by Technology [kWh/m²]

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

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	277.39	331.1
Primary energy [kWh _{PE} /m ²]	142.29	175.77
Total emissions [kg/m ²]	13.14	16.22

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	19.4	490.4	2.1	28	24.6	2.59	4.86	2.64	6.5
	Notional	24.6	533.4	2.6	33.7	18.1	2.64	4.4	----	----
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	110.6	89.2	12.4	0	8.4	2.48	0	2.64	0
	Notional	132.2	123.2	13.9	0	8.3	2.64	0	----	----

Key to terms

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

Appendix C

BRUKL – Be Clean

Project name

North Hill Highgate

As designed

Date: Mon Jun 17 09:12:44 2024

Administrative information

Building Details

Address:

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v7.2.0

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

Foundation area [m²]: 1162.42The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	16.22
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	11.23
Target primary energy rate (TPER), kWh _{PE} /m ² annum	175.77
Building primary energy rate (BPER), kWh _{PE} /m ² annum	121.69
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

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

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.21	0.21	00 Ground Floor - Kitchen_W_6
Floors	0.18	0.1	0.13	00 Ground Floor - Hydro Pool_S_3
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.12	0.12	00 Ground Floor - Kitchen_R_4
Windows** and roof windows	1.6	1.3	1.3	00 Ground Floor - Kitchen_G_7
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

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

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

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

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

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

Air permeability	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	5

Building services

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

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

1- VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	6.5	-	-	-
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

2- Communal ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.6	-	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- Communal ASHP

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	3.6	0
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I			
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		Zone	Standard
00 Ground Floor - Nurse Station	-	-	-	-	1	-	-	-	-		0.85	N/A
00 Ground Floor - Kitchen	-	-	-	-	1	-	-	-	1		-	N/A
00 Ground Floor - Chefs Office	-	-	-	-	1	-	-	-	-		0.85	N/A
00 Ground Floor - Foyer & Central Hub	-	-	-	-	1	-	-	-	-		0.85	N/A
00 Ground Floor - Restaurant	-	-	-	-	1	-	-	-	-		0.85	N/A
00 Ground Floor - Salon	-	-	-	-	1	-	-	-	-		0.85	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I	Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1		
00 Ground Floor - Photocopy	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - Admin	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - Manager	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - Private Dining	-	-	-	-	1	-	-	-	-	0.85	N/A
01 1st Floor - Dining	-	-	-	-	1	-	-	-	-	0.85	N/A
01 1st Floor - Nurse Station	-	-	-	-	1	-	-	-	-	0.85	N/A
01 1st Floor - Laundry	-	-	0.5	-	-	-	-	-	-	-	N/A
01 1st Floor - Green Room	-	-	-	-	1	-	-	-	-	0.85	N/A
01 1st Floor - Gym & Physio Room	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Nurse Station	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Lounge	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Dining	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Staff Room	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Consult Room 2	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Consult Room 1	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - Ensuite 5	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Ensuite 6	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Ensuite 8	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Ensuite 7	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Kitchen Staff Change	-	-	0.5	-	-	-	-	-	-	-	N/A
00 Ground Floor - Reception	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - WCs	-	-	0.5	-	-	-	-	-	-	-	N/A
00 Ground Floor - Visitor WC	-	-	0.5	-	-	-	-	-	-	-	N/A
00 Ground Floor - Corridor	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - Female & Male Changing Room	-	-	0.5	-	-	-	-	-	-	-	N/A
00 Ground Floor - Hydro Pool Room	-	-	-	-	1	-	-	-	-	0.85	N/A
00 Ground Floor - Ensuite 1	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Ensuite 2	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Ensuite 4	0.2	-	-	-	-	-	-	-	-	-	N/A
00 Ground Floor - Ensuite 3	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - AWC	-	-	0.5	-	-	-	-	-	-	-	N/A
01 1st Floor - Corridor	-	-	-	-	1	-	-	-	-	0.85	N/A
01 1st Floor - Ensuite 9	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 8	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 7	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 6	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 5	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 10	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 11	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 2	0.3	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 1	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 3	0.2	-	-	-	-	-	-	-	-	-	N/A
01 1st Floor - Ensuite 4	0.2	-	-	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
02 2nd Floor - Corridor	-	-	-	-	1	-	-	-	-	0.85	N/A
02 2nd Floor - Ensuite 6	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 5	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 8	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - AWC	-	-	0.5	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 9	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Female Staff Change	-	-	0.5	-	-	-	-	-	-	-	N/A
02 2nd Floor - WC	-	-	0.5	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 11	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 10	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 7	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 12	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 13	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Male Staff Change	-	-	0.5	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 1	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 2	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 3	0.2	-	-	-	-	-	-	-	-	-	N/A
02 2nd Floor - Ensuite 4	0.2	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
00 Ground Floor - Nurse Station		110	-	-
00 Ground Floor - Kitchen		110	-	-
00 Ground Floor - Chefs Office		110	-	-
00 Ground Floor - Foyer & Central Hub		110	110	1.227
00 Ground Floor - Restaurant		110	-	-
00 Ground Floor - Salon		110	110	1.364
00 Ground Floor - Photocopy		110	-	-
00 Ground Floor - Admin		110	-	-
00 Ground Floor - Manager		110	-	-
00 Ground Floor - Private Dining		110	-	-
01 1st Floor - Dining		110	-	-
01 1st Floor - Media		110	-	-
01 1st Floor - Nurse Station		110	-	-
01 1st Floor - Laundry		110	-	-
01 1st Floor - Green Room		110	-	-
01 1st Floor - Gym & Physio Room		110	-	-
02 2nd Floor - Nurse Station		110	-	-
02 2nd Floor - Lounge		110	-	-
02 2nd Floor - Dining		110	-	-
02 2nd Floor - Staff Room		110	-	-
02 2nd Floor - Consult Room 2		110	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
02 2nd Floor - Comms		110	-	-
02 2nd Floor - Consult Room 1		110	-	-
00 Ground Floor - Corridor		110	-	-
00 Ground Floor - Stairs 2		110	-	-
00 Ground Floor - Ensuite 5		110	-	-
00 Ground Floor - Bedrooms 3		110	-	-
00 Ground Floor - Ensuite 6		110	-	-
00 Ground Floor - Ensuite 8		110	-	-
00 Ground Floor - Sluice		110	-	-
00 Ground Floor - Med Store		110	-	-
00 Ground Floor - Ensuite 7		110	-	-
00 Ground Floor - Hoist		110	-	-
00 Ground Floor - Staff Entrance		110	-	-
00 Ground Floor - Kitchen Store		110	-	-
00 Ground Floor - Kitchen Staff Change		110	-	-
00 Ground Floor - Reception		110	110	1.227
00 Ground Floor - Store		110	-	-
00 Ground Floor - WCs		110	-	-
00 Ground Floor - Bedrooms 1		110	-	-
00 Ground Floor - Bedroom 2		110	-	-
00 Ground Floor - Visitor WC		110	-	-
00 Ground Floor - Lobby		110	-	-
00 Ground Floor - Stairs 1		110	-	-
00 Ground Floor - Corridor		110	-	-
00 Ground Floor - Female & Male Changing Room		110	-	-
00 Ground Floor - Hydro Pool Room		110	-	-
00 Ground Floor - Ensuite 1		110	-	-
00 Ground Floor - Ensuite 2		110	-	-
00 Ground Floor - Ensuite 4		110	-	-
00 Ground Floor - Ensuite 3		110	-	-
00 Ground Floor - Hydro Pool		110	-	-
01 1st Floor - AWC		110	-	-
01 1st Floor - Corridor		110	-	-
01 1st Floor - Bedrooms 2		110	-	-
01 1st Floor - Ensuite 9		110	-	-
01 1st Floor - Ensuite 8		110	-	-
01 1st Floor - Store		110	-	-
01 1st Floor - Ensuite 7		110	-	-
01 1st Floor - Ensuite 6		110	-	-
01 1st Floor - Ensuite 5		110	-	-
01 1st Floor - Stairs 2		110	-	-
01 1st Floor - Bedrooms 1		110	-	-
01 1st Floor - COSHH		110	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
01 1st Floor - Sluice		110	-	-
01 1st Floor - Med Store		110	-	-
01 1st Floor - Linen & Store		110	-	-
01 1st Floor - Female & Male Changing		110	-	-
01 1st Floor - Stairs 1		110	-	-
01 1st Floor - Ensuite 10		110	-	-
01 1st Floor - Ensuite 11		110	-	-
01 1st Floor - Hoist Store		110	-	-
01 1st Floor - Ensuite 2		110	-	-
01 1st Floor - Ensuite 1		110	-	-
01 1st Floor - Ensuite 3		110	-	-
01 1st Floor - Ensuite 4		110	-	-
01 1st Floor - Bedroom 3		110	-	-
02 2nd Floor - Bedrooms 1		110	-	-
02 2nd Floor - Corridor		110	-	-
02 2nd Floor - Store 1		110	-	-
02 2nd Floor - Store 3		110	-	-
02 2nd Floor - Bedrooms 2		110	-	-
02 2nd Floor - Ensuite 6		110	-	-
02 2nd Floor - Ensuite 5		110	-	-
02 2nd Floor - Stairs 2		110	-	-
02 2nd Floor - Bedrooms 3		110	-	-
02 2nd Floor - Ensuite 8		110	-	-
02 2nd Floor - AWC		110	-	-
02 2nd Floor - Ensuite 9		110	-	-
02 2nd Floor - Linen & Store		110	-	-
02 2nd Floor - Hoist		110	-	-
02 2nd Floor - Female Staff Change		110	-	-
02 2nd Floor - Lobby & Roof Hatch		110	-	-
02 2nd Floor - WC		110	-	-
02 2nd Floor - Ensuite 11		110	-	-
02 2nd Floor - Ensuite 10		110	-	-
02 2nd Floor - Ensuite 7		110	-	-
02 2nd Floor - Sluice		110	-	-
02 2nd Floor - Med Store		110	-	-
02 2nd Floor - Store 2		110	-	-
02 2nd Floor - Ensuite 12		110	-	-
02 2nd Floor - Ensuite 13		110	-	-
02 2nd Floor - Stairs 1		110	-	-
02 2nd Floor - Male Staff Change		110	-	-
02 2nd Floor - Bedrooms 4		110	-	-
02 2nd Floor - Ensuite 1		110	-	-
02 2nd Floor - Ensuite 2		110	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
02 2nd Floor - Ensuite 3		110	-	-
02 2nd Floor - Ensuite 4		110	-	-
02 2nd Floor - Bedroom 4		110	-	-

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

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00 Ground Floor - Nurse Station	N/A	N/A
00 Ground Floor - Kitchen	NO (-70.2%)	NO
00 Ground Floor - Chefs Office	N/A	N/A
00 Ground Floor - Foyer & Central Hub	NO (-34.8%)	NO
00 Ground Floor - Restaurant	NO (-42.3%)	NO
00 Ground Floor - Salon	NO (-68.5%)	NO
00 Ground Floor - Photocopy	N/A	N/A
00 Ground Floor - Admin	NO (-34.6%)	NO
00 Ground Floor - Manager	NO (-32.5%)	NO
00 Ground Floor - Private Dining	NO (-46.7%)	NO
01 1st Floor - Dining	NO (-42.9%)	NO
01 1st Floor - Media	NO (-57.8%)	NO
01 1st Floor - Nurse Station	N/A	N/A
01 1st Floor - Laundry	N/A	N/A
01 1st Floor - Green Room	NO (-68.7%)	NO
01 1st Floor - Gym & Physio Room	NO (-64.9%)	NO
02 2nd Floor - Nurse Station	N/A	N/A
02 2nd Floor - Lounge	NO (-73.7%)	NO
02 2nd Floor - Dining	NO (-63%)	NO
02 2nd Floor - Staff Room	NO (-77.3%)	NO
02 2nd Floor - Consult Room 2	NO (-82.4%)	NO
02 2nd Floor - Comms	N/A	N/A
02 2nd Floor - Consult Room 1	NO (-75.8%)	NO
00 Ground Floor - Ensuite 5	N/A	N/A
00 Ground Floor - Bedrooms 3	NO (-28.4%)	NO
00 Ground Floor - Ensuite 6	N/A	N/A
00 Ground Floor - Ensuite 8	N/A	N/A
00 Ground Floor - Ensuite 7	N/A	N/A
00 Ground Floor - Reception	N/A	N/A
00 Ground Floor - Bedrooms 1	NO (-57.5%)	NO
00 Ground Floor - Bedroom 2	NO (-70.9%)	NO
00 Ground Floor - Hydro Pool Room	NO (-65.5%)	NO
00 Ground Floor - Ensuite 1	NO (-76.5%)	NO
00 Ground Floor - Ensuite 2	N/A	N/A
00 Ground Floor - Ensuite 4	N/A	N/A
00 Ground Floor - Ensuite 3	NO (-86.2%)	NO
00 Ground Floor - Hydro Pool	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
01 1st Floor - Bedrooms 2	NO (-50.1%)	NO
01 1st Floor - Ensuite 9	N/A	N/A
01 1st Floor - Ensuite 8	N/A	N/A
01 1st Floor - Ensuite 7	N/A	N/A
01 1st Floor - Ensuite 6	N/A	N/A
01 1st Floor - Ensuite 5	N/A	N/A
01 1st Floor - Bedrooms 1	NO (-71.7%)	NO
01 1st Floor - Ensuite 10	N/A	N/A
01 1st Floor - Ensuite 11	N/A	N/A
01 1st Floor - Ensuite 2	N/A	N/A
01 1st Floor - Ensuite 1	NO (-75.4%)	NO
01 1st Floor - Ensuite 3	N/A	N/A
01 1st Floor - Ensuite 4	N/A	N/A
01 1st Floor - Bedroom 3	NO (-39.2%)	NO
02 2nd Floor - Bedrooms 1	NO (-78.4%)	NO
02 2nd Floor - Bedrooms 2	NO (-68.8%)	NO
02 2nd Floor - Ensuite 6	N/A	N/A
02 2nd Floor - Ensuite 5	N/A	N/A
02 2nd Floor - Bedrooms 3	NO (-68.9%)	NO
02 2nd Floor - Ensuite 8	N/A	N/A
02 2nd Floor - Ensuite 9	N/A	N/A
02 2nd Floor - Ensuite 11	N/A	N/A
02 2nd Floor - Ensuite 10	N/A	N/A
02 2nd Floor - Ensuite 7	N/A	N/A
02 2nd Floor - Ensuite 12	N/A	N/A
02 2nd Floor - Ensuite 13	N/A	N/A
02 2nd Floor - Bedrooms 4	NO (-53.7%)	NO
02 2nd Floor - Ensuite 1	NO (-75.4%)	NO
02 2nd Floor - Ensuite 2	N/A	N/A
02 2nd Floor - Ensuite 3	N/A	N/A
02 2nd Floor - Ensuite 4	N/A	N/A
02 2nd Floor - Bedroom 4	NO (-87.4%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	3487.3	3487.3
External area [m ²]	4331.3	4331.3
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	1078.67	1563.83
Average U-value [W/m ² K]	0.25	0.36
Alpha value* [%]	30.41	23.46

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

Building Use

% Area	Building Type
1	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
93	Residential Institutions: Hospitals and Care Homes
4	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
2	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	7.33	11.07
Cooling	7.02	8.43
Auxiliary	12.47	11.17
Lighting	11.41	11
Hot water	44.02	77.08
Equipment*	52.97	52.97
TOTAL **	82.24	118.76

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

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

Energy Production by Technology [kWh/m²]

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

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	277.39	331.1
Primary energy [kWh _{PE} /m ²]	121.69	175.77
Total emissions [kg/m ²]	11.23	16.22

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	19.4	490.4	2.1	28	24.6	2.59	4.86	2.64	6.5
	Notional	24.6	533.4	2.6	33.7	18.1	2.64	4.4	----	----
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	110.6	89.2	9.1	0	8.4	3.38	0	3.6	0
	Notional	132.2	123.2	13.9	0	8.3	2.64	0	----	----

Key to terms

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



Appendix D

Roof Layout



REV	DESCRIPTION	BY	DATE
A	62 no. PV panels now indicated on the drawing, in line with Sustainability Consultant's comments.	JA	11.06.24



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York
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NOTE:
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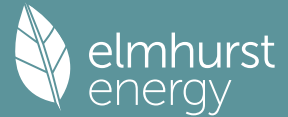
CLIENT
Highgate Care Ltd

PROJECT			
New Build Care Home With Well Being and Physiotherapy Centre at : 1 View Road / 103 - 107 North Hill, Highgate N6 4DP			
DRAWING TITLE			
Proposed Roof Plan			
DRAWING STATUS			
PLANNING			
SCALE AT A1:	DATE:	DRAWN:	CHECKED:
1 : 200	04.03.24	JRA	NMJ
PROJECT NO:	DRAWING NO.:	REVISION:	
D01-02	06	A	

Appendix E

SAP Calculation Sheets – Be Green

Full SAP Calculation Printout



Property Reference	1 Bed 1st Floor Flat - SE				Issued on Date	17/06/2024	
Assessment Reference	1 Bed 1st Floor Flat - SE			Prop Type Ref	1 Bed 1st Floor Flat - SE		
Property	1 Bed 1st Floor Flat - SE, 1 Bed 1st Floor Flat - SE, North Hill , London, N10						
SAP Rating	80 C		DER	5.26		TER	15.42
Environmental	96 A		% DER < TER				65.89
CO ₂ Emissions (t/year)	0.3		DFEE	44.59		TFEE	42.14
Compliance Check	See BREL		% DFEE < TFEE				-5.80
% DPER < TPER	31.81		DPER	55.91		TPER	81.99
Assessor Details	Miss Nimco Ali					Assessor ID	R572-0001
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	61.3000 (1b)	x 3.0000 (2b)	= 183.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 183.9000 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	1	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (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
Glazing (Uw = 0.85)			15.1700	0.8221	12.4705		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
Exposed Floor to Corridor			4.9300	0.1400	0.6902		(28b)
External Wall	67.6800	15.1700	52.5100	0.1600	8.4016	150.0000	(29a)
Corridor	24.5100	2.0000	22.5100	0.1800	4.0518	150.0000	(29a)
Total net area of external elements Aum(A, m ²)			97.1200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.6141		(33)
Party Wall 1			15.2400	0.0000	0.0000	70.0000	(32)
Party Floor 1			56.3700			40.0000	(32d)
Party Ceiling 1			61.3000			30.0000	(32b)
Internal Wall 1			53.7300			9.0000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	16897.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		275.6471 (35)
List of Thermal Bridges		

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	36.1200	0.0900	3.2508
E7 Party floor between dwellings (in blocks of flats)	14.4000	0.1100	1.5840
E16 Corner (normal)	12.0000	0.0900	1.0800
E16 Corner (normal)	6.0000	0.1400	0.8400
E17 Corner (inverted - internal area greater than external area)	9.0000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E18 Party wall between dwellings	3.0000	0.0700	0.2100
E18 Party wall between dwellings	3.0000	0.1000	0.3000
E20 Exposed floor (normal)	1.9400	0.2600	0.5044
P7 Party Wall - Exposed floor (normal)	5.0800	0.2000	1.0160
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.0800	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	7.0600	0.2500	1.7650
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740
E3 Sill	6.5300	0.1000	0.6530
E4 Jamb	27.6400	0.0600	1.6584
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			12.9656 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	40.5797 (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	17.3204	17.1099	16.8994	15.8469	15.6364	14.5838	14.5838	14.3733	15.0049	15.6364	16.0574	16.4784 (38)
Average = Sum(39)m / 12 =	57.9002	57.6896	57.4791	56.4266	56.2161	55.1635	55.1635	54.9530	55.5846	56.2161	56.6371	57.0581 (39)
												56.3740
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9445	0.9411	0.9377	0.9205	0.9171	0.8999	0.8999	0.8965	0.9068	0.9171	0.9239	0.9308 (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	2.0181 (42)											
Hot water usage for mixer showers	58.0572	57.1847	55.9133	53.4808	51.6856	49.6836	48.5457	49.8075	51.1906	53.3401	55.8249	57.8347 (42a)
Hot water usage for baths	25.0897	24.7171	24.1924	23.2249	22.5004	21.6971	21.2632	21.7843	22.3516	23.2112	24.1986	25.0049 (42b)
Hot water usage for other uses	35.2978	34.0142	32.7307	31.4471	30.1636	28.8800	28.8800	30.1636	31.4471	32.7307	34.0142	35.2978 (42c)
Average daily hot water use (litres/day)	28.1381	24.7594	26.0138	22.2084	21.0712	18.4923	17.9034	18.8992	19.4194	22.2442	24.3701	27.7462 (43)
Daily hot water use	118.4447	115.9160	112.8364	108.1528	104.3496	100.2608	98.6889	101.7553	104.9893	109.2819	114.0377	118.1374 (44)
Energy content (annual)	187.5874	165.0629	173.4253	148.0557	140.4746	123.2823	119.3557	125.9943	129.4623	148.2946	162.4677	184.9747 (45)
Distribution loss (46)m = 0.15 x (45)m	28.1381	24.7594	26.0138	22.2084	21.0712	18.4923	17.9034	18.8992	19.4194	22.2442	24.3701	27.7462 (46)
Water storage loss:	180.0000 (47)											
Store volume	1.4000 (48)											
a) If manufacturer declared loss factor is known (kWh/day):	0.5400 (49)											
Temperature factor from Table 2b	0.7560 (55)											
Enter (49) or (54) in (55)	23.4360 (56)											
Total storage loss	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360 (56)
If cylinder contains dedicated solar storage	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360 (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	234.2858	207.2421	220.1237	193.2477	187.1730	168.4743	166.0541	172.6927	174.6543	194.9930	207.6597	231.6731 (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	234.2858	207.2421	220.1237	193.2477	187.1730	168.4743	166.0541	172.6927	174.6543	194.9930	207.6597	231.6731 (64)
12Total per year (kWh/year)	2358.2736 (64)											
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	99.7315	88.6268	95.0226	85.3821	84.0665	77.1450	77.0445	79.2518	79.1998	86.6667	90.1741	98.8628 (65)

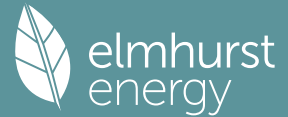
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	88.9646	88.9646	88.9646	88.9646	88.9646	88.9646	88.9646	88.9646	88.9646	88.9646	88.9646	88.9646 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	176.2133	178.0418	173.4339	163.6243	151.2415	139.6033	131.8283	129.9998	134.6076	144.4173	156.8001	168.4383 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907 (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)	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257 (71)
Water heating gains (Table 5)	134.0478	131.8851	127.7186	118.5863	112.9926	107.1458	103.5544	106.5213	109.9998	116.4874	125.2418	132.8801 (72)
Total internal gains	452.4978	461.6956	443.3893	427.4129	406.4709	391.9514	377.6195	378.7578	389.8097	403.1415	427.2442	443.5551 (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
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Full SAP Calculation Printout



Northeast			9.8400		11.2829		0.3200		0.7000		0.7700		17.2345 (75)
Southeast			1.5500		36.7938		0.3200		0.7000		0.7700		8.8529 (77)
Southwest			3.7800		36.7938		0.3200		0.7000		0.7700		21.5898 (79)

Solar gains	47.6772	86.9365	134.1560	191.7126	237.9973	246.5090	233.4026	197.3077	153.8412	100.1832	58.1488	40.1272 (83)
Total gains	500.1750	548.6321	577.5452	619.1255	644.4682	638.4603	611.0221	576.0655	543.6509	503.3247	485.3930	483.6823 (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	81.0647	81.3605	81.6585	83.1817	83.4932	85.0862	85.0862	85.4122	84.4418	83.4932	82.8725	82.2610	
alpha	6.4043	6.4240	6.4439	6.5454	6.5662	6.6724	6.6724	6.6941	6.6295	6.5662	6.5248	6.4841	
util living area	0.9929	0.9858	0.9691	0.9059	0.7624	0.5482	0.3967	0.4378	0.6834	0.9233	0.9832	0.9941 (86)	
Living	20.2119	20.3496	20.5408	20.7949	20.9471	20.9948	20.9995	20.9990	20.9797	20.7981	20.4787	20.1976	
Non living	19.2244	19.4003	19.6407	19.9533	20.1125	20.1650	20.1674	20.1702	20.1498	19.9652	19.5759	19.2153	
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	20.5969	20.3496	20.5408	20.7949	20.9471	20.9948	20.9995	20.9990	20.9797	20.7981	20.4787	20.3098 (87)	
Th 2	20.1298	20.1327	20.1356	20.1501	20.1530	20.1676	20.1676	20.1705	20.1618	20.1530	20.1472	20.1414 (88)	
util rest of house	0.9905	0.9812	0.9590	0.8781	0.7083	0.4791	0.3220	0.3594	0.6096	0.8942	0.9769	0.9921 (89)	
MIT 2	19.7688	19.4003	19.6407	19.9533	20.1125	20.1650	20.1674	20.1702	20.1498	19.9652	19.5759	19.3822 (90)	
Living area fraction									fLA =	Living area / (4) =		0.4840 (91)	
MIT	20.1696	19.8598	20.0763	20.3606	20.5164	20.5666	20.5702	20.5714	20.5515	20.3683	20.0129	19.8312 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.1696	19.8598	20.0763	20.3606	20.5164	20.5666	20.5702	20.5714	20.5515	20.3683	20.0129	19.8312 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9906	0.9794	0.9582	0.8856	0.7323	0.5125	0.3582	0.3974	0.6448	0.9025	0.9757	0.9913 (94)	
Useful gains	495.4862	537.3560	553.3912	548.2855	471.9741	327.2114	218.8584	228.9401	350.5289	454.2259	473.6022	479.4510 (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	918.8531	863.0231	780.3567	646.6838	495.6261	329.1404	219.0079	229.2293	358.6040	549.1355	731.3468	891.8851 (97)	
Space heating kWh	314.9849	218.8483	168.8623	70.8467	17.5971	0.0000	0.0000	0.0000	0.0000	70.6127	185.5762	306.8509 (98a)	
Space heating requirement - total per year (kWh/year)												1354.1792	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)	
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	314.9849	218.8483	168.8623	70.8467	17.5971	0.0000	0.0000	0.0000	0.0000	70.6127	185.5762	306.8509 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1354.1792	
Space heating per m2										(98c) / (4) =		22.0910 (99)	

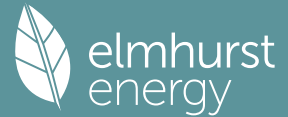
8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	518.5373	408.2103	417.6431	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9612	0.9854	0.9777	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	498.4229	402.2528	408.3314	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	700.4143	670.4863	630.8964	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	145.4338	199.5657	165.5884	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc =	cooled area / (4) =		0.7178 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	26.0974	35.8111	29.7141	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												91.6226 (107)

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 %)													252.5851 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Cooling System Energy Efficiency Ratio (see Table 10c)													3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	314.9849	218.8483	168.8623	70.8467	17.5971	0.0000	0.0000	0.0000	0.0000	70.6127	185.5762	306.8509 (98)	
Space heating efficiency (main heating system 1)	252.5851	252.5851	252.5851	252.5851	252.5851	0.0000	0.0000	0.0000	0.0000	252.5851	252.5851	252.5851 (210)	
Space heating fuel (main heating system)	124.7045	86.6434	66.8536	28.0486	6.9668	0.0000	0.0000	0.0000	0.0000	27.9560	73.4707	121.4842 (211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating													
Water heating requirement	234.2858	207.2421	220.1237	193.2477	187.1730	168.4743	166.0541	172.6927	174.6543	194.9930	207.6597	231.6731 (64)	
Efficiency of water heater												173.6723 (216)	

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(217)m	173.6723	173.6723	173.6723	173.6723	173.6723	173.6723	173.6723	173.6723	173.6723	173.6723	173.6723	173.6723	(217)
Fuel for water heating, kWh/month	134.9011	119.3294	126.7466	111.2715	107.7737	97.0070	95.6135	99.4360	100.5655	112.2764	119.5699	133.3967	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	8.0053	10.9850	9.1147	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	13.8149	12.4780	13.8149	13.3693	13.8149	13.3693	13.8149	13.3693	13.8149	13.3693	13.8149	13.3693	(231)
Lighting	18.4851	14.8294	13.3523	9.7824	7.5562	6.1735	6.8930	8.9598	11.6380	15.2696	17.2470	18.9989	(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												536.1278	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												173.6723	
Water heating fuel used												1357.8874	(219)
Space cooling fuel												28.1051	(221)

Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)													
mechanical ventilation fans (SFP = 0.7250)												162.6595	(230a)
Total electricity for the above, kWh/year												162.6595	(231)
Electricity for lighting (calculated in Appendix L)												149.1853	(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												2233.9651	(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	536.1278	0.1568	84.0470	(261)
Total CO ₂ associated with community systems			0.0000	(373)
Water heating (other fuel)	1357.8874	0.1409	191.3398	(264)
Space and water heating			275.3868	(265)
Space cooling	28.1051	0.1139	3.2008	(266)
Pumps, fans and electric keep-hot	162.6595	0.1387	22.5629	(267)
Energy for lighting	149.1853	0.1443	21.5320	(268)
Total CO ₂ , kg/year			322.6826	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.2600	(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	536.1278	1.5804	847.2739	(275)
Total CO ₂ associated with community systems			0.0000	(473)
Water heating (other fuel)	1357.8874	1.5210	2065.3935	(278)
Space and water heating			2912.6673	(279)
Space cooling	28.1051	1.4198	39.9037	(280)
Pumps, fans and electric keep-hot	162.6595	1.5128	246.0714	(281)
Energy for lighting	149.1853	1.5338	228.8254	(282)
Total Primary energy kWh/year			3427.4678	(286)
Dwelling Primary energy Rate (DPER)			55.9100	(287)

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

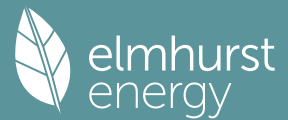
1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)	
Ground floor	61.3000	(1b)	x	3.0000 (2b) = 183.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.3000			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	183.9000 (5)

2. Ventilation rate

m³ per hour

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

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000	Air changes per hour	0.1088 (8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			5.0000	(17)
Infiltration rate			0.3588	(18)
Number of sides sheltered			1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3318	(21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	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)
Effective ac	0.4231	0.4148	0.4065	0.3650	0.3567	0.3153	0.3153	0.3070	0.3318	0.3567	0.3733	0.3899	(22b)
	0.5895	0.5860	0.5826	0.5666	0.5636	0.5497	0.5497	0.5471	0.5551	0.5636	0.5697	0.5760	(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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			13.3200	1.1450	15.2519		(27)
Exposed Floor to Corridor			4.9300	0.1300	0.6409		(28b)
External Wall	67.6800	13.3200	54.3600	0.1800	9.7848		(29a)
Corridor	24.5100	2.0000	22.5100	0.1800	4.0518		(29a)
Total net area of external elements Aum(A, m2)			97.1200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.7294		(33)
Party Wall 1			15.2400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							285.6471 (35)

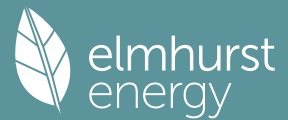
List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E7 Party floor between dwellings (in blocks of flats)	36.1200	0.0700	2.5284
E7 Party floor between dwellings (in blocks of flats)	14.4000	0.0700	1.0080
E16 Corner (normal)	12.0000	0.0900	1.0800
E16 Corner (normal)	6.0000	0.0900	0.5400
E17 Corner (inverted - internal area greater than external area)	9.0000	-0.0900	-0.8100
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E18 Party wall between dwellings	3.0000	0.0600	0.1800
E18 Party wall between dwellings	3.0000	0.0600	0.1800
E20 Exposed floor (normal)	1.9400	0.3200	0.6208
P7 Party Wall - Exposed floor (normal)	5.0800	0.1600	0.8128
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.0800	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	7.0600	0.0200	0.1412
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740
E3 Sill	6.5300	0.0500	0.3265
E4 Jamb	27.6400	0.0500	1.3820
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.0937 (36)
Point Thermal Bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 39.8231 (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	35.7756	35.5646	35.3579	34.3867	34.2050	33.3592	33.3592	33.2026	33.6850	34.2050	34.5726	34.9569	(38)
Average = Sum(39)m / 12 =	75.5987	75.3877	75.1810	74.2099	74.0282	73.1823	73.1823	73.0257	73.5081	74.0282	74.3957	74.7800	(39)
												74.2090	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2333	1.2298	1.2264	1.2106	1.2076	1.1938	1.1938	1.1913	1.1992	1.2076	1.2136	1.2199	(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													2.0181 (42)
Hot water usage for mixer showers													
	58.0572	57.1847	55.9133	53.4808	51.6856	49.6836	48.5457	49.8075	51.1906	53.3401	55.8249	57.8347	(42a)
Hot water usage for baths													
	25.0897	24.7171	24.1924	23.2249	22.5004	21.6971	21.2632	21.7843	22.3516	23.2112	24.1986	25.0049	(42b)
Hot water usage for other uses													
	35.2978	34.0142	32.7307	31.4471	30.1636	28.8800	28.8800	30.1636	31.4471	32.7307	34.0142	35.2978	(42c)
Average daily hot water use (litres/day)													108.8778 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	118.4447	115.9160	112.8364	108.1528	104.3496	100.2608	98.6889	101.7553	104.9893	109.2819	114.0377	118.1374	(44)
Energy conte	187.5874	165.0629	173.4253	148.0557	140.4746	123.2823	119.3557	125.9943	129.4623	148.2946	162.4677	184.9747	(45)
Energy content (annual)										Total = Sum(45)m =			1808.4376
Distribution loss (46)m = 0.15 x (45)m													
	28.1381	24.7594	26.0138	22.2084	21.0712	18.4923	17.9034	18.8992	19.4194	22.2442	24.3701	27.7462	(46)
Water storage loss:													
Store volume													180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5520 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8381 (55)
Total storage loss													
	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)
If cylinder contains dedicated solar storage													
	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(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)

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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												
	236.8301	209.5401	222.6680	195.7099	189.7173	170.9365	168.5984	175.2370	177.1165	197.5372	210.1219	234.2173 (62)
WWHRS	-26.5413	-23.4734	-24.5800	-20.3532	-18.9684	-16.2314	-15.2144	-16.1790	-16.7936	-19.7979	-22.4286	-26.0498 (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	210.2888	186.0668	198.0880	175.3567	170.7488	154.7051	153.3840	159.0581	160.3229	177.7394	187.6933	208.1675 (64)
												2141.6194 (64)
12Total per year (kWh/year)												2142 (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	101.7670	90.4652	97.0580	87.3519	86.1019	79.1147	79.0799	81.2873	81.1696	88.7021	92.1439	100.8982 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	88.9510	98.4815	88.9510	91.9160	88.9510	91.9160	88.9510	88.9510	91.9160	88.9510	91.9160	88.9510 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	176.2133	178.0418	173.4339	163.6243	151.2415	139.6033	131.8283	129.9998	134.6076	144.4173	156.8001	168.4383 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257 (71)
Water heating gains (Table 5)												
	136.7836	134.6208	130.4544	121.3221	115.7284	109.8816	106.2902	109.2571	112.7355	119.2232	127.9776	135.6159 (72)
Total internal gains	458.2199	467.4162	449.1114	433.1345	412.1930	394.6730	380.3417	381.4800	392.5313	408.8636	432.9658	449.2773 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W				
Northeast				8.6400	11.2829	0.6300	0.7000	0.7700	29.7926 (75)						
Southeast				1.3600	36.7938	0.6300	0.7000	0.7700	15.2928 (77)						
Southwest				3.3200	36.7938	0.6300	0.7000	0.7700	37.3323 (79)						
Solar gains				82.4176	150.2836	231.9098	331.4056	411.4161	426.1298	403.4733	341.0776	265.9389	173.1826	100.5195	69.3662 (83)
Total gains				540.6376	617.6998	681.0213	764.5402	823.6091	820.8029	783.8150	722.5576	658.4703	582.0462	533.4853	518.6435 (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	64.3389	64.5189	64.6964	65.5430	65.7039	66.4633	66.4633	66.6058	66.1687	65.7039	65.3792	65.0433
alpha	5.2893	5.3013	5.3131	5.3695	5.3803	5.4309	5.4309	5.4404	5.4112	5.3803	5.3586	5.3362
util living area	0.9935	0.9861	0.9675	0.9023	0.7592	0.5587	0.4089	0.4610	0.7172	0.9349	0.9858	0.9948 (86)
MIT	19.8754	20.0621	20.3307	20.6761	20.9016	20.9847	20.9976	20.9956	20.9455	20.6485	20.2096	19.8496 (87)
Th 2	19.8935	19.8962	19.8989	19.9115	19.9139	19.9249	19.9249	19.9270	19.9207	19.9139	19.9091	19.9041 (88)
util rest of house	0.9912	0.9812	0.9558	0.8697	0.6942	0.4704	0.3101	0.3556	0.6262	0.9052	0.9798	0.9928 (89)
MIT 2	18.6143	18.8522	19.1890	19.6074	19.8413	19.9177	19.9243	19.9258	19.8896	19.5890	19.0505	18.5893 (90)
Living area fraction									fLA = Living area / (4) =			0.4840 (91)
MIT	19.2247	19.4378	19.7416	20.1247	20.3545	20.4341	20.4438	20.4436	20.4007	20.1018	19.6115	19.1993 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2247	19.4378	19.7416	20.1247	20.3545	20.4341	20.4438	20.4436	20.4007	20.1018	19.6115	19.1993 (93)

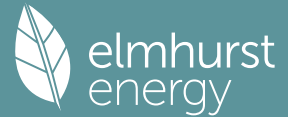
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9893	0.9785	0.9538	0.8768	0.7219	0.5129	0.3580	0.4068	0.6687	0.9112	0.9777	0.9912 (94)
Useful gains	534.8314	604.4443	649.5365	670.3358	594.5461	420.9792	280.6091	293.9396	440.2919	530.3560	521.6049	514.0615 (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	1128.2839	1095.9715	995.5155	832.9842	640.6754	426.9553	281.3005	295.2859	463.1531	703.4035	930.8025	1121.6490 (97)
Space heating kWh	441.5287	330.3063	257.4084	117.1068	34.3202	0.0000	0.0000	0.0000	0.0000	128.7473	294.6223	452.0451 (98a)
Space heating requirement - total per year (kWh/year)												2056.0851
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	441.5287	330.3063	257.4084	117.1068	34.3202	0.0000	0.0000	0.0000	0.0000	128.7473	294.6223	452.0451 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2056.0851
Space heating per m ²												33.5414 (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)

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Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	441.5287	330.3063	257.4084	117.1068	34.3202	0.0000	0.0000	0.0000	0.0000	128.7473	294.6223	452.0451 (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)	478.3626	357.8616	278.8824	126.8763	37.1833	0.0000	0.0000	0.0000	0.0000	139.4879	319.2008	489.7563 (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	210.2888	186.0668	198.0880	175.3567	170.7488	154.7051	153.3840	159.0581	160.3229	177.7394	187.6933	208.1675 (64)
Efficiency of water heater	85.6824	85.3322	84.6483	83.1755	81.1769	79.8000	79.8000	79.8000	79.8000	83.3486	85.0665	79.8000 (216)
Fuel for water heating, kWh/month	245.4282	218.0500	234.0131	210.8275	210.3416	193.8660	192.2106	199.3209	200.9059	213.2482	220.6430	242.7591 (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	18.4823	14.8272	13.3502	9.7809	7.5551	6.1726	6.8920	8.9585	11.6362	15.2673	17.2444	18.9959 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-16.5018	-24.4909	-37.0423	-43.9042	-49.3394	-46.7984	-46.2385	-42.6619	-36.6991	-28.9947	-18.5758	-14.1281 (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)	-5.9370	-12.7648	-25.8882	-39.6481	-53.1748	-53.6927	-53.0505	-44.5647	-32.2111	-18.4925	-8.0033	-4.6739 (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												2227.6112 (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												2581.6141 (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)												149.1624 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-757.4765 (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												4286.9111 (238)

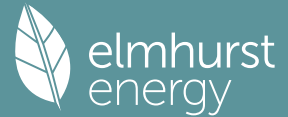
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2227.6112	0.2100	467.7983 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2581.6141	0.2100	542.1390 (264)
Space and water heating			1009.9373 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	149.1624	0.1443	21.5287 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-405.3748	0.1335	-54.1217
PV Unit electricity exported	-352.1017	0.1253	-44.1302
Total			-98.2519 (269)
Total CO2, kg/year			945.1434 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.4200 (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	2227.6112	1.1300	2517.2006 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2581.6141	1.1300	2917.2239 (278)
Space and water heating			5434.4245 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	149.1624	1.5338	228.7903 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-405.3748	1.4934	-605.3746
PV Unit electricity exported	-352.1017	0.4600	-161.9789
Total			-767.3535 (283)
Total Primary energy kWh/year			5025.9621 (286)
Target Primary Energy Rate (TPER)			81.9900 (287)

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Property Reference	1 Bed 2nd Floor Flat - SE				Issued on Date	17/06/2024
Assessment Reference	1 Bed 2nd Floor Flat - SE		Prop Type Ref	1 Bed 2nd Floor Flat - SE		
Property	1 Bed 2nd Floor Flat - SE, 1 Bed 2nd Floor Flat - SE, North Hill , London, N10					
SAP Rating	81 B	DER	5.16	TER	15.06	
Environmental	96 A	% DER < TER				65.74
CO ₂ Emissions (t/year)	0.29	DFEE	42.86	TFEE	40.52	
Compliance Check	See BREL	% DFEE < TFEE				-5.78
% DPER < TPER	31.44	DPER	54.87	TPER	80.04	
Assessor Details	Miss Nimco Ali				Assessor ID	R572-0001
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	61.3000 (1b)	x 3.0000 (2b)	= 183.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.3000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 183.9000 (5)

2. Ventilation rate

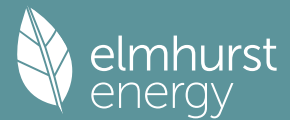
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (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
Glazing (Uw = 0.85)			15.1700	0.8221	12.4705		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
External Wall	67.6800	15.1700	52.5100	0.1600	8.4016	150.0000	7876.5000 (29a)
Corridor	24.5100	2.0000	22.5100	0.1800	4.0518	150.0000	3376.5000 (29a)
Total net area of external elements Aum(A, m ²)			92.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.9239		(33)
Party Wall 1			15.2400	0.0000	0.0000	70.0000	1066.8000 (32)
Party Floor 1			61.3000			40.0000	2452.0000 (32d)
Party Ceiling 1			61.3000			30.0000	1839.0000 (32b)
Internal Wall 1			53.7300			9.0000	483.5700 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17094.3700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							278.8641 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E7 Party floor between dwellings (in blocks of flats)	38.0600	0.0900	3.4254
E7 Party floor between dwellings (in blocks of flats)	16.3400	0.1100	1.7974
E16 Corner (normal)	12.0000	0.0900	1.0800
E16 Corner (normal)	6.0000	0.1400	0.8400
E17 Corner (inverted - internal area greater than external area)	9.0000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E18 Party wall between dwellings	3.0000	0.0700	0.2100
E18 Party wall between dwellings	3.0000	0.1000	0.3000
P3 Party wall - intermediate floor between dwellings (in blocks of flats)	10.1600	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	7.0600	0.2500	1.7650
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740
E3 Sill	6.5300	0.1000	0.6530
E4 Jamb	27.6400	0.0600	1.6584
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.8332 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	38.7571 (37)

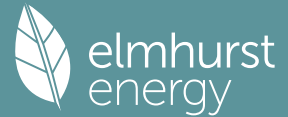
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	17.3204	17.1099	16.8994	15.8469	15.6364	14.5838	14.5838	14.3733	15.0049	15.6364	16.0574	16.4784	(38)
Average = Sum(39)m / 12 =	56.0776	55.8670	55.6565	54.6040	54.3935	53.3409	53.3409	53.1304	53.7620	54.3935	54.8145	55.2355	(39)
												54.5514	
HLP	0.9148	0.9114	0.9079	0.8908	0.8873	0.8702	0.8702	0.8667	0.8770	0.8873	0.8942	0.9011	(40)
HLP (average)												0.8899	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.0181 (42)
Hot water usage for mixer showers	58.0572	57.1847	55.9133	53.4808	51.6856	49.6836	48.5457	49.8075	51.1906	53.3401	55.8249	57.8347 (42a)
Hot water usage for baths	25.0897	24.7171	24.1924	23.2249	22.5004	21.6971	21.2632	21.7843	22.3516	23.2112	24.1986	25.0049 (42b)
Hot water usage for other uses	35.2978	34.0142	32.7307	31.4471	30.1636	28.8800	28.8800	30.1636	31.4471	32.7307	34.0142	35.2978 (42c)
Average daily hot water use (litres/day)												108.8778 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	118.4447	115.9160	112.8364	108.1528	104.3496	100.2608	98.6889	101.7553	104.9893	109.2819	114.0377	118.1374 (44)
Energy content (annual)	187.5874	165.0629	173.4253	148.0557	140.4746	123.2823	119.3557	125.9943	129.4623	148.2946	162.4677	184.9747 (45)
Distribution loss (46)m = 0.15 x (45)m	28.1381	24.7594	26.0138	22.2084	21.0712	18.4923	17.9034	18.8992	19.4194	22.2442	24.3701	27.7462 (46)
Water storage loss:												
Store volume												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.4000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7560 (55)
Total storage loss	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360 (56)
If cylinder contains dedicated solar storage	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360 (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	234.2858	207.2421	220.1237	193.2477	187.1730	168.4743	166.0541	172.6927	174.6543	194.9930	207.6597	231.6731 (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	234.2858	207.2421	220.1237	193.2477	187.1730	168.4743	166.0541	172.6927	174.6543	194.9930	207.6597	231.6731 (64)
12Total per year (kWh/year)												2358.2736 (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	99.7315	88.6268	95.0226	85.3821	84.0665	77.1450	77.0445	79.2518	79.1998	86.6667	90.1741	98.8628 (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	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	88.9646	88.9646	88.9646	91.9301	88.9646	91.9301	88.9646	88.9646	91.9301	88.9646	91.9301	88.9646 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	176.2133	178.0418	173.4339	163.6243	151.2415	139.6033	131.8283	129.9998	134.6076	144.4173	156.8001	168.4383 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907 (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)	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257 (71)
Water heating gains (Table 5)	134.0478	131.8851	127.7186	118.5863	112.9926	107.1458	103.5544	106.5213	109.9998	116.4874	125.2418	132.8801 (72)
Total internal gains	452.4978	461.6956	443.3893	427.4129	406.4709	391.9514	377.6195	378.7578	389.8097	403.1415	427.2442	443.5551 (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	9.8400	11.2829	0.3200	0.7000	0.7700	17.2345 (75)	
Southeast	1.5500	36.7938	0.3200	0.7000	0.7700	8.8529 (77)	

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Southwest	3.7800				36.7938				0.3200				0.7000				0.7700				21.5898 (79)			
Solar gains	47.6772	86.9365	134.1560	191.7126	237.9973	246.5090	233.4026	197.3077	153.8412	100.1832	58.1488	40.1272 (83)												
Total gains	500.1750	548.6321	577.5452	619.1255	644.4682	638.4603	611.0221	576.0655	543.6509	503.3247	485.3930	483.6823 (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	84.6762	84.9953	85.3168	86.9613	87.2979	89.0205	89.0205	89.3732	88.3233	87.2979	86.6274	85.9671
alpha	6.6451	6.6664	6.6878	6.7974	6.8199	6.9347	6.9347	6.9582	6.8882	6.8199	6.7752	6.7311
util living area	0.9927	0.9852	0.9671	0.8982	0.7468	0.5314	0.3838	0.4236	0.6660	0.9170	0.9824	0.9940 (86)
Living	20.2662	20.4010	20.5851	20.8248	20.9588	20.9965	20.9997	20.9994	20.9850	20.8255	20.5228	20.2523
Non living	19.3121	19.4843	19.7153	20.0089	20.1472	20.1912	20.1928	20.1957	20.1784	20.0176	19.6506	19.3039
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	20.6246	20.4010	20.5851	20.8248	20.9588	20.9965	20.9997	20.9994	20.9850	20.8255	20.5228	20.3569 (87)
Th 2	20.1549	20.1578	20.1608	20.1754	20.1783	20.1929	20.1929	20.1959	20.1871	20.1783	20.1724	20.1666 (88)
util rest of house	0.9903	0.9804	0.9565	0.8693	0.6932	0.4660	0.3136	0.3499	0.5946	0.8867	0.9758	0.9920 (89)
MIT 2	19.8189	19.4843	19.7153	20.0089	20.1472	20.1912	20.1928	20.1957	20.1784	20.0176	19.6506	19.4594 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	20.2089	19.9280	20.1363	20.4038	20.5401	20.5810	20.5834	20.5847	20.5688	20.4086	20.0728	19.8938 (92)
Temperature adjustment												0.0000
adjusted MIT	20.2089	19.9280	20.1363	20.4038	20.5401	20.5810	20.5834	20.5847	20.5688	20.4086	20.0728	19.8938 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9905	0.9789	0.9562	0.8780	0.7175	0.4976	0.3476	0.3856	0.6288	0.8961	0.9748	0.9912 (94)
Useful gains	495.4193	537.0385	552.2286	543.5757	462.4117	317.7260	212.3851	222.1530	341.8271	451.0047	473.1738	479.4241 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	892.1317	839.5687	758.9495	628.1534	480.8417	319.0304	212.4764	222.3344	347.7770	533.5246	711.0959	866.8551 (97)
Space heating kWh	295.1540	203.3003	153.8003	60.8959	13.7119	0.0000	0.0000	0.0000	0.0000	61.3948	171.3040	288.2487 (98a)
Space heating requirement - total per year (kWh/year)												1247.8100
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	295.1540	203.3003	153.8003	60.8959	13.7119	0.0000	0.0000	0.0000	0.0000	61.3948	171.3040	288.2487 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1247.8100
Space heating per m2										(98c) / (4) =		20.3558 (99)

8c. Space cooling requirement

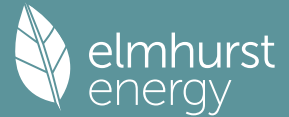
Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	501.4049	394.7230	403.7913	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.9699	0.9894	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	486.3121	390.5416	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	700.4143	670.4863	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	154.1536	208.2788	173.9565	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	27.6621	37.3747	31.2157	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												96.2525 (107)

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 %)												250.7934 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	295.1540	203.3003	153.8003	60.8959	13.7119	0.0000	0.0000	0.0000	0.0000	61.3948	171.3040	288.2487 (98)
Space heating efficiency (main heating system 1)	250.7934	250.7934	250.7934	250.7934	250.7934	0.0000	0.0000	0.0000	0.0000	250.7934	250.7934	250.7934 (210)
Space heating fuel (main heating system)	117.6881	81.0629	61.3255	24.2813	5.4674	0.0000	0.0000	0.0000	0.0000	24.4802	68.3048	114.9347 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	234.2858	207.2421	220.1237	193.2477	187.1730	168.4743	166.0541	172.6927	174.6543	194.9930	207.6597	231.6731 (64)
Efficiency of water heater (217)m	174.1073	174.1073	174.1073	174.1073	174.1073	174.1073	174.1073	174.1073	174.1073	174.1073	174.1073	174.1073 (216)
Fuel for water heating, kWh/month	134.5641	119.0313	126.4299	110.9935	107.5044	96.7647	95.3746	99.1875	100.3142	111.9959	119.2711	133.0634 (219)

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Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	8.4853	11.4646	9.5754	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	13.8149	12.4780	13.8149	13.3693	13.8149	13.3693	13.8149	13.8149	13.3693	13.8149	13.3693	13.8149	(231)
Lighting	18.4851	14.8294	13.3523	9.7824	7.5562	6.1735	6.8930	8.9598	11.6380	15.2696	17.2470	18.9989	(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												497.5451	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												174.1073	
Water heating fuel used												1354.4945	(219)
Space cooling fuel												29.5253	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)													
mechanical ventilation fans (SFP = 0.7250)												162.6595	(230a)
Total electricity for the above, kWh/year												162.6595	(231)
Electricity for lighting (calculated in Appendix L)												149.1853	(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												2193.4097	(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	497.5451	0.1570	78.1077	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1354.4945	0.1409	190.8618	(264)
Space and water heating			268.9694	(265)
Space cooling	29.5253	0.1139	3.3633	(266)
Pumps, fans and electric keep-hot	162.6595	0.1387	22.5629	(267)
Energy for lighting	149.1853	0.1443	21.5320	(268)
Total CO2, kg/year			316.4276	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.1600	(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	497.5451	1.5812	786.7010	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1354.4945	1.5210	2060.2327	(278)
Space and water heating			2846.9337	(279)
Space cooling	29.5253	1.4199	41.9224	(280)
Pumps, fans and electric keep-hot	162.6595	1.5128	246.0714	(281)
Energy for lighting	149.1853	1.5338	228.8254	(282)
Total Primary energy kWh/year			3363.7529	(286)
Dwelling Primary energy Rate (DPER)			54.8700	(287)

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

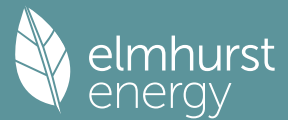
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	61.3000 (1b)	x	3.0000 (2b)	=
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	61.3000			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		=
			183.9000 (1b) - (3b)	(4)
			183.9000 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)

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Number of flues attached to solid fuel boiler
Number of flues attached to other heater
Number of blocked chimneys
Number of intermittent extract fans
Number of passive vents
Number of flueless gas fires

0 * 20 = 0.0000 (6d)
0 * 35 = 0.0000 (6e)
0 * 20 = 0.0000 (6f)
2 * 10 = 20.0000 (7a)
0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
20.0000 / (5) = 0.1088 (8)
Yes
Blower Door
5.0000 (17)
0.3588 (18)
1 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3318 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
	0.4231	0.4148	0.4065	0.3650	0.3567	0.3153	0.3153	0.3070	0.3318	0.3567	0.3733	0.3899	(22b)
Effective ac	0.5895	0.5860	0.5826	0.5666	0.5636	0.5497	0.5497	0.5471	0.5551	0.5636	0.5697	0.5760	(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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			13.3200	1.1450	15.2519		(27)
External Wall	67.6800	13.3200	54.3600	0.1800	9.7848		(29a)
Corridor	24.5100	2.0000	22.5100	0.1800	4.0518		(29a)
Total net area of external elements Aum(A, m ²)			92.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.0885		(33)
Party Wall 1			15.2400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							288.8641 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	38.0600	0.0700	2.6642
E7 Party floor between dwellings (in blocks of flats)	16.3400	0.0700	1.1438
E16 Corner (normal)	12.0000	0.0900	1.0800
E16 Corner (normal)	6.0000	0.0900	0.5400
E17 Corner (inverted - internal area greater than external area)	9.0000	-0.0900	-0.8100
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E18 Party wall between dwellings	3.0000	0.0600	0.1800
E18 Party wall between dwellings	3.0000	0.0600	0.1800
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.1600	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	7.0600	0.0200	0.1412
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740
E3 Sill	6.5300	0.0500	0.3265
E4 Jamb	27.6400	0.0500	1.3820

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges (36a) = 6.9317 (36)
Total fabric heat loss (33) + (36) + (36a) = 38.0202 (37)

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

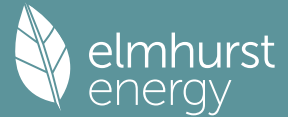
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	35.7756	35.5646	35.3579	34.3867	34.2050	33.3592	33.3592	33.2026	33.6850	34.2050	34.5726	34.9569	(38)
Average = Sum(39)m / 12 =	73.7958	73.5848	73.3781	72.4070	72.2253	71.3794	71.3794	71.2228	71.7052	72.2253	72.5928	72.9771	(39)
												72.4061	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2038	1.2004	1.1970	1.1812	1.1782	1.1644	1.1644	1.1619	1.1697	1.1782	1.1842	1.1905	(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													2.0181 (42)
Hot water usage for mixer showers													
	58.0572	57.1847	55.9133	53.4808	51.6856	49.6836	48.5457	49.8075	51.1906	53.3401	55.8249	57.8347	(42a)
Hot water usage for baths													
	25.0897	24.7171	24.1924	23.2249	22.5004	21.6971	21.2632	21.7843	22.3516	23.2112	24.1986	25.0049	(42b)
Hot water usage for other uses													
	35.2978	34.0142	32.7307	31.4471	30.1636	28.8800	28.8800	30.1636	31.4471	32.7307	34.0142	35.2978	(42c)
Average daily hot water use (litres/day)													108.8778 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	118.4447	115.9160	112.8364	108.1528	104.3496	100.2608	98.6889	101.7553	104.9893	109.2819	114.0377	118.1374	(44)
Energy conte	187.5874	165.0629	173.4253	148.0557	140.4746	123.2823	119.3557	125.9943	129.4623	148.2946	162.4677	184.9747	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
	28.1381	24.7594	26.0138	22.2084	21.0712	18.4923	17.9034	18.8992	19.4194	22.2442	24.3701	27.7462	(46)
Water storage loss:													
Store volume													180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5520 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8381 (55)
Total storage loss													
	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)
If cylinder contains dedicated solar storage													
	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(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													
	236.8301	209.5401	222.6680	195.7099	189.7173	170.9365	168.5984	175.2370	177.1165	197.5372	210.1219	234.2173	(62)
WWHRS	-26.5413	-23.4734	-24.5800	-20.3532	-18.9684	-16.2314	-15.2144	-16.1790	-16.7936	-19.7979	-22.4286	-26.0498	(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)

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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	210.2888	186.0668	198.0880	175.3567	170.7488	154.7051	153.3840	159.0581	160.3229	177.7394	187.6933	208.1675 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											2141.6194 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	101.7670	90.4652	97.0580	87.3519	86.1019	79.1147	79.0799	81.2873	81.1696	88.7021	92.1439	100.8982 (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	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	100.9071	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	88.9510	98.4815	88.9510	91.9160	88.9510	91.9160	88.9510	88.9510	91.9160	88.9510	91.9160	88.9510	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	176.2133	178.0418	173.4339	163.6243	151.2415	139.6033	131.8283	129.9998	134.6076	144.4173	156.8001	168.4383	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	33.0907	(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)	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	-80.7257	(71)
Water heating gains (Table 5)	136.7836	134.6208	130.4544	121.3221	115.7284	109.8816	106.2902	109.2571	112.7355	119.2232	127.9776	135.6159	(72)
Total internal gains	458.2199	467.4162	449.1114	433.1345	412.1930	394.6730	380.3417	381.4800	392.5313	408.8636	432.9658	449.2773	(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					8.6400	11.2829		0.6300	0.7000	0.7700		29.7926 (75)				
Southeast					1.3600	36.7938		0.6300	0.7000	0.7700		15.2928 (77)				
Southwest					3.3200	36.7938		0.6300	0.7000	0.7700		37.3323 (79)				
Solar gains					82.4176	150.2836	231.9098	331.4056	411.4161	426.1298	403.4733	341.0776	265.9389	173.1826	100.5195	69.3662 (83)
Total gains					540.6376	617.6998	681.0213	764.5402	823.6091	820.8029	783.8150	722.5576	658.4703	582.0462	533.4853	518.6435 (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	66.6531	66.8441	67.0325	67.9315	68.1024	68.9094	68.9094	69.0609	68.5963	68.1024	67.7576	67.4008
alpha	5.4435	5.4563	5.4688	5.5288	5.5402	5.5940	5.5940	5.6041	5.5731	5.5402	5.5172	5.4934
util living area	0.9936	0.9861	0.9668	0.8982	0.7495	0.5471	0.3992	0.4505	0.7066	0.9325	0.9858	0.9949 (86)
MIT	19.9267	20.1109	20.3731	20.7065	20.9157	20.9879	20.9982	20.9967	20.9542	20.6769	20.2517	19.9015 (87)
Th 2	19.9169	19.9197	19.9224	19.9351	19.9375	19.9486	19.9486	19.9506	19.9443	19.9375	19.9326	19.9276 (88)
util rest of house	0.9913	0.9811	0.9548	0.8649	0.6848	0.4617	0.3047	0.3494	0.6168	0.9021	0.9797	0.9930 (89)
MIT 2	18.6956	18.9302	19.2587	19.6611	19.8759	19.9429	19.9481	19.9497	19.9185	19.6403	19.1201	18.6714 (90)
Living area fraction	fLA = Living area / (4) =											0.4840 (91)
MIT	19.2915	19.5017	19.7981	20.1671	20.3792	20.4487	20.4564	20.4565	20.4198	20.1421	19.6678	19.2668 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2915	19.5017	19.7981	20.1671	20.3792	20.4487	20.4564	20.4565	20.4198	20.1421	19.6678	19.2668 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9895	0.9787	0.9532	0.8729	0.7130	0.5029	0.3505	0.3984	0.6590	0.9088	0.9778	0.9914	(94)
Useful gains	534.9732	604.5212	649.1282	667.3849	587.2006	412.7477	274.7546	287.8910	433.9018	528.9869	521.6516	514.1934	(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	1106.3064	1074.4606	975.7889	815.8162	626.8565	417.4757	275.2675	288.9120	453.1614	689.1778	912.3324	1099.5285	(97)
Space heating kWh	425.0719	315.7993	243.0356	106.8706	29.5040	0.0000	0.0000	0.0000	0.0000	119.1820	281.2902	435.4893	(98a)
Space heating requirement - total per year (kWh/year)												1956.2427	
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	425.0719	315.7993	243.0356	106.8706	29.5040	0.0000	0.0000	0.0000	0.0000	119.1820	281.2902	435.4893	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1956.2427	
Space heating per m2												(98c) / (4) =	31.9126 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	425.0719	315.7993	243.0356	106.8706	29.5040	0.0000	0.0000	0.0000	0.0000	119.1820	281.2902	435.4893 (98)
Space heating efficiency (main heating system 1)												

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Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating efficiency (main heating system 2)	460.5329	342.1444	263.3105	115.7861	31.9653	0.0000	0.0000	0.0000	0.0000	129.1246	304.7564	471.8194	(211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	210.2888	186.0668	198.0880	175.3567	170.7488	154.7051	153.3840	159.0581	160.3229	177.7394	187.6933	208.1675	(64)
Efficiency of water heater (217)m	85.6045	85.2360	84.5195	82.9848	81.0097	79.8000	79.8000	79.8000	79.8000	83.1841	84.9650	79.8000	(216)
Fuel for water heating, kWh/month	245.6514	218.2961	234.3696	211.3118	210.7759	193.8660	192.2106	199.3209	200.9059	213.6700	220.9067	242.9735	(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	18.4823	14.8272	13.3502	9.7809	7.5551	6.1726	6.8920	8.9585	11.6362	15.2673	17.2444	18.9959	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-16.5018	-24.4909	-37.0423	-43.9042	-49.3394	-46.7984	-46.2385	-42.6619	-36.6991	-28.9947	-18.5758	-14.1281	(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)	-5.9370	-12.7648	-25.8882	-39.6481	-53.1748	-53.6927	-53.0505	-44.5647	-32.2111	-18.4925	-8.0033	-4.6739	(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												2119.4396	(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												2584.2584	(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)												149.1624	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-757.4765	(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												4181.3838	(238)

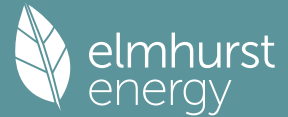
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2119.4396	0.2100	445.0823	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2584.2584	0.2100	542.6943	(264)
Space and water heating			987.7766	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	149.1624	0.1443	21.5287	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.3748	0.1335	-54.1217	
PV Unit electricity exported	-352.1017	0.1253	-44.1302	
Total			-98.2519	(269)
Total CO2, kg/year			922.9827	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.0600	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2119.4396	1.1300	2394.9667	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2584.2584	1.1300	2920.2119	(278)
Space and water heating			5315.1787	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	149.1624	1.5338	228.7903	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-405.3748	1.4934	-605.3746	
PV Unit electricity exported	-352.1017	0.4600	-161.9789	
Total			-767.3535	(283)
Total Primary energy kWh/year			4906.7163	(286)
Target Primary Energy Rate (TPER)			80.0400	(287)

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Property Reference	1 Bed 3rd Floor Flat - NW				Issued on Date	17/06/2024	
Assessment Reference	2 Bed 3rd Floor Flat_Copy			Prop Type Ref	1 Bed 3rd Floor Flat - NW		
Property	1 Bed 1st Floor Flat - NW, 1 Bed 1st Floor Flat - NW, North Hill , London, N10						
SAP Rating	78 C	DER	5.86	TER	18.88		
Environmental	96 A	% DER < TER				68.96	
CO ₂ Emissions (t/year)	0.32	DFEE	53.27	TFEE	57.57		
Compliance Check	See BREL	% DFEE < TFEE				7.46	
% DPER < TPER	38.43	DPER	61.98	TPER	100.66		
Assessor Details	Miss Nimco Ali				Assessor ID	R572-0001	
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	60.1800 (1b)	2.7000 (2b)	162.4860 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.1800		162.4860 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	162.4860 (5)

2. Ventilation rate

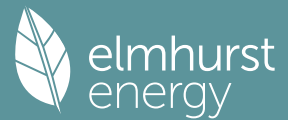
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (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
Glazing (Uw = 0.85)			15.1700	0.8221	12.4705		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
External Wall	63.6100	15.1700	48.4400	0.1600	7.7504	150.0000	7266.0000 (29a)
Corridor	31.9700	2.0000	29.9700	0.1800	5.3946	150.0000	4495.5000 (29a)
Roof	60.1800		60.1800	0.1000	6.0180	9.0000	541.6200 (30)
Total net area of external elements Aum(A, m ²)			155.7600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.6335		(33)
Party Wall 1			5.4000	0.0000	0.0000	70.0000	378.0000 (32)
Party Floor 1			60.1800			40.0000	2407.2000 (32d)
Internal Wall 1			58.3500			9.0000	525.1500 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15613.4700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							259.4462 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E7 Party floor between dwellings (in blocks of flats)	18.1600	0.0900	1.6344
E7 Party floor between dwellings (in blocks of flats)	11.8400	0.1100	1.3024
E16 Corner (normal)	13.5000	0.0900	1.2150
E16 Corner (normal)	2.7000	0.1400	0.3780
E17 Corner (inverted - internal area greater than external area)	5.4000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E18 Party wall between dwellings	2.7000	0.0700	0.1890
E18 Party wall between dwellings	2.7000	0.1000	0.2700
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.0000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	2.0000	0.0800	0.1600
E14 Flat roof	11.8400	0.1600	1.8944
E15 Flat roof with parapet	23.5600	0.3000	7.0680
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.4000	0.2500	1.3500
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740
E3 Sill	6.5300	0.1000	0.6530
E4 Jamb	27.6400	0.0600	1.6584
E24 Eaves (insulation at ceiling level - inverted)	7.9700	0.1600	1.2752
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			19.1788 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	52.8123 (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	15.3036	15.1176	14.9316	14.0016	13.8156	12.8856	12.8856	12.6997	13.2576	13.8156	14.1876	14.5596	(38)
Average = Sum(39)m / 12 =	68.1159	67.9299	67.7439	66.8139	66.6279	65.6980	65.6980	65.5120	66.0699	66.6279	66.9999	67.3719	(39)
												66.7674	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1319	1.1288	1.1257	1.1102	1.1071	1.0917	1.0917	1.0886	1.0979	1.1071	1.1133	1.1195	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

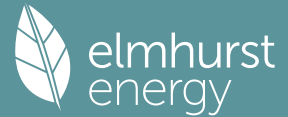
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.9867 (42)
Hot water usage for mixer showers												
Hot water usage for baths	57.5303	56.6658	55.4059	52.9954	51.2165	49.2327	48.1052	49.3555	50.7260	52.8560	55.3183	57.3099 (42a)
Hot water usage for other uses	24.8631	24.4939	23.9739	23.0152	22.2972	21.5012	21.0712	21.5876	22.1498	23.0016	23.9801	24.7791 (42b)
Average daily hot water use (litres/day)	34.9760	33.7041	32.4323	31.1604	29.8886	28.6167	28.6167	29.8886	31.1604	32.4323	33.7041	34.9760 (42c)
												107.8894 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	117.3695	114.8638	111.8121	107.1710	103.4024	99.3507	97.7931	100.8316	104.0362	108.2899	113.0025	117.0650 (44)
Energy content (annual)	185.8845	163.5645	171.8510	146.7117	139.1994	122.1632	118.2723	124.8506	128.2871	146.9483	160.9928	183.2955 (45)
Distribution loss (46)m = 0.15 x (45)m	27.8827	24.5347	25.7777	22.0068	20.8799	18.3245	17.7408	18.7276	19.2431	22.0423	24.1489	27.4943 (46)
Water storage loss:												
Store volume												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.4000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7560 (55)
Total storage loss	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360 (56)
If cylinder contains dedicated solar storage	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360 (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	232.5829	205.7437	218.5494	191.9037	185.8978	167.3552	164.9707	171.5490	173.4791	193.6467	206.1848	229.9939 (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	232.5829	205.7437	218.5494	191.9037	185.8978	167.3552	164.9707	171.5490	173.4791	193.6467	206.1848	229.9939 (64)
12Total per year (kWh/year)												2341.8570 (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	99.1653	88.1286	94.4992	84.9353	83.6425	76.7729	76.6843	78.8715	78.8091	86.2190	89.6837	98.3045 (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	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	87.4839	96.8572	87.4839	90.4001	87.4839	90.4001	87.4839	87.4839	90.4001	87.4839	90.4001	87.4839 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	173.4007	175.2000	170.6657	161.0127	148.8275	137.3751	129.7242	127.9248	132.4591	142.1122	154.2974	165.7498 (68)
Pumps, fans	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688 (71)
Total internal gains	133.2867	131.1437	127.0150	117.9656	112.4228	106.6290	103.0702	106.0101	109.4570	115.8858	124.5607	132.1297 (72)
	446.9721	456.0017	437.9655	422.1792	401.5349	387.2049	373.0791	374.2197	385.1170	398.2827	422.0589	438.1642 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W
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					W/m2		or Table 6b		or Table 6c		Table 6d	
Northeast				9.8400		11.2829		0.3200		0.7000		17.2345 (75)
Southwest				3.7800		36.7938		0.3200		0.7000		21.5898 (79)
Northwest				1.5500		11.2829		0.3200		0.7000		2.7148 (81)

Solar gains	41.5391	77.3827	123.4792	182.4983	231.3409	241.5126	227.9147	189.6651	143.6318	90.2700	50.9609	34.7679 (83)
Total gains	488.5112	533.3844	561.4447	604.6774	632.8759	628.7175	600.9938	563.8847	528.7489	488.5527	473.0199	472.9321 (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	63.6720	63.8463	64.0216	64.9127	65.0939	66.0154	66.0154	66.2028	65.6437	65.0939	64.7325	64.3751
alpha	5.2448	5.2564	5.2681	5.3275	5.3396	5.4010	5.4010	5.4135	5.3762	5.3396	5.3155	5.2917
util living area												
	0.9932	0.9881	0.9768	0.9362	0.8332	0.6415	0.4762	0.5259	0.7746	0.9488	0.9864	0.9942 (86)
Living	19.8681	20.0163	20.2463	20.5779	20.8391	20.9700	20.9949	20.9916	20.9192	20.6002	20.1910	19.8494
Non living	18.6754	18.8652	19.1569	19.5713	19.8632	19.9913	20.0061	20.0074	19.9505	19.6071	19.0975	18.6591
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	20.4209	20.0163	20.2463	20.5779	20.8391	20.9700	20.9949	20.9916	20.9192	20.6002	20.1910	20.0104 (87)
Th 2	19.9749	19.9774	19.9799	19.9925	19.9950	20.0076	20.0076	20.0102	20.0026	19.9950	19.9900	19.9849 (88)
util rest of house												
	0.9909	0.9842	0.9688	0.9140	0.7802	0.5535	0.3714	0.4172	0.6936	0.9262	0.9811	0.9923 (89)
MIT 2	19.4568	18.8652	19.1569	19.5713	19.8632	19.9913	20.0061	20.0074	19.9505	19.6071	19.0975	18.8980 (90)
Living area fraction									fLA = Living area / (4) =			0.3566 (91)
MIT	19.8006	19.2757	19.5454	19.9302	20.2112	20.3403	20.3587	20.3583	20.2959	19.9612	19.4874	19.2947 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8006	19.2757	19.5454	19.9302	20.2112	20.3403	20.3587	20.3583	20.2959	19.9612	19.4874	19.2947 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9905	0.9807	0.9645	0.9124	0.7927	0.5841	0.4089	0.4561	0.7193	0.9253	0.9777	0.9906 (94)
Useful gains	483.8650	523.0734	541.5210	551.6976	501.6502	367.2035	245.7430	257.2140	380.3355	452.0631	462.4724	468.4946 (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	1055.8398	976.5370	883.7445	736.9712	567.0845	377.1272	246.9396	259.3179	409.3633	623.7192	829.9549	1016.9570 (97)
Space heating kWh	425.5492	304.7276	254.6143	133.3970	48.6831	0.0000	0.0000	0.0000	0.0000	127.7121	264.5874	408.0560 (98a)
Space heating requirement - total per year (kWh/year)												1967.3268
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	425.5492	304.7276	254.6143	133.3970	48.6831	0.0000	0.0000	0.0000	0.0000	127.7121	264.5874	408.0560 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1967.3268
Space heating per m2										(98c) / (4) =		32.6907 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	617.5607	486.1648	497.8909	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8864	0.9410	0.9193	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	547.4238	457.4713	457.6925	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	689.7621	659.4677	617.3366	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	102.4836	150.2853	118.7752	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.5982 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	15.3266	22.4754	17.7630	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												55.5649 (107)

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 %)												261.3768 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	425.5492	304.7276	254.6143	133.3970	48.6831	0.0000	0.0000	0.0000	0.0000	127.7121	264.5874	408.0560 (98)
Space heating efficiency (main heating system 1)	261.3768	261.3768	261.3768	261.3768	261.3768	0.0000	0.0000	0.0000	0.0000	261.3768	261.3768	261.3768 (210)
Space heating fuel (main heating system)	162.8106	116.5856	97.4127	51.0363	18.6256	0.0000	0.0000	0.0000	0.0000	48.8613	101.2283	156.1179 (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	232.5829	205.7437	218.5494	191.9037	185.8978	167.3552	164.9707	171.5490	173.4791	193.6467	206.1848	229.9939 (64)

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Efficiency of water heater (217)m	171.5241	171.5241	171.5241	171.5241	171.5241	171.5241	171.5241	171.5241	171.5241	171.5241	171.5241	171.5241	(216)
Fuel for water heating, kWh/month	135.5978	119.9503	127.4162	111.8815	108.3800	97.5695	96.1793	100.0145	101.1398	112.8977	120.2075	134.0884	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	4.7014	6.8943	5.4488	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.2063	11.0250	12.2063	11.8125	12.2063	11.8125	12.2063	12.2063	11.8125	12.2063	11.8125	12.2063	(231)
Lighting	18.1774	14.5826	13.1300	9.6196	7.4305	6.0708	6.7783	8.8107	11.4443	15.0155	16.9600	18.6826	(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												752.6785	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												171.5241	
Water heating fuel used												1365.3225	(219)
Space cooling fuel												17.0445	(221)

Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)													
mechanical ventilation fans (SFP = 0.7250)												143.7189	(230a)
Total electricity for the above, kWh/year												143.7189	(231)
Electricity for lighting (calculated in Appendix L)												146.7023	(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												2425.4666	(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	752.6785	0.1558	117.2306	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1365.3225	0.1409	192.3811	(264)
Space and water heating			309.6117	(265)
Space cooling	17.0445	0.1138	1.9397	(266)
Pumps, fans and electric keep-hot	143.7189	0.1387	19.9356	(267)
Energy for lighting	146.7023	0.1443	21.1737	(268)
Total CO2, kg/year			352.6607	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.8600	(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	752.6785	1.5766	1186.6828	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1365.3225	1.5210	2076.6786	(278)
Space and water heating			3263.3615	(279)
Space cooling	17.0445	1.4195	24.1948	(280)
Pumps, fans and electric keep-hot	143.7189	1.5128	217.4179	(281)
Energy for lighting	146.7023	1.5338	225.0169	(282)
Total Primary energy kWh/year			3729.9910	(286)
Dwelling Primary energy Rate (DPER)			61.9800	(287)

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

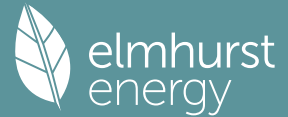
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	60.1800	2.7000	162.4860	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	60.1800			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	162.4860	(5)

2. Ventilation rate

m3 per hour

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Number of open chimneys
Number of open flues
Number of chimneys / flues attached to closed fire
Number of flues attached to solid fuel boiler
Number of flues attached to other heater
Number of blocked chimneys
Number of intermittent extract fans
Number of passive vents
Number of flueless gas fires

0 * 80 = 0.0000 (6a)
0 * 20 = 0.0000 (6b)
0 * 10 = 0.0000 (6c)
0 * 20 = 0.0000 (6d)
0 * 35 = 0.0000 (6e)
0 * 20 = 0.0000 (6f)
2 * 10 = 20.0000 (7a)
0 * 10 = 0.0000 (7b)
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) = 0.1231 (8)
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered
Blower Door
Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3451 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4400	0.4314	0.4228	0.3796	0.3710	0.3279	0.3279	0.3192	0.3451	0.3710	0.3882	0.4055 (22b)
	0.5968	0.5930	0.5894	0.5721	0.5688	0.5537	0.5537	0.5510	0.5595	0.5688	0.5754	0.5822 (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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			13.0400	1.1450	14.9313		(27)
External Wall	63.6100	13.0400	50.5700	0.1800	9.1026		(29a)
Corridor	31.9700	2.0000	29.9700	0.1800	5.3946		(29a)
Roof	60.1800		60.1800	0.1100	6.6198		(30)
Total net area of external elements Aum(A, m2)			155.7600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.0483		(33)
Party Wall 1			5.4000	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 259.4462 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	18.1600	0.0700	1.2712
E7 Party floor between dwellings (in blocks of flats)	11.8400	0.0700	0.8288
E16 Corner (normal)	13.5000	0.0900	1.2150
E16 Corner (normal)	2.7000	0.0900	0.2430
E17 Corner (inverted - internal area greater than external area)	5.4000	-0.0900	-0.4860
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E18 Party wall between dwellings	2.7000	0.0600	0.1620
E18 Party wall between dwellings	2.7000	0.0600	0.1620
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.0000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	2.0000	0.1200	0.2400
E14 Flat roof	11.8400	0.0800	0.9472
E15 Flat roof with parapet	23.5600	0.5600	13.1936
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.4000	0.0200	0.1080
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740
E3 Sill	6.5300	0.0500	0.3265
E4 Jamb	27.6400	0.0500	1.3820
E24 Eaves (insulation at ceiling level - inverted)	7.9700	0.2400	1.9128

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 21.6371 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 59.6854 (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	32.0009	31.7993	31.6018	30.6738	30.5002	29.6919	29.6919	29.5422	30.0032	30.5002	30.8514	31.2186 (38)
Heat transfer coeff	91.6863	91.4847	91.2871	90.3592	90.1855	89.3773	89.3773	89.2276	89.6886	90.1855	90.5368	90.9040 (39)
Average = Sum(39)m / 12 =												90.3583

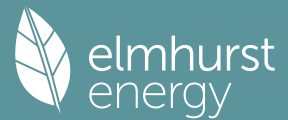
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.5235	1.5202	1.5169	1.5015	1.4986	1.4852	1.4852	1.4827	1.4903	1.4986	1.5044	1.5105 (40)
HLP (average)												1.5015
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.9867 (42)
Hot water usage for mixer showers
57.5303 56.6658 55.4059 52.9954 51.2165 49.2327 48.1052 49.3555 50.7260 52.8560 55.3183 57.3099 (42a)
Hot water usage for baths
24.8631 24.4939 23.9739 23.0152 22.2972 21.5012 21.0712 21.5876 22.1498 23.0016 23.9801 24.7791 (42b)
Hot water usage for other uses
34.9760 33.7041 32.4323 31.1604 29.8886 28.6167 28.6167 29.8886 31.1604 32.4323 33.7041 34.9760 (42c)
Average daily hot water use (litres/day) 107.8894 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	117.3695	114.8638	111.8121	107.1710	103.4024	99.3507	97.7931	100.8316	104.0362	108.2899	113.0025	117.0650 (44)
Energy conte	185.8845	163.5645	171.8510	146.7117	139.1994	122.1632	118.2723	124.8506	128.2871	146.9483	160.9928	183.2955 (45)
Energy content (annual)										Total = Sum(45)m =		1792.0210
Distribution loss (46)m = 0.15 x (45)m	27.8827	24.5347	25.7777	22.0068	20.8799	18.3245	17.7408	18.7276	19.2431	22.0423	24.1489	27.4943 (46)
Water storage loss:												
Store volume												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5520 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8381 (55)
Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (56)

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If cylinder contains dedicated solar storage											
Primary loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422 (57)
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	23.2624 (59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
WWHRS	235.1272	208.0417	221.0937	194.3659	188.4421	169.8174	167.5149	174.0933	175.9413	196.1910	208.6470 (62)
PV diverter	-26.3005	-23.2603	-24.3569	-20.1685	-18.7963	-16.0841	-15.0763	-16.0321	-16.6412	-19.6182	-22.2250 (63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	208.8267	184.7814	196.7368	174.1975	169.6458	153.7333	152.4386	158.0611	159.3000	176.5728	186.4219 (64)
Electric shower(s)	Total per year (kWh/year) = Sum(64)m =										2127.4409 (64)
	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	101.2007	89.9670	96.5346	86.9050	85.6780	78.7426	78.7197	80.9070	80.7788	88.2545	91.6535 (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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360	99.3360 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	87.5420	87.5420	87.5420	87.5420	87.5420	87.5420	87.5420	87.5420	87.5420	87.5420	87.5420 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	173.4007	175.2000	170.6657	161.0127	148.8275	137.3751	129.7242	127.9248	132.4591	142.1122	154.2974 (68)
Pumps, fans	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336	32.9336 (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 (70)
Water heating gains (Table 5)	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688	-79.4688 (71)
Total internal gains	136.0225	133.8795	129.7508	120.7014	115.1585	109.3648	105.8060	108.7459	112.1928	118.6216	127.2965 (72)
	452.7659	461.8017	443.7593	427.9749	407.3288	390.0007	375.8729	377.0135	387.9128	404.0765	427.8547 (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	8.4600	11.2829	0.6300	0.7000	0.7700	29.1719 (75)
Southwest	3.2500	36.7938	0.6300	0.7000	0.7700	36.5452 (79)
Northwest	1.3300	11.2829	0.6300	0.7000	0.7700	4.5861 (81)
Solar gains	70.3032	130.9654	208.9764	308.8542	391.5092	408.7214 (83)
Total gains	523.0691	592.7671	652.7357	736.8291	798.8380	798.7220 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)											
Utilisation factor for gains for living area, nil,m (see Table 9a)											21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
tau	47.3034	47.4076	47.5102	47.9982	48.0906	48.5255	48.5255	48.6069	48.3570	48.0906	47.9040
alpha	4.1536	4.1605	4.1673	4.1999	4.2060	4.2350	4.2350	4.2405	4.2238	4.2060	4.1936
util living area	0.9924	0.9863	0.9727	0.9287	0.8271	0.6563	0.5007	0.5609	0.8006	0.9514	0.9860 (86)
MIT	19.3580	19.5581	19.8813	20.3339	20.7100	20.9219	20.9805	20.9690	20.8146	20.3351	19.7768 (87)
Th 2	19.6699	19.6724	19.6748	19.6864	19.6886	19.6986	19.6986	19.7005	19.6948	19.6886	19.6842 (88)
util rest of house	0.9897	0.9815	0.9626	0.9017	0.7641	0.5465	0.3604	0.4156	0.7066	0.9272	0.9802 (89)
MIT 2	17.8138	18.0692	18.4778	19.0381	19.4584	19.6584	19.6935	19.6912	19.5777	19.0544	18.3571 (90)
Living area fraction	18.3645	18.6002	18.9782	19.5001	19.9047	20.1090	20.1525	20.1469	fLA = Living area / (4) =	19.5111	18.8634 (91)
MIT	18.3645	18.6002	18.9782	19.5001	19.9047	20.1090	20.1525	20.1469	20.0187	19.5111	18.8634 (92)
Temperature adjustment	18.3645	18.6002	18.9782	19.5001	19.9047	20.1090	20.1525	20.1469	20.0187	19.5111	18.8634 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Useful gains	0.9859	0.9761	0.9556	0.8970	0.7758	0.5834	0.4109	0.4677	0.7331	0.9230	0.9750
Ext temp.	515.6707	578.6094	623.7272	660.9293	619.7244	465.9362	312.9079	326.4785	462.5539	513.9493	501.2710 (94)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000 (95)
Space heating kWh	1289.5184	1253.3550	1139.1036	957.8207	739.9460	492.3788	317.5086	334.3254	530.8432	803.6524	1065.0172 (96)
Space heating requirement - total per year (kWh/year)	575.7426	453.4291	383.4401	213.7618	89.4449	0.0000	0.0000	0.0000	0.0000	215.5391	405.8973 (97)
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 (98a)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh	575.7426	453.4291	383.4401	213.7618	89.4449	0.0000	0.0000	0.0000	0.0000	215.5391	405.8973 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	575.7426	453.4291	383.4401	213.7618	89.4449	0.0000	0.0000	0.0000	0.0000	215.5391	405.8973 (98c)
Space heating per m2	(98c) / (4) =										48.5823 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
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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	575.7426	453.4291	383.4401	213.7618	89.4449	0.0000	0.0000	0.0000	0.0000	215.5391	405.8973	586.4258 (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)	623.7732	491.2558	415.4280	231.5946	96.9067	0.0000	0.0000	0.0000	0.0000	233.5202	439.7587	635.3476 (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	208.8267	184.7814	196.7368	174.1975	169.6458	153.7333	152.4386	158.0611	159.3000	176.5728	186.4219	206.7247 (64)
Efficiency of water heater	86.2120	85.9920	85.5290	84.5199	82.6934	79.8000	79.8000	79.8000	79.8000	84.5081	85.7560	79.8000 (216)
Fuel for water heating, kWh/month	242.2246	214.8820	230.0235	206.1023	205.1505	192.6483	191.0259	198.0716	199.6241	208.9419	217.3865	86.2642 (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	18.1895	14.5923	13.1387	9.6260	7.4354	6.0748	6.7828	8.8166	11.4518	15.0254	16.9712	18.6950 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-16.2096	-24.0623	-36.4020	-43.1558	-48.5087	-46.0156	-45.4664	-41.9452	-36.0753	-28.4930	-18.2490	-13.8774 (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)	-5.8192	-12.5127	-25.3787	-38.8700	-52.1325	-52.6395	-52.0084	-43.6876	-31.5758	-18.1266	-7.8444	-4.5810 (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												3167.5847 (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												2545.7224 (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)												146.7996 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-743.6368 (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												5202.4699 (238)

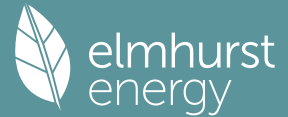
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3167.5847	0.2100	665.1928 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2545.7224	0.2100	534.6017 (264)
Space and water heating			1199.7945 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	146.7996	0.1443	21.1877 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-398.4604	0.1335	-53.1964
PV Unit electricity exported	-345.1764	0.1253	-43.2619
Total			-96.4584 (269)
Total CO2, kg/year			1136.4531 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			18.8800 (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	3167.5847	1.1300	3579.3707 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2545.7224	1.1300	2876.6664 (278)
Space and water heating			6456.0371 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	146.7996	1.5338	225.1662 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-398.4604	1.4934	-595.0409
PV Unit electricity exported	-345.1764	0.4600	-158.7919
Total			-753.8328 (283)
Total Primary energy kWh/year			6057.4713 (286)
Target Primary Energy Rate (TPER)			100.6600 (287)

Full SAP Calculation Printout



Property Reference	1 Bed 3rd Floor Flat - SE				Issued on Date	17/06/2024
Assessment Reference	1 Bed 3rd Floor Flat - SE	Prop Type Ref		1 Bed 3rd Floor Flat - SE		
Property	1 Bed 3rd Floor Flat - SE, 1 Bed 3rd Floor Flat - SE, North Hill , London, N10					
SAP Rating	78 C	DER	6.25	TER	20.32	
Environmental	96 A	% DER < TER				69.24
CO ₂ Emissions (t/year)	0.31	DFEE	56.99	TFEE	61.47	
Compliance Check	See BREL	% DFEE < TFEE				7.29
% DPER < TPER	39.08	DPER	66.09	TPER	108.49	
Assessor Details	Miss Nimco Ali				Assessor ID	R572-0001
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	53.8600 (1b)	3.0000 (2b)	161.5800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	53.8600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	161.5800 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	1	(19)

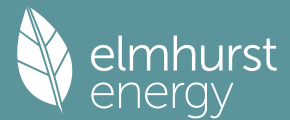
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1388 (21)

	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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (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
Glazing (Uw = 0.85)			15.1700	0.8221	12.4705		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
External Wall	68.9000	15.1700	53.7300	0.1600	8.5968	150.0000	8059.5000 (29a)
Corridor	21.7100	2.0000	19.7100	0.1800	3.5478	150.0000	2956.5000 (29a)
Roof	53.8600		53.8600	0.1000	5.3860	9.0000	484.7400 (30)
Total net area of external elements Aum(A, m ²)			144.4700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	32.0011		(33)
Party Wall 1			5.4000	0.0000	0.0000	70.0000	378.0000 (32)
Party Floor 1			61.3000			40.0000	2452.0000 (32d)
Internal Wall			42.7700			9.0000	384.9300 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14715.6700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							273.2208 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E7 Party floor between dwellings (in blocks of flats)	22.0000	0.0900	1.9800
E7 Party floor between dwellings (in blocks of flats)	8.0400	0.1100	0.8844
E16 Corner (normal)	12.0000	0.0900	1.0800
E16 Corner (normal)	5.4000	0.1400	0.7560
E17 Corner (inverted - internal area greater than external area)	8.1000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E18 Party wall between dwellings	2.7000	0.0700	0.1890
E18 Party wall between dwellings	2.7000	0.1000	0.2700
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.0000	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	3.5300	0.2500	0.8825
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740
E3 Sill	6.5300	0.1000	0.6530
E4 Jamb	27.6400	0.0600	1.6584
P4 Party wall - Roof (insulation at ceiling level)	2.0000	0.0800	0.1600
E14 Flat roof	8.0400	0.1600	1.2864
E15 Flat roof with parapet	25.5200	0.3000	7.6560
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			17.5867 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.5878 (37)

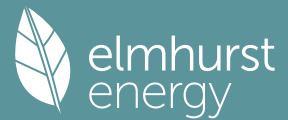
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	15.2183	15.0333	14.8483	13.9236	13.7386	12.8138	12.8138	12.6288	13.1837	13.7386	14.1085	14.4784 (38)
Average = Sum(39)m / 12 =	64.8061	64.6211	64.4361	63.5114	63.3264	62.4016	62.4016	62.2166	62.7715	63.3264	63.6963	64.0662 (39)
												63.4651
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2032	1.1998	1.1964	1.1792	1.1758	1.1586	1.1586	1.1552	1.1655	1.1758	1.1826	1.1895 (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												1.8039 (42)
Hot water usage for mixer showers	54.4648	53.6463	52.4535	50.1715	48.4874	46.6093	45.5418	46.7255	48.0230	50.0395	52.3706	54.2561 (42a)
Hot water usage for baths	23.5449	23.1952	22.7028	21.7948	21.1150	20.3612	19.9540	20.4429	20.9753	21.7820	22.7086	23.4653 (42b)
Hot water usage for other uses	33.1036	31.8998	30.6961	29.4923	28.2885	27.0848	27.0848	28.2885	29.4923	30.6961	31.8998	33.1036 (42c)
Average daily hot water use (litres/day)												102.1386 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	111.1132	108.7413	105.8524	101.4586	97.8909	94.0552	92.5806	95.4570	98.4907	102.5176	106.9790	110.8249 (44)
Energy content (annual)	175.9761	154.8461	162.6911	138.8918	131.7800	115.6519	111.9682	118.1957	121.4489	139.1154	152.4112	173.5250 (45)
Distribution loss (46)m = 0.15 x (45)m	26.3964	23.2269	24.4037	20.8338	19.7670	17.3478	16.7952	17.7294	18.2173	20.8673	22.8617	26.0288 (46)
Water storage loss:												180.0000 (47)
Store volume												1.4000 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.7560 (55)
Enter (49) or (54) in (55)												
Total storage loss	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360 (56)
If cylinder contains dedicated solar storage	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360 (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	222.6745	197.0253	209.3895	184.0838	178.4784	160.8439	158.6666	164.8941	166.6409	185.8138	197.6032	220.2234 (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	222.6745	197.0253	209.3895	184.0838	178.4784	160.8439	158.6666	164.8941	166.6409	185.8138	197.6032	220.2234 (64)
12Total per year (kWh/year)												2246.3374 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	95.8708	85.2297	91.4535	82.3351	81.1756	74.6079	74.5881	76.6588	76.5353	83.6146	86.8303	95.0558 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.3110	87.8087	79.3110	81.9547	79.3110	81.9547	79.3110	79.3110	81.9547	79.3110	81.9547	79.3110 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.2430	158.8747	154.7629	146.0093	134.9596	124.5743	117.6363	116.0046	120.1165	128.8700	139.9198	150.3050 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194 (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)	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554 (71)
Water heating gains (Table 5)	128.8586	126.8299	122.9214	114.3543	109.1070	103.6220	100.2529	103.0360	106.2991	112.3852	120.5977	127.7632 (72)
Total internal gains	415.4709	423.5715	407.0536	392.3767	373.4358	360.2094	347.2585	348.4100	358.4286	370.6245	392.5305	407.4375 (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							

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Northeast			9.8400	11.2829	0.3200	0.7000	0.7700	17.2345 (75)
Southeast			1.5500	36.7938	0.3200	0.7000	0.7700	8.8529 (77)
Southwest			3.7800	36.7938	0.3200	0.7000	0.7700	21.5898 (79)

Solar gains	47.6772	86.9365	134.1560	191.7126	237.9973	246.5090	233.4026	197.3077	153.8412	100.1832	58.1488	40.1272 (83)
Total gains	463.1481	510.5081	541.2096	584.0893	611.4332	606.7183	580.6611	545.7177	512.2698	470.8077	450.6793	447.5647 (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	63.0757	63.2562	63.4378	64.3615	64.5495	65.5061	65.5061	65.7008	65.1201	64.5495	64.1746	63.8041
alpha	5.2050	5.2171	5.2292	5.2908	5.3033	5.3671	5.3671	5.3801	5.3413	5.3033	5.2783	5.2536
util living area	0.9931	0.9874	0.9750	0.9316	0.8252	0.6326	0.4683	0.5166	0.7641	0.9453	0.9859	0.9942 (86)
Living	19.8564	20.0139	20.2519	20.5861	20.8442	20.9712	20.9951	20.9920	20.9229	20.6058	20.1867	19.8372
Non living	18.6128	18.8143	19.1152	19.5313	19.8157	19.9384	19.9519	19.9536	19.9004	19.5647	19.0449	18.5964
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	20.4150	20.0139	20.2519	20.5861	20.8442	20.9712	20.9951	20.9920	20.9229	20.6058	20.1867	19.9998 (87)
Th 2	19.9174	19.9202	19.9229	19.9367	19.9394	19.9533	19.9533	19.9560	19.9477	19.9394	19.9339	19.9284 (88)
util rest of house	0.9907	0.9831	0.9659	0.9069	0.7680	0.5403	0.3594	0.4035	0.6776	0.9202	0.9802	0.9921 (89)
MIT 2	19.3973	18.8143	19.1152	19.5313	19.8157	19.9384	19.9519	19.9536	19.9004	19.5647	19.0449	18.8364 (90)
Living area fraction									fLA = Living area / (4) =			0.3684 (91)
MIT	19.7722	19.2562	19.5339	19.9199	20.1946	20.3189	20.3362	20.3361	20.2770	19.9482	19.4655	19.2650 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7722	19.2562	19.5339	19.9199	20.1946	20.3189	20.3362	20.3361	20.2770	19.9482	19.4655	19.2650 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9903	0.9796	0.9618	0.9065	0.7830	0.5737	0.3997	0.4454	0.7068	0.9205	0.9768	0.9905 (94)
Useful gains	458.6382	500.0778	520.5340	529.4633	478.7431	348.0513	232.1012	243.0699	362.0571	433.3637	440.2419	443.2943 (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	1002.6921	927.7124	839.8545	699.8863	537.9314	356.8669	233.1460	244.8926	387.7427	591.9890	787.6368	965.1554 (97)
Space heating kWh	404.7761	287.3705	237.5745	122.7046	44.0361	0.0000	0.0000	0.0000	0.0000	118.0172	250.1244	388.2646 (98a)
Space heating requirement - total per year (kWh/year)												1852.8679
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	404.7761	287.3705	237.5745	122.7046	44.0361	0.0000	0.0000	0.0000	0.0000	118.0172	250.1244	388.2646 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1852.8679
Space heating per m2										(98c) / (4) =		34.4016 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	586.5751	461.7719	472.8465	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8922	0.9446	0.9245	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	523.3184	436.1807	437.1507	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	667.8834	639.3632	599.6272	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	104.0868	151.1678	120.8825	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.6313 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	16.4266	23.8568	19.0773	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												59.3607 (107)

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 %)												258.8165 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	404.7761	287.3705	237.5745	122.7046	44.0361	0.0000	0.0000	0.0000	0.0000	118.0172	250.1244	388.2646 (98)
Space heating efficiency (main heating system 1)	258.8165	258.8165	258.8165	258.8165	258.8165	0.0000	0.0000	0.0000	0.0000	258.8165	258.8165	258.8165 (210)
Space heating fuel (main heating system)	156.3950	111.0325	91.7926	47.4099	17.0144	0.0000	0.0000	0.0000	0.0000	45.5988	96.6416	150.0154 (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	222.6745	197.0253	209.3895	184.0838	178.4784	160.8439	158.6666	164.8941	166.6409	185.8138	197.6032	220.2234 (64)
Efficiency of water heater												172.1537 (216)

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(217)m	172.1537	172.1537	172.1537	172.1537	172.1537	172.1537	172.1537	172.1537	172.1537	172.1537	172.1537	172.1537	(217)
Fuel for water heating, kWh/month	129.3463	114.4473	121.6294	106.9299	103.6739	93.4304	92.1656	95.7830	96.7977	107.9348	114.7830	127.9226	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	5.0388	7.3180	5.8519	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.1382	10.9635	12.1382	11.7466	12.1382	11.7466	12.1382	11.7466	12.1382	11.7466	12.1382	12.1382	(231)
Lighting	16.4793	13.2203	11.9034	8.7209	6.7363	5.5036	6.1451	7.9876	10.3751	13.6127	15.3755	16.9373	(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												715.9003	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												172.1537	
Water heating fuel used												1304.8440	(219)
Space cooling fuel												18.2088	(221)

Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)													
mechanical ventilation fans (SFP = 0.7250)												142.9175	(230a)
Total electricity for the above, kWh/year												142.9175	(231)
Electricity for lighting (calculated in Appendix L)												132.9971	(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												2314.8677	(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	715.9003	0.1559	111.5742 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)			183.8220 (264)
Space and water heating			295.3963 (265)
Space cooling	18.2088	0.1138	2.0724 (266)
Pumps, fans and electric keep-hot	142.9175	0.1387	19.8244 (267)
Energy for lighting	132.9971	0.1443	19.1956 (268)
Total CO2, kg/year			336.4887 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.2500 (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	715.9003	1.5770	1128.9609 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)			1984.5498 (278)
Space and water heating			3113.5108 (279)
Space cooling	18.2088	1.4195	25.8482 (280)
Pumps, fans and electric keep-hot	142.9175	1.5128	216.2056 (281)
Energy for lighting	132.9971	1.5338	203.9954 (282)
Total Primary energy kWh/year			3559.5600 (286)
Dwelling Primary energy Rate (DPER)			66.0900 (287)

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

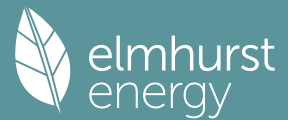
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	53.8600 (1b)	x 3.0000 (2b)	= 161.5800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	53.8600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 161.5800 (5)

2. Ventilation rate

m3 per hour

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

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000	Air changes per hour	0.1238 (8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			5.0000	(17)
Infiltration rate			0.3738	(18)
Number of sides sheltered			1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3457	(21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	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)
Effective ac	0.4408	0.4322	0.4235	0.3803	0.3717	0.3285	0.3285	0.3198	0.3457	0.3717	0.3890	0.4062	(22b)
	0.5972	0.5934	0.5897	0.5723	0.5691	0.5539	0.5539	0.5511	0.5598	0.5691	0.5756	0.5825	(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			2.0000	1.0000	2.0000			(26)
TER Opening Type (Uw = 1.20)			11.4700	1.1450	13.1336			(27)
External Wall	68.9000	11.4700	57.4300	0.1800	10.3374			(29a)
Corridor	21.7100	2.0000	19.7100	0.1800	3.5478			(29a)
Roof	53.8600		53.8600	0.1100	5.9246			(30)
Total net area of external elements Aum(A, m2)			144.4700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.9434			(33)
Party Wall 1			5.4000	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							273.2208	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E7 Party floor between dwellings (in blocks of flats)	22.0000	0.0700	1.5400	
E7 Party floor between dwellings (in blocks of flats)	8.0400	0.0700	0.5628	
E16 Corner (normal)	12.0000	0.0900	1.0800	
E16 Corner (normal)	5.4000	0.0900	0.4860	
E17 Corner (inverted - internal area greater than external area)	8.1000	-0.0900	-0.7290	
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430	
E18 Party wall between dwellings	2.7000	0.0600	0.1620	
E18 Party wall between dwellings	2.7000	0.0600	0.1620	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	2.0000	0.0000	0.0000	
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	3.5300	0.0200	0.0706	
E2 Other lintels (including other steel lintels)	7.4800	0.0500	0.3740	
E3 Sill	6.5300	0.0500	0.3265	
E4 Jamb	27.6400	0.0500	1.3820	
P4 Party wall - Roof (insulation at ceiling level)	2.0000	0.1200	0.2400	
E14 Flat roof	8.0400	0.0800	0.6432	
E15 Flat roof with parapet	25.5200	0.5600	14.2912	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			20.3483	(36)
Point Thermal bridges			0.0000	(36a)
Total fabric heat loss			(33) + (36) + (36a) =	55.2917 (37)

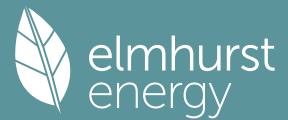
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	31.8416	31.6404	31.4432	30.5170	30.3437	29.5370	29.5370	29.3876	29.8477	30.3437	30.6942	31.0607	(38)
Average = Sum(39)m / 12 =	87.1333	86.9321	86.7349	85.8087	85.6354	84.8287	84.8287	84.6793	85.1394	85.6354	85.9859	86.3524	(39)
												85.8078	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.6178	1.6140	1.6104	1.5932	1.5900	1.5750	1.5750	1.5722	1.5808	1.5900	1.5965	1.6033	(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													1.8039 (42)
Hot water usage for mixer showers													
54.4648	53.6463	52.4535	50.1715	48.4874	46.6093	45.5418	46.7255	48.0230	50.0395	52.3706	54.2561	54.2561	(42a)
Hot water usage for baths													
23.5449	23.1952	22.7028	21.7948	21.1150	20.3612	19.9540	20.4429	20.9753	21.7820	22.7086	23.4653	23.4653	(42b)
Hot water usage for other uses													
33.1036	31.8998	30.6961	29.4923	28.2885	27.0848	27.0848	28.2885	29.4923	30.6961	31.8998	33.1036	33.1036	(42c)
Average daily hot water use (litres/day)												102.1386	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
111.1132	108.7413	105.8524	101.4586	97.8909	94.0552	92.5806	95.4570	98.4907	102.5176	106.9790	110.8249	110.8249	(44)
Energy conte	175.9761	154.8461	162.6911	138.8918	131.7800	115.6519	111.9682	118.1957	121.4489	139.1154	152.4112	173.5250	(45)
Energy content (annual)										Total = Sum(45)m =	1696.5014		
Distribution loss (46)m = 0.15 x (45)m													
26.3964	23.2269	24.4037	20.8338	19.7670	17.3478	16.7952	17.7294	18.2173	20.8673	22.8617	26.0288	26.0288	(46)
Water storage loss:													
Store volume												180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5520	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8381	(55)
Total storage loss													
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)
If cylinder contains dedicated solar storage													
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	(57)

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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												
	225.2188	199.3233	211.9338	186.5460	181.0227	163.3061	161.2108	167.4383	169.1031	188.3580	200.0654	222.7677 (62)
WWHRS	-24.8990	-22.0209	-23.0590	-19.0938	-17.7947	-15.2271	-14.2729	-15.1778	-15.7545	-18.5728	-21.0407	-24.4379 (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	200.3198	177.3025	188.8748	167.4522	163.2280	148.0790	146.9379	152.2605	153.3486	169.7852	179.0247	198.3298 (64)
												2044.9430 (64)
12Total per year (kWh/year)												2045 (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 =												
Heat gains from water heating, kWh/month	97.9062	87.0681	93.4889	84.3049	83.2110	76.5776	76.6235	78.6942	78.5051	85.6500	88.8001	97.0912 (65)

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943	90.1943 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	79.4566	87.9698	79.4566	82.1051	79.4566	82.1051	79.4566	79.4566	82.1051	79.4566	82.1051	79.4566 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	157.2430	158.8747	154.7629	146.0093	134.9596	124.5743	117.6363	116.0046	120.1165	128.8700	139.9198	150.3050 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194	32.0194 (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)	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554	-72.1554 (71)
Water heating gains (Table 5)	131.5944	129.5657	125.6572	117.0901	111.8427	106.3578	102.9886	105.7718	109.0349	115.1210	123.3335	130.4989 (72)
Total internal gains	421.3522	429.4684	412.9349	398.2628	379.3171	363.0955	350.1398	351.2913	361.3147	376.5058	398.4166	413.3188 (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				7.4400	11.2829	0.6300	0.7000	0.7700	25.6547 (75)			
Southeast				1.1700	36.7938	0.6300	0.7000	0.7700	13.1563 (77)			
Southwest				2.8600	36.7938	0.6300	0.7000	0.7700	32.1598 (79)			
Solar gains	70.9707	129.4109	199.7001	285.3771	354.2750	366.9451	347.4354	293.7057	229.0030	149.1294	86.5584	59.7320 (83)
Total gains	492.3230	558.8793	612.6350	683.6399	733.5921	730.0406	697.5752	644.9970	590.3177	525.6353	484.9751	473.0508 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	46.9130	47.0216	47.1285	47.6372	47.7336	48.1876	48.1876	48.2726	48.0117	47.7336	47.5390	47.3372
alpha	4.1275	4.1348	4.1419	4.1758	4.1822	4.2125	4.2125	4.2182	4.2008	4.1822	4.1693	4.1558
util living area	0.9924	0.9864	0.9733	0.9326	0.8387	0.6740	0.5165	0.5732	0.8058	0.9517	0.9860	0.9936 (86)
MIT	19.3397	19.5419	19.8625	20.3090	20.6874	20.9121	20.9776	20.9657	20.8068	20.3265	19.7642	19.3115 (87)
Th 2	19.6003	19.6031	19.6057	19.6183	19.6207	19.6317	19.6317	19.6338	19.6275	19.6207	19.6159	19.6109 (88)
util rest of house	0.9896	0.9813	0.9628	0.9052	0.7742	0.5577	0.3652	0.4179	0.7071	0.9261	0.9799	0.9912 (89)
MIT 2	17.7356	17.9936	18.3989	18.9525	19.3764	19.5881	19.6263	19.6242	19.5095	18.9882	18.2868	17.7068 (90)
Living area fraction									fLA = Living area / (4) =			0.3684 (91)
MIT	18.3265	18.5639	18.9380	19.4522	19.8593	20.0758	20.1241	20.1184	19.9874	19.4812	18.8310	18.2979 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3265	18.5639	18.9380	19.4522	19.8593	20.0758	20.1241	20.1184	19.9874	19.4812	18.8310	18.2979 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9859	0.9761	0.9561	0.9011	0.7869	0.5982	0.4216	0.4757	0.7366	0.9227	0.9749	0.9879 (94)
Useful gains	485.3634	545.4997	585.7631	616.0588	577.2585	436.7172	294.0717	306.8534	434.8353	485.0160	472.8125	467.3158 (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	1222.1739	1187.8344	1078.8118	905.4690	698.7247	464.5034	298.9429	314.8707	501.2491	760.5407	1008.7006	1217.3876 (97)
Space heating kWh	548.1870	431.6489	366.8282	208.3754	90.3708	0.0000	0.0000	0.0000	0.0000	204.9904	385.8394	558.0534 (98a)
Space heating requirement - total per year (kWh/year)												2794.2935
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	548.1870	431.6489	366.8282	208.3754	90.3708	0.0000	0.0000	0.0000	0.0000	204.9904	385.8394	558.0534 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2794.2935
Space heating per m2										(98c) / (4) =		51.8807 (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)

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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	548.1870	431.6489	366.8282	208.3754	90.3708	0.0000	0.0000	0.0000	0.0000	204.9904	385.8394	558.0534	(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)	593.9187	467.6586	397.4304	225.7588	97.9099	0.0000	0.0000	0.0000	0.0000	222.0914	418.0275	604.6082	(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	200.3198	177.3025	188.8748	167.4522	163.2280	148.0790	146.9379	152.2605	153.3486	169.7852	179.0247	198.3298	(64)
Efficiency of water heater	86.1982	85.9767	85.5217	84.5512	82.7901	79.8000	79.8000	79.8000	79.8000	84.4834	85.7354	79.8000	(216)
Fuel for water heating, kWh/month	232.3943	206.2215	220.8501	198.0482	197.1587	185.5627	184.1327	190.8026	192.1661	200.9687	208.8106	229.9492	(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	16.5095	13.2445	11.9252	8.7369	6.7487	5.5137	6.1564	8.0023	10.3942	13.6377	15.4037	16.9684	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-14.5561	-21.6342	-32.7707	-38.9066	-43.7879	-41.5654	-41.0771	-37.8730	-32.5338	-25.6487	-16.3991	-12.4594	(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)	-5.1593	-11.0998	-22.5219	-34.5050	-46.2842	-46.7291	-46.1612	-38.7668	-28.0127	-16.0750	-6.9540	-4.0605	(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												3027.4036	(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												2447.0655	(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)												133.2411	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-665.5414	(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												5028.1688	(238)

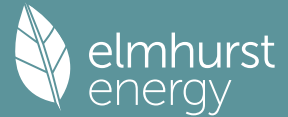
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3027.4036	0.2100	635.7547 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2447.0655	0.2100	513.8837 (264)
Space and water heating			1149.6385 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	133.2411	0.1443	19.2308 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-359.2121	0.1335	-47.9454
PV Unit electricity exported	-306.3293	0.1253	-38.3917
Total			-86.3371 (269)
Total CO2, kg/year			1094.4615 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			20.3200 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3027.4036	1.1300	3420.9660 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2447.0655	1.1300	2765.1840 (278)
Space and water heating			6186.1500 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	133.2411	1.5338	204.3697 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-359.2121	1.4932	-536.3872
PV Unit electricity exported	-306.3293	0.4600	-140.9160
Total			-677.3032 (283)
Total Primary energy kWh/year			5843.3173 (286)
Target Primary Energy Rate (TPER)			108.4900 (287)

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Property Reference	1 Bed Ground Floor Flat				Issued on Date	17/06/2024
Assessment Reference	1 Bed Ground Floor Flat		Prop Type Ref	1 Bed Ground Floor Flat		
Property	1 Bed Ground Floor Flat, 1 Bed Ground Floor Flat, North Hill , London, N10					
SAP Rating	80 C	DER	5.64	TER	17.49	
Environmental	96 A	% DER < TER				67.75
CO ₂ Emissions (t/year)	0.28	DFEE	50.30	TFEE	48.90	
Compliance Check	See BREL	% DFEE < TFEE				-2.88
% DPER < TPER	35.79	DPER	59.88	TPER	93.26	
Assessor Details	Miss Nimco Ali				Assessor ID	R572-0001
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	54.4300 (1b)	3.3000 (2b)	179.6190 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.4300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	179.6190 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	1	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.2764	0.2729	0.2695	0.2521	0.2487	0.2313	0.2313	0.2278	0.2382	0.2487	0.2556	0.2625 (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
Glazing (Uw = 0.85)			11.8900	0.8221	9.7742		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
External Wall	70.7200	11.8900	58.8300	0.1600	9.4128	150.0000	8824.5000 (29a)
Corridor	39.4400	2.0000	37.4400	0.1800	6.7392	150.0000	5616.0000 (29a)
Total net area of external elements Aum(A, m ²)			110.1600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.9262		(33)
Party Floor 1			54.4300			40.0000	2177.2000 (32d)
Party Ceiling 1			54.4300			30.0000	1632.9000 (32b)
Internal Wall			56.1300			9.0000	505.1700 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	18755.7700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		344.5852 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	42.8600	0.0900	3.8574

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	94.5532	94.9074	95.2642	97.0893	97.4627	99.3738	99.3738	99.7651	98.6004	97.4627	96.7187	95.9859
alpha	7.3035	7.3272	7.3509	7.4726	7.4975	7.6249	7.6249	7.6510	7.5734	7.4975	7.4479	7.3991
util living area	0.9968	0.9930	0.9834	0.9398	0.8155	0.5937	0.4287	0.4683	0.7219	0.9479	0.9912	0.9974 (86)
Living	20.2883	20.4054	20.5702	20.7992	20.9479	20.9958	20.9997	20.9994	20.9832	20.8139	20.5262	20.2775
Non living	19.2599	19.4109	19.6202	19.9068	20.0613	20.1123	20.1140	20.1171	20.0992	19.9308	19.5774	19.2562
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	20.6359	20.4054	20.5702	20.7992	20.9479	20.9958	20.9997	20.9994	20.9832	20.8139	20.5262	20.3786 (87)
Th 2	20.0731	20.0762	20.0794	20.0951	20.0983	20.1141	20.1141	20.1173	20.1078	20.0983	20.0920	20.0857 (88)
util rest of house	0.9954	0.9900	0.9760	0.9150	0.7570	0.5141	0.3426	0.3789	0.6390	0.9210	0.9869	0.9963 (89)
MIT 2	19.7489	19.4109	19.6202	19.9068	20.0613	20.1123	20.1140	20.1171	20.0992	19.9308	19.5774	19.4057 (90)
Living area fraction									fLA = Living area / (4) =			0.4196 (91)
MIT	20.1211	19.8282	20.0188	20.2813	20.4333	20.4830	20.4857	20.4873	20.4702	20.3014	19.9756	19.8139 (92)
Temperature adjustment												0.0000
adjusted MIT	20.1211	19.8282	20.0188	20.2813	20.4333	20.4830	20.4857	20.4873	20.4702	20.3014	19.9756	19.8139 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9955	0.9890	0.9754	0.9207	0.7799	0.5475	0.3788	0.4165	0.6738	0.9280	0.9861	0.9958 (94)
Useful gains	459.1820	497.3531	511.0864	509.3829	443.3844	306.9676	203.6391	213.2956	330.2098	426.9151	440.9761	444.8142 (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	871.7514	819.4826	739.3339	610.7355	466.8451	308.4331	203.7165	213.4496	336.5927	518.5938	693.5668	847.4949 (97)
Space heating kWh	306.9517	216.4710	169.8161	72.9739	17.4548	0.0000	0.0000	0.0000	0.0000	68.2090	181.8653	299.5944 (98a)
Space heating requirement - total per year (kWh/year)												1333.3362
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	306.9517	216.4710	169.8161	72.9739	17.4548	0.0000	0.0000	0.0000	0.0000	68.2090	181.8653	299.5944 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1333.3362
Space heating per m2										(98c) / (4) =		24.4963 (99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	492.8200	387.9647	396.8876	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9560	0.9853	0.9777	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	471.1516	382.2461	388.0510	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	612.5391	587.6553	558.9515	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	101.7990	152.8244	127.1499	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.6981 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	17.7676	26.6734	22.1922	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												66.6332 (107)

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 %)												249.8307 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	306.9517	216.4710	169.8161	72.9739	17.4548	0.0000	0.0000	0.0000	0.0000	68.2090	181.8653	299.5944 (98)
Space heating efficiency (main heating system 1)	249.8307	249.8307	249.8307	249.8307	249.8307	0.0000	0.0000	0.0000	0.0000	249.8307	249.8307	249.8307 (210)
Space heating fuel (main heating system)	122.8639	86.6471	67.9725	29.2093	6.9866	0.0000	0.0000	0.0000	0.0000	27.3021	72.7954	119.9190 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	223.5825	197.8242	210.2289	184.8003	179.1583	161.4405	159.2442	165.5039	167.2675	186.5315	198.3896	221.1187 (64)
Efficiency of water heater (217)m	174.3445	174.3445	174.3445	174.3445	174.3445	174.3445	174.3445	174.3445	174.3445	174.3445	174.3445	174.3445 (216)
Fuel for water heating, kWh/month	128.2418	113.4674	120.5824	105.9972	102.7611	92.5986	91.3388	94.9292	95.9408	106.9902	113.7917	126.8286 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	5.4502	8.1820	6.8074	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	11.8648	10.7166	11.8648	11.4821	11.8648	11.4821	11.8648	11.8648	11.4821	11.8648	11.4821	11.8648 (231)
Lighting	16.8406	13.5101	12.1644	8.9122	6.8840	5.6243	6.2798	8.1627	10.6026	13.9112	15.7126	17.3086 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												

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(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												533.6959	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												174.3445	
Water heating fuel used												1293.4678	(219)
Space cooling fuel												20.4396	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.6375)													
mechanical ventilation fans (SFP = 0.6375)												139.6987	(230a)
Total electricity for the above, kWh/year												139.6987	(231)
Electricity for lighting (calculated in Appendix L)												135.9132	(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												2123.2152	(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	533.6959	0.1567	83.6413 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1293.4678	0.1409	182.2229 (264)
Space and water heating			265.8642 (265)
Space cooling	20.4396	0.1137	2.3247 (266)
Pumps, fans and electric keep-hot	139.6987	0.1387	19.3779 (267)
Energy for lighting	135.9132	0.1443	19.6165 (268)
Total CO2, kg/year			307.1833 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.6400 (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	533.6959	1.5802	843.3446 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1293.4678	1.5209	1967.2609 (278)
Space and water heating			2810.6056 (279)
Space cooling	20.4396	1.4193	29.0093 (280)
Pumps, fans and electric keep-hot	139.6987	1.5128	211.3362 (281)
Energy for lighting	135.9132	1.5338	208.4682 (282)
Total Primary energy kWh/year			3259.4192 (286)
Dwelling Primary energy Rate (DPER)			59.8800 (287)

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

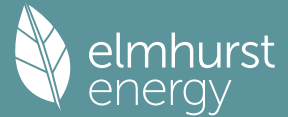
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	54.4300 (1b)	x 3.3000 (2b)	= 179.6190 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.4300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 179.6190 (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)

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Number of flueless gas fires

0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
20.0000 / (5) = 0.1113 (8)
Yes
Blower Door
5.0000 (17)
0.3613 (18)
1 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3342 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.4262	0.4178	0.4095	0.3677	0.3593	0.3175	0.3175	0.3092	0.3342	0.3593	0.3760	0.3927 (22b)
	0.5908	0.5873	0.5838	0.5676	0.5646	0.5504	0.5504	0.5478	0.5559	0.5646	0.5707	0.5771 (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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			11.6000	1.1450	13.2824		(27)
External Wall	70.7200	11.6000	59.1200	0.1800	10.6416		(29a)
Corridor	39.4400	2.0000	37.4400	0.1800	6.7392		(29a)
Total net area of external elements Aum(A, m2)			110.1600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 32.6632		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 354.5852 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	42.8600	0.0700	3.0002
E7 Party floor between dwellings (in blocks of flats)	23.9000	0.0700	1.6730
E16 Corner (normal)	16.5000	0.0900	1.4850
E16 Corner (normal)	6.6000	0.0900	0.5940
E17 Corner (inverted - internal area greater than external area)	6.6000	-0.0900	-0.5940
E2 Other lintels (including other steel lintels)	6.1200	0.0500	0.3060
E3 Sill	5.1700	0.0500	0.2585
E4 Jamb	22.8200	0.0500	1.1410
E17 Corner (inverted - internal area greater than external area)	3.3000	-0.0900	-0.2970

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.5667 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 40.2299 (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
	35.0197	34.8107	34.6058	33.6435	33.4635	32.6254	32.6254	32.4702	32.9482	33.4635	33.8277	34.2085 (38)
Heat transfer coeff	75.2496	75.0406	74.8357	73.8735	73.6934	72.8553	72.8553	72.7001	73.1781	73.6934	74.0576	74.4384 (39)
Average = Sum(39)m / 12 =												73.8726

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.3825	1.3787	1.3749	1.3572	1.3539	1.3385	1.3385	1.3357	1.3444	1.3539	1.3606	1.3676 (40)
HLP (average)												1.3572
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8206 (42)

Hot water usage for mixer showers 54.7457 53.9229 52.7241 50.4303 48.7375 46.8497 45.7767 46.9665 48.2707 50.2976 52.6407 54.5359 (42a)

Hot water usage for baths 23.6657 23.3142 22.8192 21.9067 21.2233 20.4656 20.0564 20.5478 21.0830 21.8937 22.8251 23.5856 (42b)

Hot water usage for other uses 33.2752 32.0652 30.8552 29.6451 28.4351 27.2251 27.2251 28.4351 29.6451 30.8552 32.0652 33.2752 (42c)

Average daily hot water use (litres/day) 102.6656 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	111.6865	109.3023	106.3985	101.9821	98.3959	94.5405	93.0582	95.9495	98.9988	103.0465	107.5310	111.3967 (44)
Energy conte	176.8841	155.6450	163.5305	139.6083	132.4599	116.2485	112.5458	118.8055	122.0755	139.8331	153.1976	174.4203 (45)
Energy content (annual)										Total = Sum(45)m =		1705.2541
Distribution loss (46)m = 0.15 x (45)m	26.5326	23.3467	24.5296	20.9413	19.8690	17.4373	16.8819	17.8208	18.3113	20.9750	22.9796	26.1630 (46)

Water storage loss: 180.0000 (47)

Store volume 1.5520 (48)

a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)

Temperature factor from Table 2b 0.8381 (55)

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

Total storage loss 25.9803 23.4661 25.9803 25.1422 25.9803 25.1422 25.9803 25.9803 25.1422 25.9803 25.1422 25.9803 (56)

If cylinder contains dedicated solar storage 25.9803 23.4661 25.9803 25.1422 25.9803 25.1422 25.9803 25.9803 25.1422 25.9803 25.1422 25.9803 (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 226.1267 200.1222 212.7731 187.2625 181.7025 163.9027 161.7885 168.0482 169.7297 189.0758 200.8518 223.6630 (62)

WWHRS -25.0274 -22.1345 -23.1779 -19.1922 -17.8865 -15.3056 -14.3466 -15.2561 -15.8358 -18.6686 -21.1493 -24.5640 (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 201.0993 177.9878 189.5952 168.0703 163.8160 148.5971 147.4419 152.7920 153.8939 170.4072 179.7025 199.0990 (64)

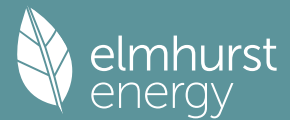
Total per year (kWh/year) = Sum(64)m = 2052.5024 (64)

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 98.2081 87.3338 93.7680 84.5431 83.4370 76.7760 76.8156 78.8970 78.7134 85.8887 89.0616 97.3889 (65)

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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	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	91.0320	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	80.1971	88.7896	80.1971	82.8703	80.1971	82.8703	80.1971	80.1971	82.8703	80.1971	82.8703	80.1971	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	158.7154	160.3624	156.2121	147.3766	136.2233	125.7408	118.7379	117.0909	121.2412	130.0768	141.2300	151.7125	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	32.1032	(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)	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	-72.8256	(71)
Water heating gains (Table 5)	132.0001	129.9609	126.0323	117.4210	112.1466	106.6333	103.2468	106.0443	109.3242	115.4417	123.6966	130.8991	(72)
Total internal gains	424.2222	432.4226	415.7511	400.9775	381.8766	365.5541	352.4914	353.6419	363.7454	379.0252	401.1065	416.1182	(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				6.4000	11.2829	0.6300	0.7000	0.7700	22.0686 (75)			
Southeast				1.5100	36.7938	0.6300	0.7000	0.7700	16.9795 (77)			
Southwest				3.6900	36.7938	0.6300	0.7000	0.7700	41.4928 (79)			
Solar gains	80.5409	144.5212	217.2107	301.7703	367.7961	378.2393	359.2102	307.9488	246.1782	164.9765	97.8043	68.0624 (83)
Total gains	504.7631	576.9437	632.9618	702.7478	749.6727	743.7933	711.7016	661.5906	609.9236	544.0016	498.9108	484.1806 (84)

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	71.2446	71.4430	71.6386	72.5718	72.7491	73.5860	73.5860	73.7431	73.2614	72.7491	72.3913	72.0210	
alpha	5.7496	5.7629	5.7759	5.8381	5.8499	5.9057	5.9057	5.9162	5.8841	5.8499	5.8261	5.8014	
util living area	0.9968	0.9926	0.9810	0.9350	0.8131	0.6114	0.4482	0.5010	0.7634	0.9568	0.9924	0.9975	(86)
MIT	19.9192	20.0880	20.3335	20.6592	20.8909	20.9834	20.9977	20.9957	20.9433	20.6459	20.2314	19.8968	(87)
Th 2	19.7768	19.7797	19.7826	19.7963	19.7988	19.8108	19.8108	19.8130	19.8062	19.7988	19.7937	19.7883	(88)
util rest of house	0.9954	0.9891	0.9719	0.9050	0.7420	0.5056	0.3284	0.3743	0.6595	0.9300	0.9881	0.9963	(89)
MIT 2	18.5580	18.7744	19.0846	19.4842	19.7239	19.8042	19.8104	19.8121	19.7779	19.4811	18.9684	18.5380	(90)
Living area fraction									fLA = Living area / (4) =			0.4196	(91)
MIT	19.1292	19.3256	19.6087	19.9773	20.2136	20.2991	20.3086	20.3088	20.2669	19.9699	19.4984	19.1082	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1292	19.3256	19.6087	19.9773	20.2136	20.2991	20.3086	20.3088	20.2669	19.9699	19.4984	19.1082	(93)

8. Space heating requirement

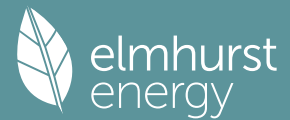
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9943	0.9874	0.9702	0.9103	0.7685	0.5502	0.3789	0.4279	0.7025	0.9347	0.9867	0.9954	(94)
Useful gains	501.8610	569.6710	614.1197	639.6767	576.1510	409.2356	269.6412	283.0746	428.4736	508.4571	492.2887	481.9530	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1115.8900	1082.5090	980.9992	818.3159	627.3952	415.2062	270.1917	284.1705	451.2848	690.4986	918.1958	1109.7414	(97)
Space heating kWh	456.8375	344.6272	272.9583	128.6202	38.1257	0.0000	0.0000	0.0000	0.0000	135.4389	306.6531	467.0746	(98a)
Space heating requirement - total per year (kWh/year)												2150.3354	
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	456.8375	344.6272	272.9583	128.6202	38.1257	0.0000	0.0000	0.0000	0.0000	135.4389	306.6531	467.0746	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2150.3354	
Space heating per m ²										(98c) / (4) =		39.5064	(99)

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

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

Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	456.8375	344.6272	272.9583	128.6202	38.1257	0.0000	0.0000	0.0000	0.0000	135.4389	306.6531	467.0746	(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)	494.9486	373.3772	295.7294	139.3501	41.3063	0.0000	0.0000	0.0000	0.0000	146.7377	332.2353	506.0396	(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)

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Water heating												
Water heating requirement												
	201.0993	177.9878	189.5952	168.0703	163.8160	148.5971	147.4419	152.7920	153.8939	170.4072	179.7025	199.0990 (64)
Efficiency of water heater												79.8000 (216)
(217)m	85.8409	85.5153	84.8763	83.4673	81.3567	79.8000	79.8000	79.8000	79.8000	83.5499	85.2476	85.9044 (217)
Fuel for water heating, kWh/month												
	234.2698	208.1355	223.3782	201.3605	201.3552	186.2120	184.7643	191.4687	192.8495	203.9587	210.8007	231.7681 (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	16.6634	13.3680	12.0364	8.8184	6.8116	5.5651	6.2137	8.0768	10.4910	13.7648	15.5473	17.1265 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-14.7055	-21.8538	-33.0992	-39.2913	-44.2155	-41.9687	-41.4748	-38.2419	-32.8545	-25.9060	-16.5663	-12.5875 (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	-5.2186	-11.2267	-22.7785	-34.8972	-46.8097	-47.2602	-46.6866	-39.2090	-28.3328	-16.2593	-7.0339	-4.1072 (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												2329.7242 (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												2470.3213 (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)												134.4829 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-672.5848 (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												4347.9436 (238)

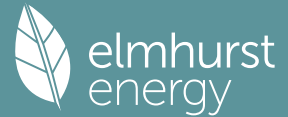
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2329.7242	0.2100	489.2421 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2470.3213	0.2100	518.7675 (264)
Space and water heating			1008.0095 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	134.4829	0.1443	19.4100 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-362.7651	0.1335	-48.4207
PV Unit electricity exported	-309.8197	0.1253	-38.8293
Total			-87.2500 (269)
Total CO2, kg/year			952.0989 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			17.4900 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2329.7242	1.1300	2632.5883 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2470.3213	1.1300	2791.4630 (278)
Space and water heating			5424.0514 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	134.4829	1.5338	206.2744 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-362.7651	1.4932	-541.6967
PV Unit electricity exported	-309.8197	0.4600	-142.5221
Total			-684.2188 (283)
Total Primary energy kWh/year			5076.2078 (286)
Target Primary Energy Rate (TPER)			93.2600 (287)

Full SAP Calculation Printout



Property Reference	2 Bed 1st Floor Flat - NW				Issued on Date	17/06/2024
Assessment Reference	1 Bed 1st Floor Flat - NW	Prop Type Ref	2 Bed 1st Floor Flat - NW			
Property	1 Bed 1st Floor Flat - NW, 1 Bed 1st Floor Flat - NW, North Hill , London, N10					
SAP Rating	81 B	DER	4.65	TER	13.98	
Environmental	96 A	% DER < TER				66.74
CO ₂ Emissions (t/year)	0.35	DFEE	42.42	TFEE	41.47	
Compliance Check	See BREL	% DFEE < TFEE				-2.29
% DPER < TPER	33.32	DPER	49.40	TPER	74.08	
Assessor Details	Miss Nimco Ali				Assessor ID	R572-0001
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	81.2900 (1b)	3.0000 (2b)	243.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.2900		243.8700 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	243.8700 (5)

2. Ventilation rate

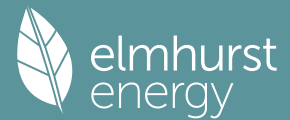
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (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
Glazing (Uw = 0.85)			14.9900	0.8221	12.3225		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
Exposed Floor to Corridor			7.8600	0.1400	1.1004		(28b)
External Wall	79.2000	14.9900	64.2100	0.1600	10.2736	150.0000	9631.5000 (29a)
Corridor	35.4600	2.0000	33.4600	0.1800	6.0228	150.0000	5019.0000 (29a)
Total net area of external elements Aum(A, m ²)			122.5200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.7193		(33)
Party Wall 1			15.2400	0.0000	0.0000	70.0000	1066.8000 (32)
Party Floor 1			73.4300			40.0000	2937.2000 (32d)
Party Ceiling 1			81.2900			30.0000	2438.7000 (32b)
Internal Wall			78.1800			9.0000	703.6200 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		21796.8200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							268.1365 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	36.5800	0.0900	3.2922
E7 Party floor between dwellings (in blocks of flats)	15.2400	0.1100	1.6764
E16 Corner (normal)	9.0000	0.0900	0.8100
E16 Corner (normal)	6.0000	0.1400	0.8400
E17 Corner (inverted - internal area greater than external area)	3.0000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E2 Other lintels (including other steel lintels)	7.4200	0.0500	0.3710
E3 Sill	6.4700	0.1000	0.6470
E4 Jamb	32.3800	0.0600	1.9428
E18 Party wall between dwellings	6.0000	0.0700	0.4200
E18 Party wall between dwellings	3.0000	0.1000	0.3000
E20 Exposed floor (normal)	3.5700	0.2600	0.9282
P7 Party Wall - Exposed floor (normal)	4.9700	0.2000	0.9940
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	6.5600	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	10.7800	0.2500	2.6950
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			14.6466 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	46.3659 (37)

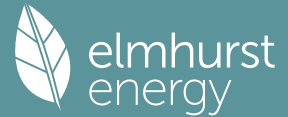
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.9687	22.6895	22.4104	21.0146	20.7354	19.3397	19.3397	19.0605	19.8980	20.7354	21.2937	21.8520 (38)
Average = Sum(39)m / 12 =	69.3346	69.0554	68.7763	67.3805	67.1014	65.7056	65.7056	65.4264	66.2639	67.1014	67.6597	68.2180 (39)
												67.3107
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8529	0.8495	0.8461	0.8289	0.8255	0.8083	0.8083	0.8049	0.8152	0.8255	0.8323	0.8392 (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												2.4869 (42)
Hot water usage for mixer showers												
Hot water usage for baths	65.9165	64.9260	63.4825	60.7206	58.6824	56.4094	55.1175	56.5500	58.1204	60.5609	63.3821	65.6640 (42a)
Hot water usage for other uses	28.4695	28.0467	27.4513	26.3535	25.5314	24.6199	24.1276	24.7188	25.3625	26.3379	27.4583	28.3733 (42b)
Average daily hot water use (litres/day)	40.0982	38.6400	37.1819	35.7238	34.2657	32.8076	32.8076	34.2657	35.7238	37.1819	38.6400	40.0982 (42c)
												123.6214 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	134.4842	131.6127	128.1157	122.7979	118.4795	113.8369	112.0526	115.5345	119.2068	124.0807	129.4804	134.1354 (44)
Energy content (annual)	212.9901	187.4147	196.9090	168.1041	159.4962	139.9758	135.5179	143.0559	146.9939	168.3764	184.4686	210.0236 (45)
Distribution loss (46)m = 0.15 x (45)m												2053.3262
Water storage loss:	31.9485	28.1122	29.5363	25.2156	23.9244	20.9964	20.3277	21.4584	22.0491	25.2565	27.6703	31.5035 (46)
Store volume												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.4000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7560 (55)
Total storage loss	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360 (56)
If cylinder contains dedicated solar storage	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360 (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	259.6885	229.5939	243.6074	213.2961	206.1946	185.1678	182.2163	189.7543	192.1859	215.0748	229.6606	256.7220 (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	259.6885	229.5939	243.6074	213.2961	206.1946	185.1678	182.2163	189.7543	192.1859	215.0748	229.6606	256.7220 (64)
12Total per year (kWh/year)												2603.1622 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	108.1779	96.0587	102.8310	92.0482	90.3912	82.6955	82.4184	84.9248	85.0291	93.3439	97.4894	107.1916 (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	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	116.6876	129.1899	116.6876	120.5772	116.6876	120.5772	116.6876	116.6876	120.5772	116.6876	120.5772	116.6876 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	222.1155	224.4203	218.6122	206.2472	190.6387	175.9689	166.1686	163.8637	169.6719	182.0368	197.6454	212.3151 (68)
Pumps, fans	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753 (71)
Total internal gains	145.4004	142.9446	138.2137	127.8448	121.4936	114.8549	110.7775	114.1462	118.0959	125.4622	135.4020	144.0747 (72)
	544.5068	556.8580	533.8167	514.9724	489.1231	471.7043	453.9369	455.0009	468.6483	484.4899	513.9278	533.3807 (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							

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Northeast			6.5600		11.2829		0.3200		0.7000		0.7700		11.4897 (75)
Southwest			3.7800		36.7938		0.3200		0.7000		0.7700		21.5898 (79)
Northwest			4.6500		11.2829		0.3200		0.7000		0.7700		8.1444 (81)

Solar gains	41.2238	76.7410	122.3230	180.5995	228.7886	238.7915	225.3692	187.6357	142.2230	89.4858	50.5642	34.5105 (83)
Total gains	585.7306	633.5990	656.1397	695.5719	717.9117	710.4958	679.3061	642.6366	610.8713	573.9757	564.4920	567.8912 (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	87.3254	87.6784	88.0343	89.8579	90.2317	92.1485	92.1485	92.5417	91.3721	90.2317	89.4872	88.7548	
alpha	6.8217	6.8452	6.8690	6.9905	7.0154	7.1432	7.1432	7.1694	7.0915	7.0154	6.9658	6.9170	
util living area	0.9952	0.9907	0.9800	0.9327	0.8062	0.5861	0.4250	0.4672	0.7218	0.9430	0.9884	0.9961 (86)	
Living	20.2443	20.3633	20.5338	20.7801	20.9402	20.9946	20.9995	20.9991	20.9784	20.7932	20.4953	20.2352	
Non living	19.3291	19.4825	19.6993	20.0094	20.1833	20.2432	20.2460	20.2488	20.2268	20.0316	19.6624	19.3269	
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	20.6134	20.3633	20.5338	20.7801	20.9402	20.9946	20.9995	20.9991	20.9784	20.7932	20.4953	20.3422 (87)	
Th 2	20.2077	20.2106	20.2136	20.2284	20.2313	20.2462	20.2462	20.2491	20.2402	20.2313	20.2254	20.2195 (88)	
util rest of house	0.9937	0.9877	0.9733	0.9116	0.7580	0.5197	0.3525	0.3916	0.6531	0.9207	0.9841	0.9948 (89)	
MIT 2	19.8574	19.4825	19.6993	20.0094	20.1833	20.2432	20.2460	20.2488	20.2268	20.0316	19.6624	19.4877 (90)	
Living area fraction									fLA = Living area / (4) =			0.3731 (91)	
MIT	20.1395	19.8111	20.0106	20.2970	20.4657	20.5236	20.5271	20.5287	20.5072	20.3157	19.9731	19.8065 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.1395	19.8111	20.0106	20.2970	20.4657	20.5236	20.5271	20.5287	20.5072	20.3157	19.9731	19.8065 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9935	0.9858	0.9712	0.9137	0.7735	0.5444	0.3796	0.4199	0.6781	0.9235	0.9823	0.9939 (94)	
Useful gains	581.9495	624.6243	637.2519	635.5303	555.2717	386.8029	257.8762	269.8152	414.2108	530.0686	554.4929	564.4375 (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	1098.2245	1029.6944	929.2110	767.9340	588.1936	389.2110	258.0352	270.1290	424.5680	651.9398	870.9922	1064.6462 (97)	
Space heating kWh	384.1085	272.2071	217.2176	95.3307	24.4939	0.0000	0.0000	0.0000	0.0000	90.6722	227.8795	372.1553 (98a)	
Space heating requirement - total per year (kWh/year)												1684.0647	
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	384.1085	272.2071	217.2176	95.3307	24.4939	0.0000	0.0000	0.0000	0.0000	90.6722	227.8795	372.1553 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1684.0647	
Space heating per m2										(98c) / (4) =		20.7168 (99)	

8c. Space cooling requirement

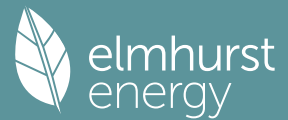
Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	617.6325	486.2213	497.2409	0.0000	0.0000	0.0000	0.0000 (100)	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9506	0.9818	0.9724	0.0000	0.0000	0.0000	0.0000 (101)	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	587.1333	477.3508	483.4968	0.0000	0.0000	0.0000	0.0000 (102)	
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	769.1172	735.5591	694.7433	0.0000	0.0000	0.0000	0.0000 (103)	
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	131.0284	192.1070	157.1674	0.0000	0.0000	0.0000	0.0000 (104)	
Cooled fraction									fC = cooled area / (4) =			0.7135 (105)	
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)	
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	23.3720	34.2668	28.0345	0.0000	0.0000	0.0000	0.0000 (107)	
Space cooling requirement												85.6734 (107)	

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 %)													261.7785 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Cooling System Energy Efficiency Ratio (see Table 10c)													3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	384.1085	272.2071	217.2176	95.3307	24.4939	0.0000	0.0000	0.0000	0.0000	90.6722	227.8795	372.1553 (98)	
Space heating efficiency (main heating system 1)	261.7785	261.7785	261.7785	261.7785	261.7785	0.0000	0.0000	0.0000	0.0000	261.7785	261.7785	261.7785 (210)	
Space heating fuel (main heating system)	146.7304	103.9837	82.9776	36.4165	9.3567	0.0000	0.0000	0.0000	0.0000	34.6370	87.0505	142.1642 (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	259.6885	229.5939	243.6074	213.2961	206.1946	185.1678	182.2163	189.7543	192.1859	215.0748	229.6606	256.7220 (64)	
Efficiency of water heater												171.4268 (216)	

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(217)m	171.4268	171.4268	171.4268	171.4268	171.4268	171.4268	171.4268	171.4268	171.4268	171.4268	171.4268	171.4268	(217)
Fuel for water heating, kWh/month	151.4865	133.9311	142.1058	124.4240	120.2814	108.0156	106.2939	110.6911	112.1096	125.4615	133.9701	149.7560	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	7.1693	10.5113	8.5996	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	18.3200	16.5471	18.3200	17.7290	18.3200	17.7290	18.3200	17.7290	18.3200	17.7290	18.3200	18.3200	(231)
Lighting	26.3000	21.0988	18.9972	13.9181	10.7508	8.7835	9.8072	12.7478	16.5581	21.7251	24.5385	27.0310	(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												643.3167	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												171.4268	
Water heating fuel used												1518.5266	(219)
Space cooling fuel												26.2802	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)													
mechanical ventilation fans (SFP = 0.7250)												215.7030	(230a)
Total electricity for the above, kWh/year												215.7030	(231)
Electricity for lighting (calculated in Appendix L)												212.2561	(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												2616.0826	(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	643.3167	0.1566	100.7207 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1518.5266	0.1410	214.0710 (264)
Space and water heating			314.7917 (265)
Space cooling	26.2802	0.1138	2.9902 (266)
Pumps, fans and electric keep-hot	215.7030	0.1387	29.9207 (267)
Energy for lighting	212.2561	0.1443	30.6351 (268)
Total CO2, kg/year			378.3377 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6500 (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	643.3167	1.5796	1016.1979 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1518.5266	1.5213	2310.0891 (278)
Space and water heating			3326.2870 (279)
Space cooling	26.2802	1.4194	37.3031 (280)
Pumps, fans and electric keep-hot	215.7030	1.5128	326.3155 (281)
Energy for lighting	212.2561	1.5338	325.5655 (282)
Total Primary energy kWh/year			4015.4711 (286)
Dwelling Primary energy Rate (DPER)			49.4000 (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	81.2900 (1b)	x 3.0000 (2b)	= 243.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	81.2900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 243.8700 (5)

2. Ventilation rate

m3 per hour

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Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	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	Air changes per hour	0.1230 (8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			5.0000	(17)
Infiltration rate			0.3730	(18)
Number of sides sheltered			1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3450	(21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	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)
Effective ac	0.4399	0.4313	0.4227	0.3795	0.3709	0.3278	0.3278	0.3192	0.3450	0.3709	0.3882	0.4054	(22b)
	0.5968	0.5930	0.5893	0.5720	0.5688	0.5537	0.5537	0.5509	0.5595	0.5688	0.5753	0.5822	(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			2.0000	1.0000	2.0000			(26)
TER Opening Type (Uw = 1.20)			14.9900	1.1450	17.1641			(27)
Exposed Floor to Corridor			7.8600	0.1300	1.0218			(28b)
External Wall	79.2000	14.9900	64.2100	0.1800	11.5578			(29a)
Corridor	35.4600	2.0000	33.4600	0.1800	6.0228			(29a)
Total net area of external elements Aum(A, m2)			122.5200					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.7665			(33)
Party Wall 1			15.2400	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							278.1365	(35)

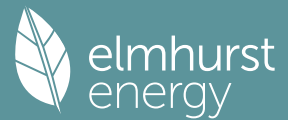
List of Thermal Bridges													
K1 Element						Length	Psi-value	Total					
E7 Party floor between dwellings (in blocks of flats)						36.5800	0.0700	2.5606					
E7 Party floor between dwellings (in blocks of flats)						15.2400	0.0700	1.0668					
E16 Corner (normal)						9.0000	0.0900	0.8100					
E16 Corner (normal)						6.0000	0.0900	0.5400					
E17 Corner (inverted - internal area greater than external area)						3.0000	-0.0900	-0.2700					
E17 Corner (inverted - internal area greater than external area)						3.0000	-0.0900	-0.2700					
E2 Other lintels (including other steel lintels)						7.4200	0.0500	0.3710					
E3 Sill						6.4700	0.0500	0.3235					
E4 Jamb						32.3800	0.0500	1.6190					
E18 Party wall between dwellings						6.0000	0.0600	0.3600					
E18 Party wall between dwellings						3.0000	0.0600	0.1800					
E20 Exposed floor (normal)						3.5700	0.3200	1.1424					
P7 Party Wall - Exposed floor (normal)						4.9700	0.1600	0.7952					
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)						6.5600	0.0000	0.0000					
E23 Balcony within or between dwellings, balcony support penetrates wall insulation						10.7800	0.0200	0.2156					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								9.4441					(36)
Point Thermal Bridges								0.0000					(36a)
Total fabric heat loss								47.2106					(33) + (36) + (36a) =

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	48.0261	47.7237	47.4273	46.0351	45.7746	44.5620	44.5620	44.3374	45.0291	45.7746	46.3015	46.8524	(38)
Average = Sum(39)m / 12 =	95.2367	94.9343	94.6379	93.2457	92.9852	91.7726	91.7726	91.5481	92.2397	92.9852	93.5122	94.0631	(39)
													93.2444
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1716	1.1678	1.1642	1.1471	1.1439	1.1290	1.1290	1.1262	1.1347	1.1439	1.1504	1.1571	(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													2.4869 (42)
Hot water usage for mixer showers													
	65.9165	64.9260	63.4825	60.7206	58.6824	56.4094	55.1175	56.5500	58.1204	60.5609	63.3821	65.6640	(42a)
Hot water usage for baths													
	28.4695	28.0467	27.4513	26.3535	25.5314	24.6199	24.1276	24.7188	25.3625	26.3379	27.4583	28.3733	(42b)
Hot water usage for other uses													
	40.0982	38.6400	37.1819	35.7238	34.2657	32.8076	32.8076	34.2657	35.7238	37.1819	38.6400	40.0982	(42c)
Average daily hot water use (litres/day)													123.6214 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	134.4842	131.6127	128.1157	122.7979	118.4795	113.8369	112.0526	115.5345	119.2068	124.0807	129.4804	134.1354	(44)
Energy content (annual)	212.9901	187.4147	196.9090	168.1041	159.4962	139.9758	135.5179	143.0559	146.9939	168.3764	184.4686	210.0236	(45)
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m =
	31.9485	28.1122	29.5363	25.2156	23.9244	20.9964	20.3277	21.4584	22.0491	25.2565	27.6703	31.5035	(46)
Water storage loss:													
Store volume													180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5520 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8381 (55)
Total storage loss													
	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)
If cylinder contains dedicated solar storage													
	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(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)

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Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	262.2328	231.8919	246.1517	215.7583	208.7389	187.6300	184.7606	192.2986	194.6481	217.6190	232.1228	259.2663 (62)
PV diverter	-30.1343	-26.6510	-27.9074	-23.1084	-21.5362	-18.4287	-17.2740	-18.3691	-19.0671	-22.4780	-25.4648	-29.5763 (63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
	232.0985	205.2409	218.2443	192.6499	187.2026	169.2013	167.4866	173.9294	175.5810	195.1411	206.6580	229.6900 (64)
Total per year (kWh/year) = Sum(64)m =											2353.1237 (64)	2353 (64)
12Total per year (kWh/year)												
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)	0.0000 (64a)
Heat gains from water heating, kWh/month												
	110.2133	97.8972	104.8664	94.0180	92.4266	84.6653	84.4538	86.9602	86.9988	95.3793	99.4592	109.2270 (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	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	113.9982	126.2123	113.9982	117.7982	113.9982	117.7982	113.9982	113.9982	117.7982	113.9982	117.7982	113.9982 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	222.1155	224.4203	218.6122	206.2472	190.6387	175.9689	166.1686	163.8637	169.6719	182.0368	197.6454	212.3151 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753 (71)
Water heating gains (Table 5)	148.1362	145.6803	140.9494	130.5805	124.2293	117.5907	113.5132	116.8820	120.8317	128.1979	138.1377	146.8105 (72)
Total internal gains	547.5532	559.6162	536.8630	517.9292	492.1695	471.6610	453.9833	455.0472	468.6050	487.5363	516.8845	536.4271 (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				6.5600	11.2829	0.6300		0.7000		0.7700		22.6203 (75)	
Southwest				3.7800	36.7938	0.6300		0.7000		0.7700		42.5049 (79)	
Northwest				4.6500	11.2829	0.6300		0.7000		0.7700		16.0342 (81)	
Solar gains	81.1593	151.0838	240.8234	355.5552	450.4275	470.1207	443.6956	369.4079	280.0015	176.1751	99.5484	67.9425 (83)	
Total gains	628.7125	710.7000	777.6864	873.4843	942.5970	941.7817	897.6789	824.4551	748.6066	663.7114	616.4329	604.3696 (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	65.9460	66.1560	66.3632	67.3541	67.5428	68.4352	68.4352	68.6031	68.0887	67.5428	67.1622	66.7688
alpha	5.3964	5.4104	5.4242	5.4903	5.5029	5.5623	5.5623	5.5735	5.5392	5.5029	5.4775	5.4513
util living area	0.9959	0.9914	0.9796	0.9316	0.8075	0.6059	0.4469	0.5048	0.7709	0.9567	0.9911	0.9967 (86)
MIT	19.8365	20.0054	20.2625	20.6189	20.8744	20.9796	20.9968	20.9940	20.9280	20.5975	20.1659	19.8172 (87)
Th 2	19.9428	19.9458	19.9487	19.9626	19.9652	19.9773	19.9773	19.9795	19.9726	19.9652	19.9599	19.9544 (88)
util rest of house	0.9945	0.9884	0.9719	0.9069	0.7487	0.5170	0.3447	0.3961	0.6857	0.9356	0.9873	0.9955 (89)
MIT 2	18.6043	18.8211	19.1474	19.5904	19.8675	19.9671	19.9764	19.9777	19.9284	19.5766	19.0370	18.5883 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.0640	19.2630	19.5635	19.9742	20.2432	20.3449	20.3571	20.3569	20.3014	19.9575	19.4582	19.0468 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0640	19.2630	19.5635	19.9742	20.2432	20.3449	20.3571	20.3569	20.3014	19.9575	19.4582	19.0468 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9928	0.9857	0.9684	0.9072	0.7658	0.5498	0.3829	0.4368	0.7150	0.9354	0.9848	0.9941 (94)
Useful gains	624.1705	700.5259	753.0934	792.4207	721.7990	517.8038	343.7627	360.1612	535.2893	620.8632	607.0727	600.7875 (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	1406.0770	1363.5404	1236.3012	1032.6173	794.3903	527.2207	344.8012	362.2455	572.0106	870.1067	1155.6426	1396.5373 (97)
Space heating kWh	581.7384	445.5458	359.5066	172.9416	54.0079	0.0000	0.0000	0.0000	0.0000	185.4372	394.9703	592.0379 (98a)
Space heating requirement - total per year (kWh/year)												2786.1856
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	581.7384	445.5458	359.5066	172.9416	54.0079	0.0000	0.0000	0.0000	0.0000	185.4372	394.9703	592.0379 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2786.1856
Space heating per m ²												34.2746 (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)

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Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	581.7384	445.5458	359.5066	172.9416	54.0079	0.0000	0.0000	0.0000	0.0000	185.4372	394.9703	592.0379 (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)	630.2692	482.7148	389.4979	187.3690	58.5135	0.0000	0.0000	0.0000	0.0000	200.9070	427.9202	641.4278 (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	232.0985	205.2409	218.2443	192.6499	187.2026	169.2013	167.4866	173.9294	175.5810	195.1411	206.6580	229.6900 (64)
Efficiency of water heater	86.0328	85.7500	85.1714	83.8186	81.6529	79.8000	79.8000	79.8000	79.8000	83.9455	85.4882	79.8000 (216)
Fuel for water heating, kWh/month	269.7790	239.3480	256.2412	229.8415	229.2662	212.0317	209.8830	217.9567	220.0263	232.4615	241.7388	266.8142 (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	23.6866	19.0023	17.1094	12.5351	9.6825	7.9107	8.8327	11.4810	14.9127	19.5663	22.1001	24.3449 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.6517	-32.0086	-48.2168	-56.8952	-63.6956	-60.3023	-59.5580	-55.0580	-47.5363	-37.7663	-24.3222	-18.5495 (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)	-8.1045	-17.3963	-35.2353	-53.9036	-72.2486	-72.9591	-72.1092	-60.6132	-43.8456	-25.2066	-10.9243	-6.3838 (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												3018.6193 (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												2825.3881 (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)												191.1643 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1004.4905 (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												5116.6812 (238)

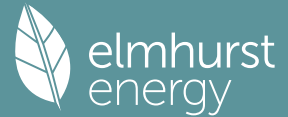
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3018.6193	0.2100	633.9100 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2825.3881	0.2100	593.3315 (264)
Space and water heating			1227.2415 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	191.1643	0.1443	27.5909 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-525.5604	0.1336	-70.2172
PV Unit electricity exported	-478.9301	0.1254	-60.0374
Total			-130.2545 (269)
Total CO2, kg/year			1136.5072 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.9800 (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	3018.6193	1.1300	3411.0398 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2825.3881	1.1300	3192.6885 (278)
Space and water heating			6603.7283 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	191.1643	1.5338	293.2142 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-525.5604	1.4937	-785.0419
PV Unit electricity exported	-478.9301	0.4601	-220.3659
Total			-1005.4078 (283)
Total Primary energy kWh/year			6021.6355 (286)
Target Primary Energy Rate (TPER)			74.0800 (287)

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Property Reference	2 Bed 2nd Floor Flat - NW				Issued on Date	17/06/2024	
Assessment Reference	2 Bed 2nd Floor Flat_Copy			Prop Type Ref	2 Bed 2nd Floor Flat - NW		
Property	1 Bed 1st Floor Flat - NW, 1 Bed 1st Floor Flat - NW, North Hill , London, N10						
SAP Rating	80 C	DER	4.73	TER	14.48		
Environmental	96 A	% DER < TER				67.33	
CO ₂ Emissions (t/year)	0.35	DFEE	43.73	TFEE	43.70		
Compliance Check	See BREL	% DFEE < TFEE				-0.07	
% DPER < TPER	34.61	DPER	50.18	TPER	76.74		
Assessor Details	Miss Nimco Ali				Assessor ID	R572-0001	
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	81.2900	3.0000	243.8700
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	81.2900		
Dwelling volume			

2. Ventilation rate

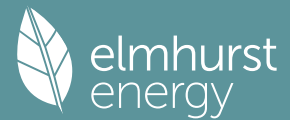
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1388 (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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (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
Glazing (Uw = 0.85)			14.9900	0.8221	12.3225		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
External Wall	79.2000	14.9900	64.2100	0.1600	10.2736	150.0000	9631.5000 (29a)
Corridor	35.4600	2.0000	33.4600	0.1800	6.0228	150.0000	5019.0000 (29a)
Terrace Roof	23.1900		23.1900	0.1400	3.2466	9.0000	208.7100 (30)
Total net area of external elements Aum(A, m ²)			137.8500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.8655		(33)
Party Wall 1			15.2400	0.0000	0.0000	70.0000	1066.8000 (32)
Party Floor 1			81.2900			40.0000	3251.6000 (32d)
Party Ceiling 1			58.1000			30.0000	1743.0000 (32b)
Internal Wall 1			78.1800			9.0000	703.6200 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		21624.2300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.0134 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	34.8300	0.0900	3.1347
E7 Party floor between dwellings (in blocks of flats)	23.6400	0.1100	2.6004
E16 Corner (normal)	9.0000	0.0900	0.8100
E16 Corner (normal)	6.0000	0.1400	0.8400
E17 Corner (inverted - internal area greater than external area)	3.0000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E2 Other lintels (including other steel lintels)	7.4200	0.0500	0.3710
E3 Sill	6.4700	0.1000	0.6470
E4 Jamb	32.3800	0.0600	1.9428
E18 Party wall between dwellings	6.0000	0.0700	0.4200
E18 Party wall between dwellings	3.0000	0.1000	0.3000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.5200	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.3900	0.2500	1.3475
P4 Party wall - Roof (insulation at ceiling level)	2.6400	0.0800	0.2112
E24 Eaves (insulation at ceiling level - inverted)	12.5800	0.1600	2.0128
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			14.3674 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	48.2329 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.9687	22.6895	22.4104	21.0146	20.7354	19.3397	19.3397	19.0605	19.8980	20.7354	21.2937	21.8520 (38)
Average = Sum(39)m / 12 =	71.2016	70.9224	70.6433	69.2475	68.9684	67.5726	67.5726	67.2934	68.1309	68.9684	69.5267	70.0850 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8759	0.8725	0.8690	0.8519	0.8484	0.8313	0.8313	0.8278	0.8381	0.8484	0.8553	0.8622 (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	2.4869 (42)											
Hot water usage for mixer showers	65.9165	64.9260	63.4825	60.7206	58.6824	56.4094	55.1175	56.5500	58.1204	60.5609	63.3821	65.6640 (42a)
Hot water usage for baths	28.4695	28.0467	27.4513	26.3535	25.5314	24.6199	24.1276	24.7188	25.3625	26.3379	27.4583	28.3733 (42b)
Hot water usage for other uses	40.0982	38.6400	37.1819	35.7238	34.2657	32.8076	32.8076	34.2657	35.7238	37.1819	38.6400	40.0982 (42c)
Average daily hot water use (litres/day)	31.9485	28.1122	29.5363	25.2156	23.9244	20.9964	20.3277	21.4584	22.0491	25.2565	27.6703	31.5035 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	134.4842	131.6127	128.1157	122.7979	118.4795	113.8369	112.0526	115.5345	119.2068	124.0807	129.4804	134.1354 (44)
Energy content (annual)	212.9901	187.4147	196.9090	168.1041	159.4962	139.9758	135.5179	143.0559	146.9939	168.3764	184.4686	210.0236 (45)
Distribution loss (46)m = 0.15 x (45)m	31.9485	28.1122	29.5363	25.2156	23.9244	20.9964	20.3277	21.4584	22.0491	25.2565	27.6703	31.5035 (46)
Water storage loss:	180.0000 (47)											
Store volume	1.4000 (48)											
a) If manufacturer declared loss factor is known (kWh/day):	0.5400 (49)											
Temperature factor from Table 2b	0.7560 (55)											
Enter (49) or (54) in (55)	23.4360 (56)											
Total storage loss	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360 (56)
If cylinder contains dedicated solar storage	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360 (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	259.6885	229.5939	243.6074	213.2961	206.1946	185.1678	182.2163	189.7543	192.1859	215.0748	229.6606	256.7220 (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	259.6885	229.5939	243.6074	213.2961	206.1946	185.1678	182.2163	189.7543	192.1859	215.0748	229.6606	256.7220 (64)
12Total per year (kWh/year)	2603.1622 (64)											
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	108.1779	96.0587	102.8310	92.0482	90.3912	82.6955	82.4184	84.9248	85.0291	93.3439	97.4894	107.1916 (65)

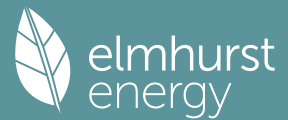
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	116.6876	129.1899	116.6876	120.5772	116.6876	120.5772	116.6876	116.6876	120.5772	116.6876	120.5772	116.6876 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	222.1155	224.4203	218.6122	206.2472	190.6387	175.9689	166.1686	163.8637	169.6719	182.0368	197.6454	212.3151 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344 (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)	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753 (71)
Water heating gains (Table 5)	145.4004	142.9446	138.2137	127.8448	121.4936	114.8549	110.7775	114.1462	118.0959	125.4622	135.4020	144.0747 (72)
Total internal gains	544.5068	556.8580	533.8167	514.9724	489.1231	471.7043	453.9369	455.0009	468.6483	484.4899	513.9278	533.3807 (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
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Northeast			6.5600		11.2829		0.3200		0.7000		0.7700		11.4897 (75)
Southwest			3.7800		36.7938		0.3200		0.7000		0.7700		21.5898 (79)
Northwest			4.6500		11.2829		0.3200		0.7000		0.7700		8.1444 (81)

Solar gains	41.2238	76.7410	122.3230	180.5995	228.7886	238.7915	225.3692	187.6357	142.2230	89.4858	50.5642	34.5105 (83)
Total gains	585.7306	633.5990	656.1397	695.5719	717.9117	710.4958	679.3061	642.6366	610.8713	573.9757	564.4920	567.8912 (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	84.3623	84.6944	85.0290	86.7429	87.0940	88.8930	88.8930	89.2618	88.1646	87.0940	86.3946	85.7064	
alpha	6.6242	6.6463	6.6686	6.7829	6.8063	6.9262	6.9262	6.9508	6.8776	6.8063	6.7596	6.7138	
util living area	0.9953	0.9910	0.9809	0.9372	0.8179	0.6009	0.4369	0.4801	0.7360	0.9468	0.9888	0.9961 (86)	
Living	20.2013	20.3223	20.4977	20.7538	20.9281	20.9926	20.9993	20.9987	20.9728	20.7698	20.4600	20.1918	
Non living	19.2595	19.4154	19.6387	19.9619	20.1532	20.2223	20.2261	20.2288	20.2033	19.9877	19.6025	19.2566	
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	20.5914	20.3223	20.4977	20.7538	20.9281	20.9926	20.9993	20.9987	20.9728	20.7698	20.4600	20.3049 (87)	
Th 2	20.1880	20.1910	20.1939	20.2086	20.2116	20.2263	20.2263	20.2293	20.2204	20.2116	20.2057	20.1998 (88)	
util rest of house	0.9938	0.9881	0.9745	0.9170	0.7699	0.5318	0.3605	0.4006	0.6661	0.9255	0.9847	0.9948 (89)	
MIT 2	19.8178	19.4154	19.6387	19.9619	20.1532	20.2223	20.2261	20.2288	20.2033	19.9877	19.6025	19.4266 (90)	
Living area fraction									fLA = Living area / (4) =			0.3731 (91)	
MIT	20.1065	19.7538	19.9592	20.2574	20.4423	20.5097	20.5146	20.5161	20.4904	20.2795	19.9225	19.7543 (92)	
Temperature adjustment												0.0000	
adjusted MIT	20.1065	19.7538	19.9592	20.2574	20.4423	20.5097	20.5146	20.5161	20.4904	20.2795	19.9225	19.7543 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9936	0.9861	0.9723	0.9184	0.7847	0.5575	0.3890	0.4303	0.6913	0.9276	0.9828	0.9939 (94)	
Useful gains	581.9916	624.8136	637.9433	638.7954	563.3750	396.0691	264.2829	276.5294	422.2956	532.4135	554.7813	564.4548 (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	1125.4464	1053.4648	950.8012	786.4687	602.9455	399.3366	264.5181	276.9839	435.3831	667.5816	891.5039	1090.1220 (97)	
Space heating kWh	404.3303	288.0536	232.7663	106.3248	29.4404	0.0000	0.0000	0.0000	0.0000	100.5651	242.4402	391.0963 (98a)	
Space heating requirement - total per year (kWh/year)												1795.0171	
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	404.3303	288.0536	232.7663	106.3248	29.4404	0.0000	0.0000	0.0000	0.0000	100.5651	242.4402	391.0963 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1795.0171	
Space heating per m2										(98c) / (4) =		22.0816 (99)	

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	635.1823	500.0371	511.4301	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9407	0.9768	0.9656	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	597.5219	488.4399	493.8417	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	769.1172	735.5591	694.7433	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	123.5486	183.8567	149.4708	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.7135 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	22.0378	32.7952	26.6617	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												81.4947 (107)

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 %)												263.1197 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	404.3303	288.0536	232.7663	106.3248	29.4404	0.0000	0.0000	0.0000	0.0000	100.5651	242.4402	391.0963 (98)
Space heating efficiency (main heating system 1)	263.1197	263.1197	263.1197	263.1197	263.1197	0.0000	0.0000	0.0000	0.0000	263.1197	263.1197	263.1197 (210)
Space heating fuel (main heating system)	153.6678	109.4763	88.4640	40.4093	11.1890	0.0000	0.0000	0.0000	0.0000	38.2203	92.1407	148.6382 (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	259.6885	229.5939	243.6074	213.2961	206.1946	185.1678	182.2163	189.7543	192.1859	215.0748	229.6606	256.7220 (64)
Efficiency of water heater												171.1051 (216)

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(217)m	171.1051	171.1051	171.1051	171.1051	171.1051	171.1051	171.1051	171.1051	171.1051	171.1051	171.1051	171.1051	(217)
Fuel for water heating, kWh/month	151.7714	134.1830	142.3730	124.6580	120.5076	108.2188	106.4938	110.8993	112.3204	125.6975	134.2220	150.0377	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	6.7601	10.0599	8.1784	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	18.3200	16.5471	18.3200	17.7290	18.3200	17.7290	18.3200	18.3200	17.7290	18.3200	17.7290	18.3200	(231)
Lighting	26.3000	21.0988	18.9972	13.9181	10.7508	8.7835	9.8072	12.7478	16.5581	21.7251	24.5385	27.0310	(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												682.2055	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												171.1051	
Water heating fuel used												1521.3824	(219)
Space cooling fuel												24.9984	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)													
mechanical ventilation fans (SFP = 0.7250)												215.7030	(230a)
Total electricity for the above, kWh/year												215.7030	(231)
Electricity for lighting (calculated in Appendix L)												212.2561	(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												2656.5454	(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	682.2055	0.1564	106.6938 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1521.3824	0.1410	214.4736 (264)
Space and water heating			321.1673 (265)
Space cooling	24.9984	0.1138	2.8438 (266)
Pumps, fans and electric keep-hot	215.7030	0.1387	29.9207 (267)
Energy for lighting	212.2561	0.1443	30.6351 (268)
Total CO2, kg/year			384.5669 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.7300 (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	682.2055	1.5790	1077.2015 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1521.3824	1.5213	2314.4334 (278)
Space and water heating			3391.6349 (279)
Space cooling	24.9984	1.4194	35.4818 (280)
Pumps, fans and electric keep-hot	215.7030	1.5128	326.3155 (281)
Energy for lighting	212.2561	1.5338	325.5655 (282)
Total Primary energy kWh/year			4078.9977 (286)
Dwelling Primary energy Rate (DPER)			50.1800 (287)

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

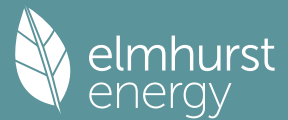
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	81.2900 (1b)	x 3.0000 (2b)	= 243.8700 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	81.2900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 243.8700 (5)

2. Ventilation rate

m3 per hour

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Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	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	Air changes per hour	0.1230 (8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			5.0000	(17)
Infiltration rate			0.3730	(18)
Number of sides sheltered			1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3450	(21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	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)
Effective ac	0.4399	0.4313	0.4227	0.3795	0.3709	0.3278	0.3278	0.3192	0.3450	0.3709	0.3882	0.4054 (22b)
	0.5968	0.5930	0.5893	0.5720	0.5688	0.5537	0.5537	0.5509	0.5595	0.5688	0.5753	0.5822 (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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			14.9900	1.1450	17.1641		(27)
External Wall	79.2000	14.9900	64.2100	0.1800	11.5578		(29a)
Corridor	35.4600	2.0000	33.4600	0.1800	6.0228		(29a)
Terrace Roof	23.1900		23.1900	0.1100	2.5509		(30)
Total net area of external elements Aum(A, m2)			137.8500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.2956		(33)
Party Wall 1			15.2400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							273.1607 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E7 Party floor between dwellings (in blocks of flats)	34.8300	0.0700	2.4381
E7 Party floor between dwellings (in blocks of flats)	23.6400	0.0700	1.6548
E16 Corner (normal)	9.0000	0.0900	0.8100
E16 Corner (normal)	6.0000	0.0900	0.5400
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E17 Corner (inverted - internal area greater than external area)	3.0000	-0.0900	-0.2700
E2 Other lintels (including other steel lintels)	7.4200	0.0500	0.3710
E3 Sill	6.4700	0.0500	0.3235
E4 Jamb	32.3800	0.0500	1.6190
E18 Party wall between dwellings	6.0000	0.0600	0.3600
E18 Party wall between dwellings	3.0000	0.0600	0.1800
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.5200	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.3900	0.0200	0.1078
P4 Party wall - Roof (insulation at ceiling level)	2.6400	0.1200	0.3168
E24 Eaves (insulation at ceiling level - inverted)	12.5800	0.2400	3.0192
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.2002 (36)
Point Thermal Bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 50.4958 (37)

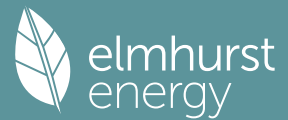
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	48.0261	47.7237	47.4273	46.0351	45.7746	44.5620	44.5620	44.3374	45.0291	45.7746	46.3015	46.8524 (38)
Average = Sum(39)m / 12 =	98.5219	98.2195	97.9231	96.5309	96.2704	95.0578	95.0578	94.8333	95.5249	96.2704	96.7974	97.3483 (39)
												96.5296
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2120	1.2083	1.2046	1.1875	1.1843	1.1694	1.1694	1.1666	1.1751	1.1843	1.1908	1.1975 (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												2.4869 (42)
Hot water usage for mixer showers	65.9165	64.9260	63.4825	60.7206	58.6824	56.4094	55.1175	56.5500	58.1204	60.5609	63.3821	65.6640 (42a)
Hot water usage for baths	28.4695	28.0467	27.4513	26.3535	25.5314	24.6199	24.1276	24.7188	25.3625	26.3379	27.4583	28.3733 (42b)
Hot water usage for other uses	40.0982	38.6400	37.1819	35.7238	34.2657	32.8076	32.8076	34.2657	35.7238	37.1819	38.6400	40.0982 (42c)
Average daily hot water use (litres/day)												123.6214 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	134.4842	131.6127	128.1157	122.7979	118.4795	113.8369	112.0526	115.5345	119.2068	124.0807	129.4804	134.1354 (44)
Energy content (annual)	212.9901	187.4147	196.9090	168.1041	159.4962	139.9758	135.5179	143.0559	146.9939	168.3764	184.4686	210.0236 (45)
Distribution loss (46)m = 0.15 x (45)m	31.9485	28.1122	29.5363	25.2156	23.9244	20.9964	20.3277	21.4584	22.0491	25.2565	27.6703	31.5035 (46)
Water storage loss:												
Store volume												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5520 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8381 (55)
Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (56)
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (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)

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Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
WWHRS	262.2328	231.8919	246.1517	215.7583	208.7389	187.6300	184.7606	192.2986	194.6481	217.6190	232.1228	259.2663 (62)
PV diverter	-30.1343	-26.6510	-27.9074	-23.1084	-21.5362	-18.4287	-17.2740	-18.3691	-19.0671	-22.4780	-25.4648	-29.5763 (63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
	232.0985	205.2409	218.2443	192.6499	187.2026	169.2013	167.4866	173.9294	175.5810	195.1411	206.6580	229.6900 (64)
Total per year (kWh/year) = Sum(64)m =											2353.1237 (64)	2353 (64)
12Total per year (kWh/year)												
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)	0.0000 (64a)
Heat gains from water heating, kWh/month												
	110.2133	97.8972	104.8664	94.0180	92.4266	84.6653	84.4538	86.9602	86.9988	95.3793	99.4592	109.2270 (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	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441	124.3441 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	113.9982	126.2123	113.9982	117.7982	113.9982	117.7982	113.9982	113.9982	117.7982	113.9982	117.7982	113.9982 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	222.1155	224.4203	218.6122	206.2472	190.6387	175.9689	166.1686	163.8637	169.6719	182.0368	197.6454	212.3151 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344	35.4344 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753	-99.4753 (71)
Water heating gains (Table 5)	148.1362	145.6803	140.9494	130.5805	124.2293	117.5907	113.5132	116.8820	120.8317	128.1979	138.1377	146.8105 (72)
Total internal gains	547.5532	559.6162	536.8630	517.9292	492.1695	471.6610	453.9833	455.0472	468.6050	487.5363	516.8845	536.4271 (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				6.5600	11.2829	0.6300	0.7000	0.7700	22.6203 (75)			
Southwest				3.7800	36.7938	0.6300	0.7000	0.7700	42.5049 (79)			
Northwest				4.6500	11.2829	0.6300	0.7000	0.7700	16.0342 (81)			
Solar gains	81.1593	151.0838	240.8234	355.5552	450.4275	470.1207	443.6956	369.4079	280.0015	176.1751	99.5484	67.9425 (83)
Total gains	628.7125	710.7000	777.6864	873.4843	942.5970	941.7817	897.6789	824.4551	748.6066	663.7114	616.4329	604.3696 (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	62.6066	62.7993	62.9894	63.8979	64.0708	64.8881	64.8881	65.0417	64.5708	64.0708	63.7220	63.3614
alpha	5.1738	5.1866	5.1993	5.2599	5.2714	5.3259	5.3259	5.3361	5.3047	5.2714	5.2481	5.2241
util living area	0.9957	0.9912	0.9797	0.9347	0.8182	0.6222	0.4616	0.5206	0.7834	0.9582	0.9909	0.9965 (86)
MIT	19.7606	19.9331	20.1990	20.5708	20.8484	20.9725	20.9953	20.9914	20.9111	20.5538	20.1035	19.7407 (87)
Th 2	19.9104	19.9134	19.9163	19.9300	19.9326	19.9446	19.9446	19.9446	19.9400	19.9326	19.9274	19.9274 (88)
util rest of house	0.9942	0.9881	0.9722	0.9108	0.7599	0.5300	0.3533	0.4059	0.6979	0.9377	0.9871	0.9953 (89)
MIT 2	18.4861	18.7076	19.0451	19.5083	19.8130	19.9306	19.9433	19.9442	19.8844	19.4998	18.9359	18.4690 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.9616	19.1648	19.4756	19.9047	20.1993	20.3193	20.3358	20.3349	20.2674	19.8931	19.3716	18.9435 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9616	19.1648	19.4756	19.9047	20.1993	20.3193	20.3358	20.3349	20.2674	19.8931	19.3716	18.9435 (93)

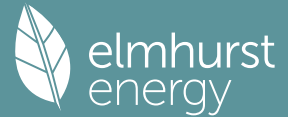
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9923	0.9852	0.9683	0.9101	0.7757	0.5638	0.3939	0.4490	0.7266	0.9368	0.9844	0.9937 (94)
Useful gains	623.8843	700.1810	753.0118	794.9528	731.1833	530.9558	353.5757	370.1687	543.9436	621.7593	606.7885	600.5359 (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	1444.4908	1401.0863	1270.6132	1062.2928	818.2301	543.6674	355.1172	373.1609	589.1447	894.6506	1187.8552	1435.2498 (97)
Space heating kWh	610.5312	471.0084	385.0954	192.4848	64.7628	0.0000	0.0000	0.0000	0.0000	203.0311	418.3680	621.0271 (98a)
Space heating requirement - total per year (kWh/year)												2966.3088
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	610.5312	471.0084	385.0954	192.4848	64.7628	0.0000	0.0000	0.0000	0.0000	203.0311	418.3680	621.0271 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2966.3088
Space heating per m ²												(98c) / (4) =

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)

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Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	610.5312	471.0084	385.0954	192.4848	64.7628	0.0000	0.0000	0.0000	0.0000	203.0311	418.3680	621.0271 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	661.4639	510.3016	417.2215	208.5426	70.1656	0.0000	0.0000	0.0000	0.0000	219.9686	453.2697	672.8355 (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	232.0985	205.2409	218.2443	192.6499	187.2026	169.2013	167.4866	173.9294	175.5810	195.1411	206.6580	229.6900 (64)
Efficiency of water heater	86.1245	85.8610	85.3193	84.0579	81.9344	79.8000	79.8000	79.8000	79.8000	84.1488	85.6077	79.8000 (216)
Fuel for water heating, kWh/month	269.4918	239.0385	255.7971	229.1872	228.4786	212.0317	209.8830	217.9567	220.0263	231.9000	241.4013	86.1759 (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	23.6866	19.0023	17.1094	12.5351	9.6825	7.9107	8.8327	11.4810	14.9127	19.5663	22.1001	24.3449 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.6517	-32.0086	-48.2168	-56.8952	-63.6956	-60.3023	-59.5580	-55.0580	-47.5363	-37.7663	-24.3222	-18.5495 (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)	-8.1045	-17.3963	-35.2353	-53.9036	-72.2486	-72.9591	-72.1092	-60.6132	-43.8456	-25.2066	-10.9243	-6.3838 (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												3213.7690 (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												2821.7284 (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)												191.1643 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1004.4905 (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												5308.1712 (238)

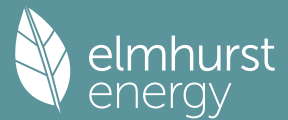
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3213.7690	0.2100	674.8915 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2821.7284	0.2100	592.5630 (264)
Space and water heating			1267.4544 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	191.1643	0.1443	27.5909 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-525.5604	0.1336	-70.2172
PV Unit electricity exported	-478.9301	0.1254	-60.0374
Total			-130.2545 (269)
Total CO2, kg/year			1176.7201 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.4800 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	3213.7690	1.1300	3631.5589 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2821.7284	1.1300	3188.5531 (278)
Space and water heating			6820.1120 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	191.1643	1.5338	293.2142 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-525.5604	1.4937	-785.0419
PV Unit electricity exported	-478.9301	0.4601	-220.3659
Total			-1005.4078 (283)
Total Primary energy kWh/year			6238.0192 (286)
Target Primary Energy Rate (TPER)			76.7400 (287)

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Property Reference	2 Bed Ground Floor Flat				Issued on Date	17/06/2024
Assessment Reference	2 Bed Ground Floor Flat			Prop Type Ref	2 Bed Ground Floor Flat	
Property	2B Ground Floor Flat, 2B Ground Floor Flat, North Hill , London, N10					
SAP Rating	77 C	DER	5.78	TER	17.30	
Environmental	95 A	% DER < TER				66.59
CO ₂ Emissions (t/year)	0.38	DFEE	52.92	TFEE	54.03	
Compliance Check	See BREL	% DFEE < TFEE				2.07
% DPER < TPER	33.52	DPER	61.18	TPER	92.02	
Assessor Details	Miss Nimco Ali				Assessor ID	R572-0001
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	71.3500	3.3000	235.4550
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.3500		
Dwelling volume			235.4550

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	1 (19)

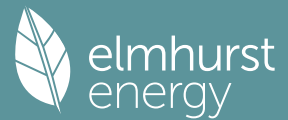
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1388 (21)

	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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												78.3000 (23c)
Effective ac	0.2854	0.2819	0.2785	0.2611	0.2577	0.2403	0.2403	0.2368	0.2473	0.2577	0.2646	0.2715 (25)

3. Heat losses and heat loss parameter

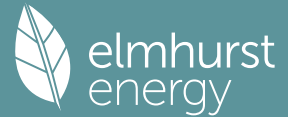
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Glazing (Uw = 0.85)			14.9900	0.8221	12.3225		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
Exposed Floor			27.6600	0.1400	3.8724	110.0000	3042.6000 (28b)
External Wall	77.6800	14.9900	62.6900	0.1600	10.0304	150.0000	9403.5000 (29a)
Corridor	51.1500	2.0000	49.1500	0.1800	8.8470	150.0000	7372.5000 (29a)
Total net area of external elements Aum(A, m ²)			156.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.0723		(33)
Party Floor 1			43.6900			40.0000	1747.6000 (32d)
Party Ceiling 1			71.3500			30.0000	2140.5000 (32b)
Internal Wall			74.2800			9.0000	668.5200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	24375.2200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							341.6289 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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E20 Exposed floor (normal)						10.5800	0.2000	2.1160				
E20 Exposed floor (normal)						5.7400	0.2600	1.4924				
E7 Party floor between dwellings (in blocks of flats)						36.1400	0.0900	3.2526				
E7 Party floor between dwellings (in blocks of flats)						15.5000	0.1100	1.7050				
E16 Corner (normal)						13.2000	0.0900	1.1880				
E16 Corner (normal)						6.6000	0.1400	0.9240				
E17 Corner (inverted - internal area greater than external area)						6.6000	0.0000	0.0000				
E2 Other lintels (including other steel lintels)						7.4200	0.0500	0.3710				
E3 Sill						6.4700	0.1000	0.6470				
E4 Jamb						32.3800	0.0600	1.9428				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												13.6388 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 50.7111 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	22.1761	21.9066	21.6371	20.2895	20.0199	18.6723	18.6723	18.4028	19.2114	20.0199	20.5590	21.0980 (38)
Average = Sum(39)m / 12 =	72.8872	72.6177	72.3482	71.0006	70.7311	69.3835	69.3835	69.1139	69.9225	70.7311	71.2701	71.8092 (39)
												70.9332
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0215	1.0178	1.0140	0.9951	0.9913	0.9724	0.9724	0.9687	0.9800	0.9913	0.9989	1.0064 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.9942
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.2784 (42)
Hot water usage for mixer showers												
	62.4217	61.4837	60.1167	57.5013	55.5711	53.4187	52.1952	53.5518	55.0389	57.3500	60.0216	62.1826 (42a)
Hot water usage for baths												
	26.9666	26.5661	26.0021	24.9623	24.1836	23.3202	22.8539	23.4139	24.0237	24.9475	26.0088	26.8755 (42b)
Hot water usage for other uses												
	37.9636	36.5831	35.2026	33.8221	32.4416	31.0611	31.0611	32.4416	33.8221	35.2026	36.5831	37.9636 (42c)
Average daily hot water use (litres/day)												117.0654 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	127.3520	124.6329	121.3215	116.2857	112.1964	107.8000	106.1102	109.4074	112.8847	117.5002	122.6136	127.0216 (44)
Energy content (annual)	201.6944	177.4756	186.4666	159.1892	151.0379	132.5527	128.3311	135.4692	139.1982	159.4466	174.6855	198.8852 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1944.4321
	30.2542	26.6213	27.9700	23.8784	22.6557	19.8829	19.2497	20.3204	20.8797	23.9170	26.2028	29.8328 (46)
Water storage loss:												
Store volume												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.4000 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												1.0920 (55)
Total storage loss												
	33.8520	30.5760	33.8520	32.7600	33.8520	32.7600	33.8520	33.8520	32.7600	33.8520	32.7600	33.8520 (56)
If cylinder contains dedicated solar storage												
	33.8520	30.5760	33.8520	32.7600	33.8520	32.7600	33.8520	33.8520	32.7600	33.8520	32.7600	33.8520 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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												
	290.4040	257.6004	275.1762	245.0372	239.7475	187.8247	185.4455	192.5836	194.4702	248.1562	260.5335	287.5948 (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	290.4040	257.6004	275.1762	245.0372	239.7475	187.8247	185.4455	192.5836	194.4702	248.1562	260.5335	287.5948 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2864.5737 (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	110.9495	98.6497	105.8862	95.4008	94.1062	62.0834	61.2800	63.6534	64.2930	96.9021	100.5533	110.0154 (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	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	102.9148	113.9414	102.9148	106.3453	102.9148	106.3453	102.9148	102.9148	106.3453	102.9148	106.3453	102.9148 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	200.4271	202.5069	197.2659	186.1083	172.0239	158.7865	149.9432	147.8634	153.1044	164.2620	178.3464	191.5838 (68)
Pumps, fans	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379 (71)
Total internal gains	149.1256	146.8001	142.3202	132.5011	126.4868	86.2269	82.3656	85.5557	89.2958	130.2447	139.6574	147.8702 (72)
	509.6443	520.4251	499.6776	482.1315	458.6022	408.5355	392.4003	393.5105	405.9222	454.5982	481.5258	499.5454 (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	6.5600											11.4897 (75)
Southwest	3.7800											21.5898 (79)
Northwest	4.6500											8.1444 (81)

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Solar gains	41.2238	76.7410	122.3230	180.5995	228.7886	238.7915	225.3692	187.6357	142.2230	89.4858	50.5642	34.5105 (83)
Total gains	550.8680	597.1661	622.0006	662.7309	687.3908	647.3269	617.7695	581.1463	548.1452	544.0840	532.0900	534.0559 (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	92.8955	93.2403	93.5876	95.3639	95.7273	97.5866	97.5866	97.9671	96.8343	95.7273	95.0033	94.2901
alpha	7.1930	7.2160	7.2392	7.3576	7.3818	7.5058	7.5058	7.5311	7.4556	7.3818	7.3336	7.2860
util living area	0.9982	0.9961	0.9906	0.9618	0.8604	0.6727	0.4929	0.5444	0.8185	0.9695	0.9951	0.9985 (86)
Living	20.2082	20.3183	20.4859	20.7359	20.9209	20.9897	20.9991	20.9982	20.9596	20.7520	20.4511	20.1997
Non living	19.1525	19.2953	19.5102	19.8296	20.0314	20.1017	20.1062	20.1091	20.0771	19.8557	19.4775	19.1515
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	20.5950	20.3183	20.4859	20.7359	20.9209	20.9897	20.9991	20.9982	20.9596	20.7520	20.4511	20.3116 (87)
Th 2	20.0654	20.0686	20.0717	20.0874	20.0906	20.1064	20.1064	20.1095	20.1000	20.0906	20.0843	20.0780 (88)
util rest of house	0.9974	0.9944	0.9862	0.9440	0.8071	0.5855	0.3936	0.4406	0.7381	0.9515	0.9926	0.9979 (89)
MIT 2	19.7015	19.2953	19.5102	19.8296	20.0314	20.1017	20.1062	20.1091	20.0771	19.8557	19.4775	19.3184 (90)
Living area fraction									fLA = Living area / (4) =			0.3417 (91)
MIT	20.0068	19.6448	19.8435	20.1393	20.3353	20.4052	20.4113	20.4129	20.3787	20.1620	19.8102	19.6578 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0068	19.6448	19.8435	20.1393	20.3353	20.4052	20.4113	20.4129	20.3787	20.1620	19.8102	19.6578 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9973	0.9934	0.9848	0.9452	0.8227	0.6154	0.4276	0.4763	0.7649	0.9532	0.9916	0.9975 (94)
Useful gains	549.3821	593.2260	612.5682	626.3916	565.5174	398.3818	264.1790	276.7921	419.3032	518.6258	527.6014	532.7113 (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	1144.8228	1070.7367	965.3817	797.9956	610.7866	402.7819	264.4385	277.3449	439.0203	676.3281	905.8564	1110.0112 (97)
Space heating kWh	443.0079	320.8871	262.4932	123.5549	33.6802	0.0000	0.0000	0.0000	0.0000	117.3305	272.3436	429.5111 (98a)
Space heating requirement - total per year (kWh/year)												2002.8085
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	443.0079	320.8871	262.4932	123.5549	33.6802	0.0000	0.0000	0.0000	0.0000	117.3305	272.3436	429.5111 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2002.8085
Space heating per m2										(98c) / (4) =		28.0702 (99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	652.2044	513.4375	525.2659	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9151	0.9661	0.9481	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	596.8303	496.0394	498.0064	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	707.5808	675.5354	634.3470	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	79.7404	133.5451	101.4374	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			0.7708 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	15.3669	25.7357	19.5482	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												60.6509 (107)

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 %)												264.3272 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Cooling System Energy Efficiency Ratio (see Table 10c)												3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	443.0079	320.8871	262.4932	123.5549	33.6802	0.0000	0.0000	0.0000	0.0000	117.3305	272.3436	429.5111 (98)
Space heating efficiency (main heating system 1)	264.3272	264.3272	264.3272	264.3272	264.3272	0.0000	0.0000	0.0000	0.0000	264.3272	264.3272	264.3272 (210)
Space heating fuel (main heating system)	167.5983	121.3977	99.3062	46.7432	12.7419	0.0000	0.0000	0.0000	0.0000	44.3884	103.0327	162.4922 (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	290.4040	257.6004	275.1762	245.0372	239.7475	187.8247	185.4455	192.5836	194.4702	248.1562	260.5335	287.5948 (64)
Efficiency of water heater (217)m	170.9400	170.9400	170.9400	170.9400	170.9400	170.9400	170.9400	170.9400	170.9400	170.9400	170.9400	170.9400 (216)
Fuel for water heating, kWh/month	169.8865	150.6964	160.9782	143.3469	140.2524	109.8776	108.4857	112.6615	113.7652	145.1715	152.4123	168.2431 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	4.7138	7.8944	5.9964	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	17.6878	15.9761	17.6878	17.1173	17.6878	17.1173	17.6878	17.6878	17.1173	17.6878	17.1173	17.6878 (231)

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Lighting	22.1523	17.7714	16.0012	11.7231	9.0553	7.3982	8.2605	10.7374	13.9468	18.2989	20.6686	22.7680 (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												757.7005 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												170.9400
Water heating fuel used												1675.7773 (219)
Space cooling fuel												18.6046 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7250)												
mechanical ventilation fans (SFP = 0.7250)												208.2599 (230a)
Total electricity for the above, kWh/year												208.2599 (231)
Electricity for lighting (calculated in Appendix L)												178.7816 (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												2839.1239 (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	757.7005	0.1562	118.3832 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1675.7773	0.1416	237.3504 (264)
Space and water heating			355.7336 (265)
Space cooling	18.6046	0.1136	2.1135 (266)
Pumps, fans and electric keep-hot	208.2599	0.1387	28.8882 (267)
Energy for lighting	178.7816	0.1443	25.8037 (268)
Total CO2, kg/year			412.5390 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.7800 (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	757.7005	1.5784	1195.9779 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1675.7773	1.5238	2553.5006 (278)
Space and water heating			3749.4785 (279)
Space cooling	18.6046	1.4188	26.3965 (280)
Pumps, fans and electric keep-hot	208.2599	1.5128	315.0556 (281)
Energy for lighting	178.7816	1.5338	274.2212 (282)
Total Primary energy kWh/year			4365.1519 (286)
Dwelling Primary energy Rate (DPER)			61.1800 (287)

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

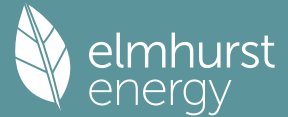
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	71.3500 (1b)	x 3.3000 (2b)	= 235.4550 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.3500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 235.4550 (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)

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Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1274 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3774	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3491 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000	(22)
Wind factor	1.2750 1.2500 1.2250 1.1000 1.0750 0.9500 0.9500 0.9250 1.0000 1.0750 1.1250 1.1750	(22a)
Adj infilt rate	0.4451 0.4364 0.4277 0.3840 0.3753 0.3317 0.3317 0.3229 0.3491 0.3753 0.3927 0.4102	(22b)
Effective ac	0.5991 0.5952 0.5914 0.5737 0.5704 0.5550 0.5550 0.5521 0.5609 0.5704 0.5771 0.5841	(25)

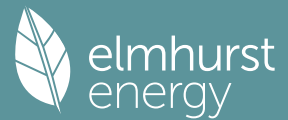
3. Heat losses and heat loss parameter

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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			14.9900	1.1450	17.1641		(27)
Exposed Floor			27.6600	0.1300	3.5958		(28b)
External Wall	77.6800	14.9900	62.6900	0.1800	11.2842		(29a)
Corridor	51.1500	2.0000	49.1500	0.1800	8.8470		(29a)
Total net area of external elements Aum(A, m2)			156.4900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.8911		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							351.6289 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E20 Exposed floor (normal)				10.5800	0.3200	3.3856	
E20 Exposed floor (normal)				5.7400	0.3200	1.8368	
E7 Party floor between dwellings (in blocks of flats)				36.1400	0.0700	2.5298	
E7 Party floor between dwellings (in blocks of flats)				15.5000	0.0700	1.0850	
E16 Corner (normal)				13.2000	0.0900	1.1880	
E16 Corner (normal)				6.6000	0.0900	0.5940	
E17 Corner (inverted - internal area greater than external area)				6.6000	-0.0900	-0.5940	
E2 Other lintels (including other steel lintels)				7.4200	0.0500	0.3710	
E3 Sill				6.4700	0.0500	0.3235	
E4 Jamb				32.3800	0.0500	1.6190	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.3387 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	55.2298 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)							
(38)m	Jan 46.5472 Feb 46.2483 Mar 45.9554 Apr 44.5793 May 44.3218 Jun 43.1233 Jul 43.1233 Aug 42.9014 Sep 43.5850 Oct 44.3218 Nov 44.8427 Dec 45.3872	(38)					
Heat transfer coeff	101.7770 101.4781 101.1852 99.8091 99.5516 98.3531 98.3531 98.1312 98.8148 99.5516 100.0725 100.6170	(39)					
Average = Sum(39)m / 12 =							99.8079
HLP	Jan 1.4264 Feb 1.4223 Mar 1.4182 Apr 1.3989 May 1.3953 Jun 1.3785 Jul 1.3785 Aug 1.3753 Sep 1.3849 Oct 1.3953 Nov 1.4026 Dec 1.4102	(40)					
HLP (average)							1.3988
Days in mont	31 28 31 30 31 30 31 31 30 31 30 31						

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2784 (42)
Hot water usage for mixer showers	62.4217	61.4837	60.1167	57.5013	55.5711	53.4187	52.1952	53.5518	55.0389	57.3500	60.0216	62.1826	(42a)
Hot water usage for baths	26.9666	26.5661	26.0021	24.9623	24.1836	23.3202	22.8539	23.4139	24.0237	24.9475	26.0088	26.8755	(42b)
Hot water usage for other uses	37.9636	36.5831	35.2026	33.8221	32.4416	31.0611	31.0611	32.4416	33.8221	35.2026	36.5831	37.9636	(42c)
Average daily hot water use (litres/day)												117.0654	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	127.3520	124.6329	121.3215	116.2857	112.1964	107.8000	106.1102	109.4074	112.8847	117.5002	122.6136	127.0216	(44)
Energy content (annual)	201.6944	177.4756	186.4666	159.1892	151.0379	132.5527	128.3311	135.4692	139.1982	159.4466	174.6855	198.8852	(45)
Distribution loss (46)m = 0.15 x (45)m	30.2542	26.6213	27.9700	23.8784	22.6557	19.8829	19.2497	20.3204	20.8797	23.9170	26.2028	29.8328	(46)
Water storage loss:													
Store volume													180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5520 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8381 (55)
Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	250.9370	221.9528	235.7092	206.8434	200.2806	180.2069	177.5738	184.7118	186.8524	208.6893	222.3397	248.1278	(62)
WWHRS	-28.5366	-25.2380	-26.4278	-21.8833	-20.3944	-17.4516	-16.3581	-17.3952	-18.0561	-21.2862	-24.1147	-28.0082	(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	222.4004	196.7148	209.2814	184.9602	179.8862	162.7553	161.2157	167.3166	168.7962	187.4031	198.2250	220.1197	(64)
12Total per year (kWh/year)												2259.0746	(64)
Electric shower(s)												2259	(64)

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	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	106.4575	94.5924	101.3943	91.0538	89.6142	82.1971	82.0642	84.4376	84.4067	92.4101	96.2063	105.5235 (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	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224	113.9224 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.3667	112.2274	101.3667	104.7456	101.3667	104.7456	101.3667	101.3667	104.7456	101.3667	104.7456	101.3667 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.4271	202.5069	197.2659	186.1083	172.0239	158.7865	149.9432	147.8634	153.1044	164.2620	178.3464	191.5838 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922	34.3922 (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)	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379	-91.1379 (71)
Water heating gains (Table 5)	143.0881	140.7625	136.2826	126.4636	120.4492	114.1627	110.3014	113.4914	117.2316	124.2072	133.6198	141.8326 (72)
Total internal gains	505.0586	515.6736	495.0919	477.4942	454.0165	434.8715	418.7879	419.8982	432.2583	450.0125	476.8885	494.9597 (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					6.5600	11.2829		0.6300	0.7000	0.7700		22.6203 (75)
Southwest					3.7800	36.7938		0.6300	0.7000	0.7700		42.5049 (79)
Northwest					4.6500	11.2829		0.6300	0.7000	0.7700		16.0342 (81)
Solar gains	81.1593	151.0838	240.8234	355.5552	450.4275	470.1207	443.6956	369.4079	280.0015	176.1751	99.5484	67.9425 (83)
Total gains	586.2179	666.7574	735.9153	833.0494	904.4440	904.9922	862.4835	789.3061	712.2598	626.1876	576.4369	562.9022 (84)

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)												21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	68.4741	68.6758	68.8746	69.8242	70.0048	70.8578	70.8578	71.0181	70.5268	70.0048	69.6404	69.2635
alpha	5.5649	5.5784	5.5916	5.6549	5.6670	5.7239	5.7239	5.7345	5.7018	5.6670	5.6427	5.6176
util living area	0.9982	0.9960	0.9894	0.9585	0.8598	0.6665	0.4969	0.5617	0.8316	0.9763	0.9959	0.9986 (86)
MIT	19.7793	19.9373	20.1896	20.5502	20.8370	20.9710	20.9954	20.9911	20.9014	20.5337	20.1024	19.7616 (87)
Th 2	19.7431	19.7463	19.7494	19.7642	19.7670	19.7799	19.7799	19.7823	19.7749	19.7670	19.7614	19.7555 (88)
util rest of house	0.9974	0.9941	0.9839	0.9369	0.7952	0.5536	0.3619	0.4188	0.7337	0.9596	0.9936	0.9979 (89)
MIT 2	18.3559	18.5598	18.8819	19.3356	19.6486	19.7679	19.7790	19.7804	19.7209	19.3271	18.7824	18.3423 (90)
Living area fraction									FLA = Living area / (4) =			0.3417 (91)
MIT	18.8423	19.0305	19.3288	19.7506	20.0547	20.1790	20.1947	20.1941	20.1243	19.7394	19.2335	18.8272 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8423	19.0305	19.3288	19.7506	20.0547	20.1790	20.1947	20.1941	20.1243	19.7394	19.2335	18.8272 (93)

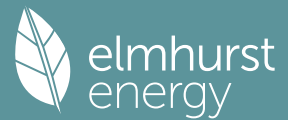
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9965	0.9925	0.9814	0.9366	0.8122	0.5922	0.4084	0.4683	0.7652	0.9591	0.9921	0.9972 (94)
Useful gains	584.1682	661.7454	722.2497	780.2370	734.5840	535.9481	352.2759	369.6571	545.0368	600.5691	571.8813	561.3280 (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	1480.0674	1433.9339	1298.0808	1082.9878	831.7225	548.7119	353.5452	372.3191	595.2893	909.8384	1214.2250	1471.7482 (97)
Space heating kWh	666.5490	518.9106	428.4183	217.9805	72.2710	0.0000	0.0000	0.0000	0.0000	230.0963	462.4875	677.3526 (98a)
Space heating requirement - total per year (kWh/year)												3274.0659
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	666.5490	518.9106	428.4183	217.9805	72.2710	0.0000	0.0000	0.0000	0.0000	230.0963	462.4875	677.3526 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3274.0659
Space heating per m2										(98c) / (4) =		45.8874 (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	666.5490	518.9106	428.4183	217.9805	72.2710	0.0000	0.0000	0.0000	0.0000	230.0963	462.4875	677.3526 (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)	722.1549	562.2000	464.1585	236.1653	78.3001	0.0000	0.0000	0.0000	0.0000	249.2918	501.0699	733.8598 (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)												

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Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
	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	222.4004	196.7148	209.2814	184.9602	179.8862	162.7553	161.2157	167.3166	168.7962	187.4031	198.2250	220.1197 (64)
Efficiency of water heater (217)m	86.3632	86.1298	85.6306	84.4291	82.1874	79.8000	79.8000	79.8000	79.8000	84.5212	85.8937	79.8000 (216)
Fuel for water heating, kWh/month	257.5177	228.3934	244.4004	219.0716	218.8731	203.9540	202.0246	209.6699	211.5241	221.7233	230.7796	254.7393 (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	21.0620	16.8967	15.2136	11.1461	8.6096	7.0341	7.8540	10.2089	13.2603	17.3983	19.6513	21.6474 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-19.1078	-28.3048	-42.7265	-50.5316	-56.6806	-53.7104	-53.0556	-48.9970	-42.2244	-33.4519	-21.4868	-16.3643 (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	-7.0098	-15.0589	-30.5212	-46.7190	-62.6406	-63.2560	-62.5116	-52.5301	-37.9834	-21.8208	-9.4498	-5.5201 (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												3547.2003 (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												2702.6711 (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)												169.9823 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-881.6631 (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												5624.1906 (238)

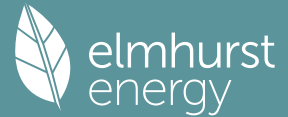
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3547.2003	0.2100	744.9121 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2702.6711	0.2100	567.5609 (264)
Space and water heating			1312.4730 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	169.9823	0.1443	24.5337 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-466.6418	0.1336	-62.3232
PV Unit electricity exported	-415.0213	0.1253	-52.0204
Total			-114.3436 (269)
Total CO2, kg/year			1234.5924 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			17.3000 (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	3547.2003	1.1300	4008.3364 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2702.6711	1.1300	3054.0183 (278)
Space and water heating			7062.3547 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	169.9823	1.5338	260.7246 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-466.6418	1.4935	-696.9504
PV Unit electricity exported	-415.0213	0.4601	-190.9397
Total			-887.8900 (283)
Total Primary energy kWh/year			6565.2900 (286)
Target Primary Energy Rate (TPER)			92.0200 (287)

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Property Reference	3 Bed Basement Flat				Issued on Date	17/06/2024
Assessment Reference	3 Bed Basement Flat	Prop Type Ref		3 Bed Basement Flat		
Property	3B Basement Flat, 3B Basement Flat, North Hill , London, N10					
SAP Rating	82 B	DER	3.79	TER	12.06	
Environmental	96 A	% DER < TER				68.57
CO ₂ Emissions (t/year)	0.47	DFEE	40.77	TFEE	42.82	
Compliance Check	See BREL	% DFEE < TFEE				4.79
% DPER < TPER	37.11	DPER	40.04	TPER	63.67	
Assessor Details	Miss Nimco Ali				Assessor ID	R572-0001
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	135.6200	2.8500	386.5170
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	135.6200		
Dwelling volume			386.5170

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	1 (19)

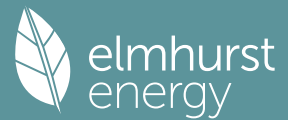
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1388 (21)

	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	0.1769	0.1734	0.1700	0.1526	0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												77.4000 (23c)
Effective ac	0.2899	0.2864	0.2830	0.2656	0.2622	0.2448	0.2448	0.2413	0.2518	0.2622	0.2691	0.2760 (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
Glazing (Uw = 0.85)			18.4500	0.8221	15.1668		(27)
Entrance Door			2.0000	1.0000	2.0000		(26)
Basement Floor			71.3500	0.1000	7.1350	110.0000	7848.5000 (28)
External Wall	128.1600	18.4500	109.7100	0.1600	17.5536	150.0000	16456.5000 (29a)
Corridor	15.8500	2.0000	13.8500	0.1800	2.4930	150.0000	2077.5000 (29a)
Exposed Ceiling to Corridor	24.0500		24.0500	0.1600	3.8480	9.0000	216.4500 (30)
Terrace Roof	2.7400		2.7400	0.1400	0.3836	9.0000	24.6600 (30)
Total net area of external elements Aum(A, m ²)			242.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.5800		(33)
Party Ceiling 1			44.5600			30.0000	1336.8000 (32b)
Internal Wall			118.3900			9.0000	1065.5100 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	29025.9200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							214.0239 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.8400	0.0500	0.4420
E3 Sill	7.8900	0.1000	0.7890
E4 Jamb	32.4600	0.0600	1.9476
E5 Ground floor (normal)	44.9700	0.1200	5.3964
E5 Ground floor (normal)	5.5600	0.2600	1.4456
E7 Party floor between dwellings (in blocks of flats)	44.9700	0.0900	4.0473
E7 Party floor between dwellings (in blocks of flats)	5.5600	0.1100	0.6116
E16 Corner (normal)	17.1000	0.0900	1.5390
E16 Corner (normal)	5.7000	0.1400	0.7980
E17 Corner (inverted - internal area greater than external area)	5.7000	-0.0900	-0.5130
E17 Corner (inverted - internal area greater than external area)	5.7000	0.0000	0.0000
E14 Flat roof	3.6700	0.1600	0.5872
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			17.0907 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	65.6707 (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	36.9777	36.5353	36.0928	33.8806	33.4382	31.2260	31.2260	30.7835	32.1109	33.4382	34.3231	35.2080	(38)
Heat transfer coeff	102.6484	102.2060	101.7636	99.5514	99.1089	96.8967	96.8967	96.4543	97.7816	99.1089	99.9938	100.8787	(39)
Average = Sum(39)m / 12 =												99.4407	
HLP	0.7569	0.7536	0.7504	0.7340	0.7308	0.7145	0.7145	0.7112	0.7210	0.7308	0.7373	0.7438	(40)
HLP (average)												0.7332	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9082 (42)
Hot water usage for mixer showers	72.9814	71.8847	70.2864	67.2286	64.9719	62.4553	61.0249	62.6110	64.3497	67.0518	70.1753	72.7018	(42a)
Hot water usage for baths	31.5076	31.0397	30.3807	29.1658	28.2560	27.2472	26.7023	27.3567	28.0691	29.1485	30.3885	31.4011	(42b)
Hot water usage for other uses	44.4133	42.7982	41.1832	39.5682	37.9532	36.3381	36.3381	37.9532	39.5682	41.1832	42.7982	44.4133	(42c)
Average daily hot water use (litres/day)												136.8747	(43)
Daily hot water use	148.9023	145.7226	141.8504	135.9625	131.1811	126.0407	124.0654	127.9209	131.9870	137.3835	143.3621	148.5162	(44)
Energy conte	235.8249	207.5070	218.0188	186.1259	176.5950	154.9817	150.0463	158.3927	162.7532	186.4281	204.2456	232.5404	(45)
Energy content (annual)										Total = Sum(45)m =		2273.4597	
Distribution loss (46)m = 0.15 x (45)m	35.3737	31.1261	32.7028	27.9189	26.4892	23.2473	22.5069	23.7589	24.4130	27.9642	30.6368	34.8811	(46)
Water storage loss:													
Store volume												180.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.4000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7560	(55)
Total storage loss	23.4360	21.1680	23.4360	22.6800	23.4360	22.6800	23.4360	23.4360	22.6800	23.4360	22.6800	23.4360	(56)
If cylinder contains dedicated solar storage													
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	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	282.5233	249.6862	264.7172	231.3179	223.2934	200.1737	196.7447	205.0911	207.9452	233.1265	249.4376	279.2388	(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	282.5233	249.6862	264.7172	231.3179	223.2934	200.1737	196.7447	205.0911	207.9452	233.1265	249.4376	279.2388	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2823.2957	(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	115.7705	102.7394	109.8500	98.0405	96.0765	87.6850	87.2491	90.0243	90.2690	99.3461	104.0653	114.6784	(65)

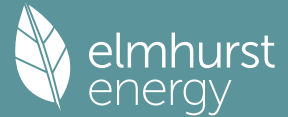
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	170.7080	188.9982	170.7080	176.3983	170.7080	176.3983	170.7080	170.7080	176.3983	170.7080	176.3983	170.7080	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	304.3743	307.5328	299.5736	282.6294	261.2404	241.1378	227.7080	224.5495	232.5087	249.4529	270.8419	290.9445	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	(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)	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	(71)
Water heating gains (Table 5)	155.6055	152.8861	147.6478	136.1673	129.1351	121.7848	117.2703	121.0004	125.3737	133.5297	144.5351	154.1377	(72)
Total internal gains	697.3114	716.0406	684.5530	661.8186	627.7071	605.9444	582.3099	582.8815	600.9042	620.3142	658.3988	682.4138	(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	11.3900	11.2829	0.3200	0.7000	0.7700	19.9493 (75)
Southwest	3.7800	36.7938	0.3200	0.7000	0.7700	21.5898 (79)

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Northwest			3.2800		11.2829		0.3200		0.7000		0.7700		5.7448 (81)	
Solar gains	47.2839	89.0765	144.5476	217.0987	277.8507	291.0969	274.2999	226.6439	169.3041	104.5607	58.1894	39.4595	(83)	
Total gains	744.5953	805.1171	829.1006	878.9173	905.5579	897.0413	856.6098	809.5254	770.2083	724.8749	716.5883	721.8733	(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	78.5473	78.8873	79.2303	80.9909	81.3525	83.2098	83.2098	83.5915	82.4568	81.3525	80.6326	79.9253	
alpha	6.2365	6.2592	6.2820	6.3994	6.4235	6.5473	6.5473	6.5728	6.4971	6.4235	6.3755	6.3284	
util living area	0.9969	0.9941	0.9881	0.9602	0.8728	0.6710	0.4951	0.5433	0.8030	0.9666	0.9929	0.9974	(86)
Living	20.0569	20.1794	20.3622	20.6483	20.8718	20.9822	20.9978	20.9962	20.9450	20.6779	20.3388	20.0514	
Non living	19.1706	19.3291	19.5639	19.9325	20.1955	20.3163	20.3271	20.3292	20.2805	19.9746	19.5441	19.1724	
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	20.5176	20.1794	20.3622	20.6483	20.8718	20.9822	20.9978	20.9962	20.9450	20.6779	20.3388	20.1841	(87)
Th 2	20.2909	20.2937	20.2966	20.3109	20.3137	20.3281	20.3281	20.3309	20.3223	20.3137	20.3080	20.3023	(88)
util rest of house	0.9960	0.9926	0.9847	0.9485	0.8385	0.6083	0.4208	0.4667	0.7467	0.9546	0.9906	0.9967	(89)
MIT 2	19.8442	19.3291	19.5639	19.9325	20.1955	20.3163	20.3271	20.3292	20.2805	19.9746	19.5441	19.3760	(90)
Living area fraction	FLA = Living area / (4) =												
MIT	20.0588	19.6001	19.8183	20.1606	20.4110	20.5285	20.5409	20.5418	20.4923	20.1987	19.7974	19.6335	(92)
Temperature adjustment	0.0000												
adjusted MIT	20.0588	19.6001	19.8183	20.1606	20.4110	20.5285	20.5409	20.5418	20.4923	20.1987	19.7974	19.6335	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9957	0.9905	0.9818	0.9455	0.8438	0.6275	0.4445	0.4911	0.7617	0.9521	0.9885	0.9958	(94)
Useful gains	741.4021	797.5073	813.9921	830.9876	764.0855	562.8875	380.7883	397.5309	586.7034	690.1648	708.3276	718.8738	(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	1617.6180	1502.4364	1355.3225	1121.0072	863.3401	574.4511	381.8580	399.4904	625.0469	951.3192	1269.6588	1556.9132	(97)
Space heating kWh	651.9047	473.7123	402.7498	208.8141	73.8454	0.0000	0.0000	0.0000	0.0000	194.2989	404.1585	623.5013	(98a)
Space heating requirement - total per year (kWh/year)	3032.9849												
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	651.9047	473.7123	402.7498	208.8141	73.8454	0.0000	0.0000	0.0000	0.0000	194.2989	404.1585	623.5013	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3032.9849												
Space heating per m2	(98c) / (4) =												22.3638 (99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	910.8291	717.0357	733.0525	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.8861	0.9259	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	807.1058	678.7208	678.7291	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	952.5897	909.7776	858.6423	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	104.7484	171.9063	133.8554	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction	fc = cooled area / (4) =												0.7005 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	18.3437	30.1045	23.4410	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement	71.8892 (107)												

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 %)													278.7211 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Cooling System Energy Efficiency Ratio (see Table 10c)													3.2600 (209)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	651.9047	473.7123	402.7498	208.8141	73.8454	0.0000	0.0000	0.0000	0.0000	194.2989	404.1585	623.5013	(98)
Space heating efficiency (main heating system 1)	278.7211	278.7211	278.7211	278.7211	278.7211	0.0000	0.0000	0.0000	0.0000	278.7211	278.7211	278.7211	(210)
Space heating fuel (main heating system)	233.8914	169.9593	144.4992	74.9186	26.4944	0.0000	0.0000	0.0000	0.0000	69.7108	145.0046	223.7008	(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	282.5233	249.6862	264.7172	231.3179	223.2934	200.1737	196.7447	205.0911	207.9452	233.1265	249.4376	279.2388	(64)
Efficiency of water heater	170.3422	170.3422	170.3422	170.3422	170.3422	170.3422	170.3422	170.3422	170.3422	170.3422	170.3422	170.3422	(216)
Fuel for water heating, kWh/month	165.8563	146.5792	155.4032	135.7960	131.0852	117.5127	115.4997	120.3995	122.0750	136.8578	146.4332	163.9282	(219)

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Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	5.6269	9.2345	7.1905	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	35.0433	31.6520	35.0433	33.9129	35.0433	33.9129	35.0433	35.0433	33.9129	35.0433	33.9129	35.0433	(231)
Lighting	43.4528	34.8594	31.3870	22.9955	17.7624	14.5120	16.2034	21.0618	27.3572	35.8942	40.5424	44.6604	(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												1088.1791	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												170.3422	
Water heating fuel used												1657.4258	(219)
Space cooling fuel												22.0519	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.8750)													
mechanical ventilation fans (SFP = 0.8750)												412.6069	(230a)
Total electricity for the above, kWh/year												412.6069	(231)
Electricity for lighting (calculated in Appendix L)												350.6886	(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												3530.9523	(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	1088.1791	0.1557	169.4764	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1657.4258	0.1410	233.7302	(264)
Space and water heating			403.2066	(265)
Space cooling	22.0519	0.1136	2.5056	(266)
Pumps, fans and electric keep-hot	412.6069	0.1387	57.2337	(267)
Energy for lighting	350.6886	0.1443	50.6152	(268)
Total CO2, kg/year			513.5611	(272)
EPD Dwelling Carbon Dioxide Emission Rate (DER)			3.7900	(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	1088.1791	1.5766	1715.6148	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1657.4258	1.5214	2521.6853	(278)
Space and water heating			4237.3002	(279)
Space cooling	22.0519	1.4189	31.2892	(280)
Pumps, fans and electric keep-hot	412.6069	1.5128	624.1917	(281)
Energy for lighting	350.6886	1.5338	537.8979	(282)
Total Primary energy kWh/year			5430.6790	(286)
Dwelling Primary energy Rate (DPER)			40.0400	(287)

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

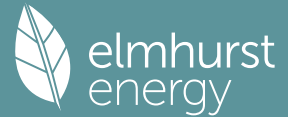
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	135.6200	(1b) x 2.8500	(2b) = 386.5170	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	135.6200			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 386.5170	(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)

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Number of flues attached to solid fuel boiler
Number of flues attached to other heater
Number of blocked chimneys
Number of intermittent extract fans
Number of passive vents
Number of flueless gas fires

0 * 20 = 0.0000 (6d)
0 * 35 = 0.0000 (6e)
0 * 20 = 0.0000 (6f)
4 * 10 = 40.0000 (7a)
0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.1035 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3535 (18)
Number of sides sheltered 1 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3270 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000
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												
	0.4169	0.4087	0.4005	0.3597	0.3515	0.3106	0.3106	0.3025	0.3270	0.3515	0.3678	0.3842
Effective ac	0.5869	0.5835	0.5802	0.5647	0.5618	0.5482	0.5482	0.5457	0.5535	0.5618	0.5677	0.5738

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			2.0000	1.0000	2.0000		(26)
TER Opening Type (Uw = 1.20)			18.4500	1.1450	21.1260		(27)
Basement Floor			71.3500	0.1300	9.2755		(28)
External Wall	128.1600	18.4500	109.7100	0.1800	19.7478		(29a)
Corridor	15.8500	2.0000	13.8500	0.1800	2.4930		(29a)
Exposed Ceiling to Corridor	24.0500		24.0500	0.1100	2.6455		(30)
Terrace Roof	2.7400		2.7400	0.1100	0.3014		(30)
Total net area of external elements Aum(A, m2)			242.1500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	57.5892		(33)

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

217.3095 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.8400	0.0500	0.4420
E3 Sill	7.8900	0.0500	0.3945
E4 Jamb	32.4600	0.0500	1.6230
E5 Ground floor (normal)	44.9700	0.1600	7.1952
E5 Ground floor (normal)	5.5600	0.1600	0.8896
E7 Party floor between dwellings (in blocks of flats)	44.9700	0.0700	3.1479
E7 Party floor between dwellings (in blocks of flats)	5.5600	0.0700	0.3892
E16 Corner (normal)	17.1000	0.0900	1.5390
E16 Corner (normal)	5.7000	0.0900	0.5130
E17 Corner (inverted - internal area greater than external area)	5.7000	-0.0900	-0.5130
E17 Corner (inverted - internal area greater than external area)	5.7000	-0.0900	-0.5130
E14 Flat roof	3.6700	0.0800	0.2936

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

15.4010 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 72.9902 (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
	74.8596	74.4291	74.0073	72.0256	71.6549	69.9290	69.9290	69.6093	70.5938	71.6549	72.4049	73.1890
Heat transfer coeff	147.8497	147.4193	146.9974	145.0158	144.6450	142.9191	142.9191	142.5995	143.5839	144.6450	145.3951	146.1792
Average = Sum(39)m / 12 =												145.0140

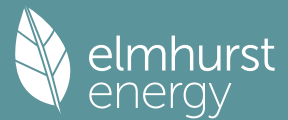
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.0902	1.0870	1.0839	1.0693	1.0665	1.0538	1.0538	1.0515	1.0587	1.0665	1.0721	1.0779
HLP (average)												1.0693
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9082 (42)
Hot water usage for mixer showers 72.9814 71.8847 70.2864 67.2286 64.9719 62.4553 61.0249 62.6110 64.3497 67.0518 70.1753 72.7018 (42a)
Hot water usage for baths 31.5076 31.0397 30.3807 29.1658 28.2560 27.2472 26.7023 27.3567 28.0691 29.1485 30.3885 31.4011 (42b)
Hot water usage for other uses 44.4133 42.7982 41.1832 39.5682 37.9532 36.3381 36.3381 37.9532 39.5682 41.1832 42.7982 44.4133 (42c)
Average daily hot water use (litres/day) 136.8747 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	148.9023	145.7226	141.8504	135.9625	131.1811	126.0407	124.0654	127.9209	131.9870	137.3835	143.3621	148.5162
Energy conte	235.8249	207.5070	218.0188	186.1259	176.5950	154.9817	150.0463	158.3927	162.7532	186.4281	204.2456	232.5404
Energy content (annual)										Total = Sum(45)m =		2273.4597
Distribution loss (46)m = 0.15 x (45)m	35.3737	31.1261	32.7028	27.9189	26.4892	23.2473	22.5069	23.7589	24.4130	27.9642	30.6368	34.8811
Water storage loss:												
Store volume												180.0000
a) If manufacturer declared loss factor is known (kWh/day):												1.5520
Temperature factor from Table 2b												0.5400
Enter (49) or (54) in (55)												0.8381
Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total heat required for water heating calculated for each month	285.0675	251.9843	267.2615	233.7801	225.8376	202.6359	199.2890	207.6354	210.4074	235.6708	251.8998	281.7831
WWHRS	-33.3641	-29.5074	-30.8985	-25.5852	-23.8445	-20.4039	-19.1254	-20.3379	-21.1106	-24.8871	-28.1941	-32.7462
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

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Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	251.7035	222.4768	236.3630	208.1949	201.9932	182.2321	180.1636	187.2975	189.2967	210.7837	223.7057	249.0369 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											2543.2475 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	117.8059	104.5779	111.8854	100.0102	98.1120	89.6548	89.2845	92.0597	92.2388	101.3815	106.0350	116.7138 (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	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	145.4119	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	165.7367	183.4942	165.7367	171.2612	165.7367	171.2612	165.7367	165.7367	171.2612	165.7367	171.2612	165.7367	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	304.3743	307.5328	299.5736	282.6294	261.2404	241.1378	227.7080	224.5495	232.5087	249.4529	270.8419	290.9445	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	37.5412	(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)	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	-116.3295	(71)
Water heating gains (Table 5)	158.3413	155.6219	150.3836	138.9031	131.8709	124.5205	120.0061	123.7362	128.1094	136.2654	147.2709	156.8734	(72)
Total internal gains	698.0759	716.2724	685.3174	662.4173	628.4716	603.5431	580.0743	580.6459	598.5029	621.0786	658.9976	683.1782	(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				11.3900	11.2829	0.6300	0.7000	0.7700	39.2752	(75)			
Southwest				3.7800	36.7938	0.6300	0.7000	0.7700	42.5049	(79)			
Northwest				3.2800	11.2829	0.6300	0.7000	0.7700	11.3101	(81)			
Solar gains	93.0902	175.3693	284.5782	427.4131	547.0186	573.0971	540.0279	446.2051	333.3174	205.8539	114.5604	77.6858	(83)
Total gains	791.1660	891.6417	969.8956	1089.8304	1175.4902	1176.6402	1120.1022	1026.8510	931.8204	826.9325	773.5580	760.8640	(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	55.3706	55.5323	55.6917	56.4527	56.5974	57.2809	57.2809	57.4093	57.0157	56.5974	56.3054	56.0034
alpha	4.6914	4.7022	4.7128	4.7635	4.7732	4.8187	4.8187	4.8273	4.8010	4.7732	4.7537	4.7336
util living area	0.9967	0.9937	0.9865	0.9581	0.8775	0.7105	0.5456	0.6102	0.8520	0.9733	0.9936	0.9973 (86)
MIT	19.5003	19.6718	19.9504	20.3632	20.7187	20.9293	20.9841	20.9736	20.8232	20.3727	19.8782	19.4818 (87)
Th 2	20.0089	20.0115	20.0140	20.0260	20.0282	20.0387	20.0387	20.0407	20.0347	20.0282	20.0237	20.0190 (88)
util rest of house	0.9958	0.9919	0.9823	0.9441	0.8368	0.6272	0.4341	0.4961	0.7887	0.9617	0.9913	0.9965 (89)
MIT 2	18.2514	18.4722	18.8286	19.3538	19.7739	19.9934	20.0327	20.0294	19.8996	19.3741	18.7453	18.2347 (90)
Living area fraction	18.6494	18.8545	19.1861	19.6755	20.0750	20.2916	20.3359	20.3303	20.1939	19.6924	19.1063	18.6321 (91)
MIT	18.6494	18.8545	19.1861	19.6755	20.0750	20.2916	20.3359	20.3303	20.1939	19.6924	19.1063	18.6321 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6494	18.8545	19.1861	19.6755	20.0750	20.2916	20.3359	20.3303	20.1939	19.6924	19.1063	18.6321 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9938	0.9888	0.9774	0.9378	0.8390	0.6505	0.4696	0.5321	0.8006	0.9565	0.9883	0.9949	(94)
Ext temp.	786.2969	881.6440	948.0002	1022.0862	986.2174	765.4463	525.9552	546.3580	745.9986	790.9439	764.4797	756.9578	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Space heating kWh	2121.5599	2057.1602	1864.8264	1562.6112	1211.3982	813.4426	533.9273	560.4618	874.9867	1315.1643	1745.6638	2109.6776	(97)
Space heating requirement - total per year (kWh/year)	993.4357	789.9469	682.1187	389.1780	167.5346	0.0000	0.0000	0.0000	0.0000	390.0200	706.4526	1006.4236	(98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)	993.4357	789.9469	682.1187	389.1780	167.5346	0.0000	0.0000	0.0000	0.0000	390.0200	706.4526	1006.4236	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	993.4357	789.9469	682.1187	389.1780	167.5346	0.0000	0.0000	0.0000	0.0000	390.0200	706.4526	1006.4236	(98c)
Space heating per m2	(98c) / (4) =											37.7902	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)	
Fraction of space heat from main system(s)												1.0000 (202)	
Efficiency of main space heating system 1 (in %)												92.3000 (206)	
Efficiency of main space heating system 2 (in %)												0.0000 (207)	
Efficiency of secondary/supplementary heating system, %												0.0000 (208)	
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	993.4357	789.9469	682.1187	389.1780	167.5346	0.0000	0.0000	0.0000	0.0000	390.0200	706.4526	1006.4236	(98)

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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)	1076.3117	855.8472	739.0235	421.6446	181.5109	0.0000	0.0000	0.0000	0.0000	422.5569	765.3874	1090.3831	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	251.7035	222.4768	236.3630	208.1949	201.9932	182.2321	180.1636	187.2975	189.2967	210.7837	223.7057	249.0369	(64)
Efficiency of water heater	86.8206	86.6525	86.2954	85.4416	83.6434	79.8000	79.8000	79.8000	79.8000	85.4201	86.4550	86.8569	(216)
Fuel for water heating, kWh/month	289.9122	256.7461	273.8998	243.6693	241.4932	228.3610	225.7689	234.7086	237.2140	246.7612	258.7540	286.7211	(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	7.0685	7.3041	7.0685	7.3041	7.0685	(231)
Lighting	34.4368	27.6265	24.8746	18.2242	14.0769	11.5009	12.8414	16.6917	21.6809	28.4466	32.1303	35.3939	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-34.8298	-50.8027	-75.4928	-87.8005	-97.1417	-91.4984	-90.3251	-84.0411	-73.3961	-59.3493	-38.8734	-29.9134	(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)	-14.8138	-31.6219	-63.7344	-97.0505	-129.6606	-130.8280	-129.3416	-108.9388	-79.0606	-45.7113	-19.9299	-11.6840	(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												5552.6651	(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												3024.0094	(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)												277.9247	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1675.8396	(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												7264.7596	(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	5552.6651	0.2100	1166.0597 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3024.0094	0.2100	635.0420 (264)
Space and water heating			1801.1016 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	277.9247	0.1443	40.1131 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-813.4643	0.1339	-108.9244
PV Unit electricity exported	-862.3753	0.1255	-108.2133
Total			-217.1377 (269)
Total CO2, kg/year			1636.0063 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.0600 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	5552.6651	1.1300	6274.5116 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3024.0094	1.1300	3417.1306 (278)
Space and water heating			9691.6421 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	277.9247	1.5338	426.2903 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-813.4643	1.4948	-1215.9990
PV Unit electricity exported	-862.3753	0.4606	-397.1995
Total			-1613.1985 (283)
Total Primary energy kWh/year			8634.8346 (286)
Target Primary Energy Rate (TPER)			63.6700 (287)

Appendix F

BRUKL – Be Green

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 type etc.)	Model total floor area	Number of units	Total area represented by model	TER	Energy saving/generation technologies (-)	DER	DER	DER	Target Fabric Energy Efficiency	Dwelling Fabric Energy Efficiency	Part L 2021 CO ₂ emissions	Energy saving/generation technologies	Part L 2021 CO ₂ emissions	Part L 2021 CO ₂ emissions with Notional PV savings included	'Be Lean' savings	Part L 2021 CO ₂ emissions	Part L 2021 CO ₂ emissions with Notional PV savings included	'Be Clean' savings	Part L 2021 CO ₂ emissions	'Be Green' savings
	(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.)
1 Bed 1st Floor Fl	81.29	1	81.29	14.13	-130.25	13.64	13.64	4.65	41.47	42.42	1,149	-130	1,109	979	170	1,109	979	0	378	601
1 Bed 1st Floor Fl	61.3	1	61.3	15.93	-98.25	15.61	15.61	5.26	42.14	44.59	977	-98	957	859	118	957	859	0	322	536
1 Bed 2nd Floor F	81.29	1	81.29	14.63	-130.25	13.95	13.95	4.73	43.70	43.73	1,189	-130	1,134	1,004	186	1,134	1,004	0	385	619
1 Bed 2nd Floor F	61.3	1	61.3	15.57	-98.25	15.21	15.21	5.16	40.52	42.86	954	-98	932	834	120	932	834	0	316	518
1 Bed 3rd Floor Fl	60.18	1	60.18	19.39	-96.46	18.16	18.16	5.86	57.57	53.27	1,167	-96	1,093	996	170	1,093	996	0	353	644
1 Bed 3rd Floor Fl	53.86	1	53.86	20.80	-86.34	19.30	19.30	6.25	61.47	56.99	1,120	-86	1,039	953	167	1,039	953	0	337	617
1 Bed Ground Flo	54.43	1	54.43	17.97	-86.34	16.96	16.96	5.64	48.90	50.30	978	-86	923	837	141	923	837	0	307	530
2 Bed Ground Flo	71.35	1	71.35	17.56	-114.34	16.29	16.29	5.78	54.03	52.92	1,253	-114	1,162	1,048	205	1,162	1,048	0	412	636
3 Bed Basement F	135.62	1	135.62	12.59	-217.14	11.21	11.21	3.79	42.82	40.77	1,707	-217	1,520	1,303	404	1,520	1,303	0	514	789
Sum		9	661	15.9	-130.2	14.9	14.9	5.0	47.1	46.4	10,494	-1,058	9,870	8,813	1,682	9,870	8,813	0	3,324	5,489

NON-RESIDENTIAL CO₂ ANALYSIS (PART L2)

				Baseline		'Be Lean'	'Be Clean'	'Be Green'			Baseline		'Be Lean'			'Be Clean'			'Be Green'	
Building Use	Model Area	Number of units	Total area represented by model	BRUKL TER	BRUKL Displaced electricity (-)	BRUKL BER	BRUKL BER	BRUKL BER			Part L 2021 CO ₂ emissions	Energy saving/generation technologies	Part L 2021 CO ₂ emissions	Part L 2021 CO ₂ emissions with Notional PV savings included	'Be Lean' savings	Part L 2021 CO ₂ emissions	Part L 2021 CO ₂ emissions with Notional PV savings included	'Be Clean' savings	Part L 2021 CO ₂ emissions	'Be Green' savings
	(m ²)		(m ²)	(kgCO ₂ / m ²)	(kWh / m ²)	(kgCO ₂ / m ²)	(kgCO ₂ / m ²)	(kgCO ₂ / m ²)			(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)
	1162.42	1	1162.42	16.22	0.00	13.14	11.23	10.46			18.854	0.00	15,274.20	15,274	3,580	13,054	13,054	-2,220	12,159	895

Sum	1	1,162	16.2	0.0	13.1	11.2	10.5		18,854	0	15,274	15,274	3,580	13,054	13,054	-2,220	12,159	895
SITE-WIDE ENERGY CONSUMPTION AND CO ₂ ANALYSIS																		
Total Sum		1,823	-	-	-	-	-		29,349	-1,058	25,144	24,087	5,262	22,924	21,866	-2,220	15,483	6,384

Part L 2021 Performance

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	10.5	
After energy demand reduction (be lean)	8.8	
After heat network connection (be clean)	8.8	
After renewable energy (be green)	3.3	

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	1.7	16%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	5.5	52%
Cumulative on site savings	7.2	68%
Annual savings from off-set payment	3.3	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	100	-
Cash in-lieu contribution (£)	9,473	

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

Non-residential

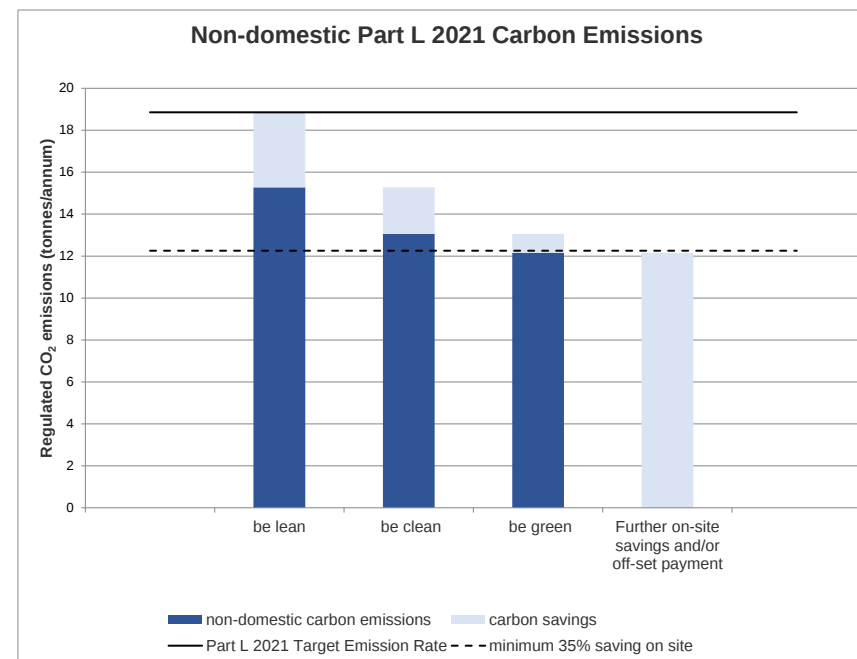
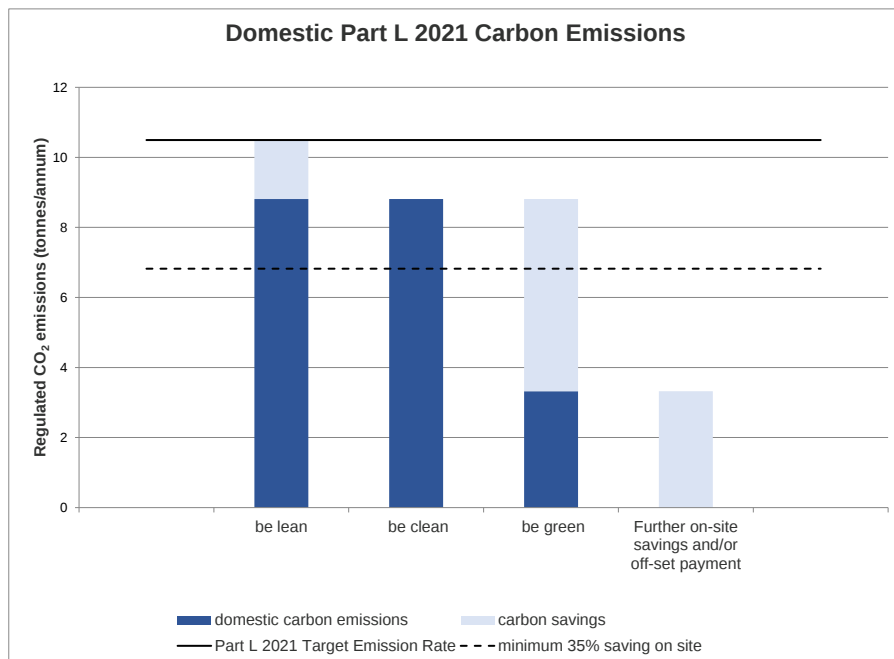
Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential buildings

	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO ₂ per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	18.9	
After energy demand reduction (be lean)	15.3	
After heat network connection (be clean)	13.1	
After renewable energy (be green)	12.2	

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-residential buildings

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	3.6	19%
Be clean: savings from heat network	2.2	12%
Be green: savings from renewable energy	0.9	5%
Total Cumulative Savings	6.7	36%
Annual savings from off-set payment	12.2	-
	(Tonnes CO ₂)	
Cumulative savings for off-set payment	365	-
Cash in-lieu contribution (£)	34,653	

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



SITE-WIDE

	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	29.3		
Be lean	24.1	5.3	18%
Be clean	21.9	2.2	8%
Be green	15.5	6.4	22%
Total Savings	-	13.9	47%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	464.5	-

	Target Fabric Energy Efficiency (kWh/m ²)	Dwelling Fabric Energy Efficiency (kWh/m ²)	Improvement (%)
Development total	47.06	46.44	1%

	Area weighted non-residential cooling demand (MJ/m ²)	Total non-residential cooling demand (MJ/year)
Actual		
Notional		

EUI & space heating demand (predicted energy use)

Residential

Building type	EUI (kWh/m ² /year) (excluding renewable energy)	Space heating demand (kWh/m ² /year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m ² /year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance(kWh/m ² /year) (excluding renewable energy)	Methodology used (e.g. 'be seen' methodology or an alternative predictive energy modelling methodology)	Explanatory notes (if expected performance differs from the Table 4 values in the guidance)
Residential	0	0	35	15	& dwellings / & Landlord Circulation	

Non-residential

[illegible]

[illegible]